



The
University
Of
Sheffield.

**Exploring Organisational Factors
Contributing to Adverse Events in Maternity
Care: A case study of a Northern Nigerian
teaching hospital**

By

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Author's Declaration

I declare that this thesis is my own account of my research and contains as its main content work, which has not previously been submitted for a degree at any tertiary education institution.



Habiba Aminu Saddiq

Abstract

In Sub-Saharan Africa (SSA), there has been an increased number of hospital births following sustained efforts to promote births in hospitals (rather than the community), as part of a strategy to address high maternal and infant mortality. However, many patient safety researchers have indicated growing concern that a significant number of women are at risk of unintentional harm from the care they receive in hospitals. Improving the safety of birth care requires understanding the contributory factors to adverse events (AEs) within the hospital setting. Existing literature has described the contributory factors but often lacks sufficient detail on how and why these occur.

Methods

A systematic review of the literature to understand the type of AEs, their contributory factors and the extent to which identified AEs were considered preventable informed this study's focus and approach. This study, guided by a systems approach, proactively sought to understand latent conditions underpinning contributory factors to AEs within the O&G department of one Northern Nigerian Teaching Hospital and identify solutions that could be transferable to similar settings. A combination of qualitative methods was used to gain in-depth, rich data, including observations (126 hours) and in-depth interviews (32) with various staff members (doctors, midwives/nurses and senior hospital managerial staff) to reflect a wide range of perspectives and experiences. A thematic analysis of the data was undertaken.

Findings

The findings add to existing knowledge in two ways. Firstly, they affirm existing literature on the contributory factors to AEs in SSA hospitals. Insufficiencies in building structures, limited resources (material and human), and organisational culture challenges impede safe care for women and contribute to potential and actual AEs. The findings then provided an additional layer of understanding of what underpins these AEs contributory factors. The insufficient availability of resources was reinforced by an inefficient resource management system. The poor patient safety culture within the case study context was influenced by an inadequate standardisation in care processes and enforcement mechanisms, a lack of a performance management system, professional hierarchies and power conflicts, and poor women-centred communication. Secondly, the study provided an in-depth insight into AE reporting and management processes. There were three forms of staff responses to AEs and/or their contributory factors in the O&G department. Not all of them will proactively identify/address AEs and/or their contributory factors.

These responses are influenced by many elements of organisational processes/systems and patient safety culture within the department and broader hospital.

Conclusions

Applying the system lens enhanced our understanding of the system weaknesses that underpin the contributory factors to AEs within a case study Nigerian hospital O&G department. While the findings highlight the need for increased provision and policies at the health system level, the study also proposes strategies that could address some of the issues currently compromising patient safety, which do not rely on additional funding. It is intended that the findings will support a proactive approach to managing risks in this setting, with much of the learning also potentially transferable to other hospitals and contexts.

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Finally, I would like to thank the Commonwealth Scholarship Commission UK for financial support towards this PhD.

Dedication

This PhD work and any of my life successes are dedicated to my lovely father, Malam Aminu Usman, who championed girls' rights and education and ensured that his daughters were educated, even after he passed on. May your gentle soul rest in perfect peace Baba. I pray to almighty Allah to let you know that your daughters are in the position you wanted them to be.

This thesis is also dedicated to my little sister, whose adverse events (AEs) experience has influenced this thesis. The AEs led to the loss of her termed baby and almost her life from potential factors within the birthing hospital. It should be a consolation for you and others with similar experience that the findings of this research may contribute to making some difference for other new mothers and their babies.

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List of Abbreviations

Abbreviation	Term
AEs	Adverse events
O&G	Obstetrics and Gynaecology
CMD	Chief Medical Director
CMAC	Chair Medical Advisory committee
SR	Senior registrar/resident
JR	Junior registrar/resident
NO	Nursing officer
SNO	Senior nursing officer
PNO	Principal nursing officer
ACNO	Assistant chief nursing officer
CNO	Chief nursing officer
USAID	United State Agency For International Development
HOD	Head of department
MgSO ₄	Magnesium sulphate
SSA	Sub-Saharan Africa/African
CTG	Cardiotocograph
MVA	Manual vacuum aspiration
SOPs	Standard operation procedures
IUFD	Intrauterine foetal death
O&G	Obstetrics and Gynaecology
UN	United Nations
EmOC	Emergency obstetric care
CEmOC	Comprehensive emergency obstetric care
BEmOC	Basic emergency obstetric care
NHS	National Health Service

CHAPTER 1: INTRODUCTION AND BACKGROUND

This research presented in this thesis explored organisational factors contributing to adverse events (AEs) in women attending hospital for births within one Obstetrics and Gynaecology (O&G) department of a Northern Nigerian teaching hospital. The research used qualitative methods to gain a deep understanding of how and why contributory factors to AEs within the organisation occur. While there are many factors contributing to AEs, the focus in this study was on those relating to the organisation and its systems, not the wider external environment or the women. This study focussed on contributory factors for AEs and ways of reporting them but did not examine actual AEs.

This introduction chapter begins with a brief background of the research need and provides information on the national context in Nigeria, the chosen country for study. It also provides an overview of the Nigerian healthcare system to provide a broader understanding of the context of this research. It then outlines my personal motivations for this research. The final section presents the research questions, aims, objectives and outlines the structure of the remaining thesis.

1.1 Background to the research

The Nigerian government and private aid organisations are investing funds in programmes designed to encourage women to attend hospitals for antenatal and childbirth care to reduce maternal and infant mortality. This is essentially supporting the Sustainable Development Goal number 3, which targets reducing maternal mortality to less than 70 per 100,000 live births by 2030 [1]. However, significant numbers of women suffer from unintended harm in hospital settings, known as adverse events (AEs), some of which are known to be preventable with typical/ordinary standards of care [2, 3]. Harm from AEs can result from direct “commission” (doing something wrong) or “omission” (not doing the right thing), resulting in an undesirable consequence for the patient/women [4]. Such harm can vary in severity from mild to severe, with temporary or permanent injury or even death [5].

The occurrence of AEs has serious consequences for those affected and their families. These include increased suffering, and more prolonged or multiple hospital admission. Also, there are implications for clinical practice, including loss of trust in the healthcare system, medical lawsuits, and increased burden on the health services [6]. In some contexts, the health system or facility also faces enormous financial consequences due to AEs. A specific example of this is highlighted in the National Practitioner data bank

and Federal Repository with 9,744 cases of surgical events identified to have cost the US about \$1.3billion between 1990- 2010 in the settlement of claims [7].

Adverse events are a global phenomenon, and neither new nor rare. For example, the widely publicised medical scandal resulting from the public inquiry into the 'higher than expected number of deaths' at Mid Staffordshire NHS Trust in the UK has highlighted that even today and even in developed health systems, there is the need to pay greater attention to patient safety in hospitals [8]. Back in 1991, a prominent Harvard medical practice study found that about 1 in 200 patients admitted had suffered AEs [3]. A more recent extensive US survey found that nearly one in three respondents reported experiencing a medical mistake either personally or among relatives or friends (Wolters Kluwer [9]. Medical errors are noted to rank third in the leading causes of death in the US [10]. A study in the UK found that in the region of 10% of patients suffered an adverse event, and a third of these resulted in disability ranging from moderate to severe and even death. The authors concluded that more than half (57%) were preventable, given a typical/routine standard of hospital care, [11]. Similarly, in a large study of patient records in 13 public acute hospitals in New Zealand, over one third of 850 (315) of the identified hospital events were found to be preventable [12].

Despite the considerable health and economic impact of AEs, limited research has been carried out on hospital AEs in countries with less developed health systems, such as Sub-Saharan Africa. Greater incidence of patient safety errors may be expected where health system infrastructures are poor and safety standards are low. In support of this, a large multi-country study of hospitals covering eight developing countries, including two from the Sub-Saharan African region (Egypt, Jordan, Kenya, Morocco, Tunisia, Yemen, Sudan and South Africa) reviewed 15548 patients records, and found AEs ranging between 2.5% -18.4% per country, with the majority (83%) rated as preventable [5].

This PhD research focuses on maternity care AEs, with two lives (mother and baby) potentially affected. It is known that the majority of maternal deaths occur around labour, delivery and the 24-hours postpartum, with about five medical conditions (postpartum haemorrhage, puerperal sepsis, pre-eclampsia, and eclampsia, obstructed or prolonged labour and complications of unsafe abortion) accounting for up to 60% of these mortalities globally [13, 14]. It has been estimated that around 830 women are dying daily from preventable causes during pregnancy and childbirth, most of which occur in lower resource settings [15]. In Nigeria figures indicate that nearly half of maternal deaths occur

in hospital settings [16]. It has been estimated that when a mother dies, the risk of her infant dying in the first week of life could be increased by up to six-fold [17].

A life-threatening situation may develop rapidly and without warning, even in previously uncomplicated pregnancies [18, 19]. The unpredictable nature of pregnancy and childbirth makes hospital births recommended in order to receive prompt, effective, and lifesaving interventions. However, without necessary provision in healthcare facilities, there is increased risk of AEs for women and their babies [20]. An adverse event experience could also discourage women from using healthcare services designed to improve maternal and infant health [21]. Therefore, it is vital to ensure the safety of care during childbirth. Knowing the underlying factors contributing to AEs would help determine the necessary actions and changes to maternity care, which might require little or no extra cost [22].

While studies of developing countries provided valuable insights regarding the extent and seriousness of the problem, there is an urgent need to understand better these events in African contexts [23]. Furthermore, the study did not include Nigeria, potentially reducing the transferability of the findings to that context. A lack of literature regarding patient safety issues in Nigeria was emphasised in a study examining information disclosure by doctors [24]. The Nigerian health system was described as weak and deteriorating, with a falling standard of health care in another study carried out in 2016 [25]. Therefore, AEs in Nigeria merits exploration. The earlier mentioned studies provide some insight into the type and scale of AEs but there is still a gap in our understanding of the extent of preventability and contributory factors in Nigeria. This knowledge is crucial in developing interventions to minimise the risk of AEs in labour and delivery units. This would considerably strengthen Nigerian maternity care and support achieving the United Nations sustainable development goal number 3, which encompasses decreasing maternal and infant deaths [26].

1.2 Overview of the Nigerian Health System.

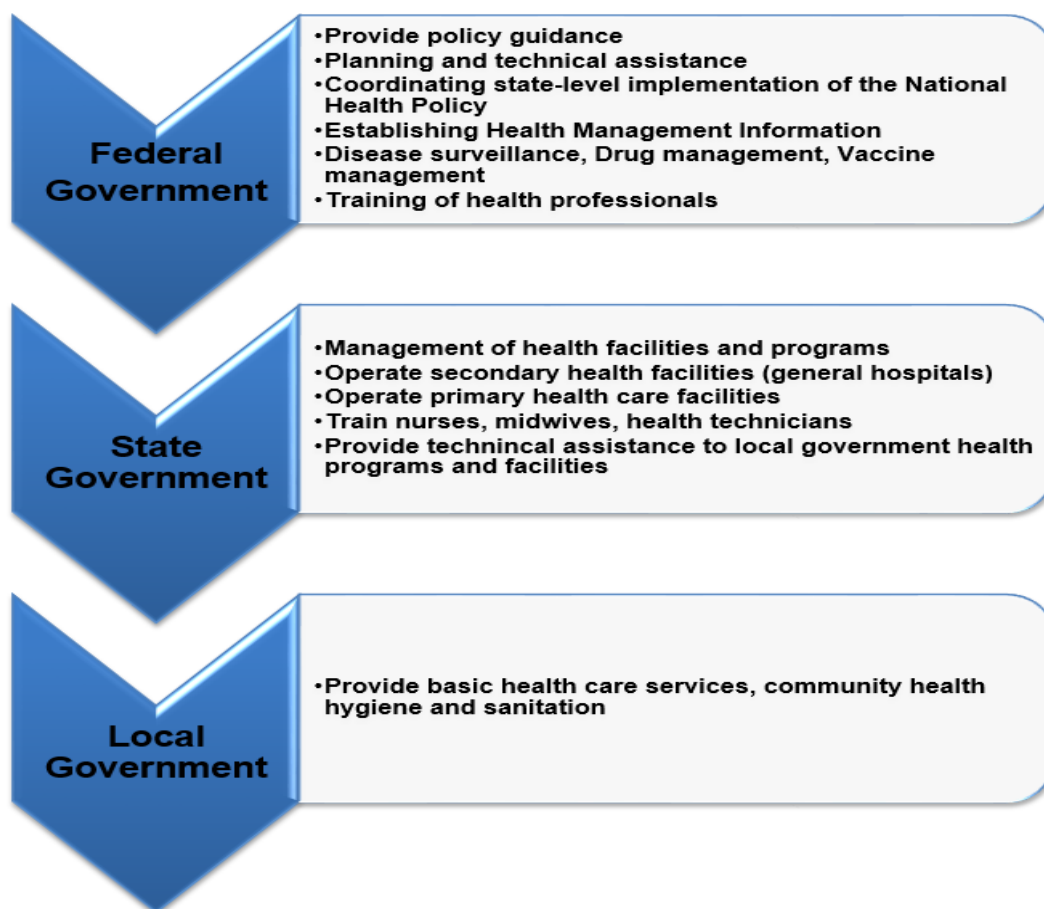
The justification for choosing Nigeria as a research context includes having the largest population in Africa and insufficient literature on maternity care AEs. It was also a setting of personal interest being my home country. In this section, I will discuss the Nigerian Health system, to provide an understanding of how healthcare services are managed. Nigeria is located on the west coast of Africa, sharing boundaries with Benin, Niger, Cameroun and Chad. It has an estimated population of 198 million, the most populous in Africa and is ranked seventh most populous in the world. It operates a three-tiered federal system of governance, including Federal, the 36 states and the Federal Capital territory (FCT) and 774 Local Government Area (LGA's). As shown in Figure 1, the country is divided into six geo-political zones comprising north East, North West, North Central, South East, South West and South. These are essentially categorised states with similar cultures, ethnic groups and a common history.

Figure 1: Map of Nigeria



According to the Nigerian National Strategic Healthcare Development policy document [27], the country runs a “pluralistic healthcare system” with both public and private sectors providing care (private sector care will not be discussed here as the focus is on public hospitals). The country's constitution places the responsibility for public healthcare delivery and its management on the three tiers of government (Federal, State and Local Government). Figure 2 shows a summary of the three categories of Nigerian healthcare system and their functions. The National Health Act (NHAct) defines the organisation of the care system, service providers, the relationship between various tiers, and a framework for the development of National Health Policy. Hospitals are graded into three levels (tertiary, secondary and primary). The Federal Government is responsible for the tertiary hospitals, comprising higher-level specialist facilities; teaching, federal medical centres and single-speciality (e.g. neuropsychiatrist, ophthalmic, orthopaedics) hospital. The State Governments run the general hospitals, and intermediary services. The primary centres’ much lower-level services, are overseen by local government. Referrals are made to higher-level facilities based on a patient’s clinical need.

Figure 2: Levels of Healthcare System and their functions



Adapted from the website of Federal Ministry of Health Nigeria.

In principle, patients should access the healthcare service from the lower level and move up to the tertiary level depending on their condition, but in practice, it is usually a matter of preference and affordability. The system can be characterised as a “pay at the point of service” [28]. While the government is responsible for building the facilities and providing resources (material and human), service users are expected to pay for some of the consumables and services, such as surgery, ultrasound, diagnostic investigations and admission. The fees are generally subsidised compared to the private hospitals, but payment has been an area of difficulty for people on lower incomes.

The Federal Ministry of Health's website shows that Nigeria currently has 20 teaching hospitals, 22 federal medical centres and 13 speciality hospitals. However, one hospital known to be a teaching hospital for the past six years has been omitted from the list. Therefore, these figures may be inaccurate. One of the teaching hospitals in the northern part of the country has been selected for this study. The justification for selecting this facility will be discussed in chapter 3.

1.3 Personal motivations for the research

Prior to commencing this study, I was a lecturer in the Nursing Science Department in Nigeria, teaching undergraduate nursing students. Before moving to the lecturing position, I have worked in two different public hospitals, mainly in the Emergency and Obstetrics and Gynecology units. My interest in understanding and improving patient safety developed while working as a trainee student nurse/midwife and later hospital staff. Several incidents occurred whereby patient safety was compromised, and I considered some of these situations avoidable. This issue had always been an area of concern for me. Feeling something could be done to mitigate some of the avoidable situations, I took the lecturing position. I saw it as an opportunity to introduce some changes in the nurses/midwives' practices so that patient safety could improve.

A couple of years after, I began wondering that some of the situations compromising patient safety, such as insufficient resources, were beyond the control of the potential healthcare personnel that I was working to educate. I thought it would be helpful to understand what factors within healthcare organisations were undermining patient safety.

1.4 Research questions, aims and objectives

The research questions, aims and objectives were informed by a systematic review presented in chapter two. The findings from the systematic review highlighted the need to focus this study on factors within the organisation/management that contribute to AEs.

Research questions

1. What forms of organisational and/or management related factors potentially contribute to AEs in Nigerian hospital maternity services?
2. How are the potential and/or actual contributory factors of AEs identified, reported and managed?

Aims

This study aims to understand the organisational and/or management-related factors contributing to AEs within a case study hospital maternity department in Nigeria.

Objectives

1. To observe the activities of frontline maternity staff in a hospital in Nigeria, to examine the systems, processes and actions that could and/or potentially result in AEs.
2. To examine the processes of identification, documentation, reporting and managing AEs in a Nigerian hospital maternity service.
3. To explore frontline maternity staff and hospital managers' views on their experiences of AEs, potential contributory factors and systems to manage AEs.

1.5 Thesis structure

There are five chapters in this thesis as shown in Table 1, beginning with the introduction and background (Chapter One) outlined above, which introduces the need and justification for undertaking this study. It then provides an overview of the Nigerian health system, researcher's motivation for the study and the research questions, aims and objectives.

Chapter two presents a systematic review, which informed the research questions and focus.

Chapter three describes the methodological approach and methods employed. It provides the philosophical assumptions underpinning the research, justification for adopting a qualitative case study design, and details of the data collection methods and data analysis, as well as discussing ethical and rigour considerations.

Chapter four is presented in three sections. The first section provides an overview of the context in which AEs and their contributory factors occur. The second section presents the findings relating to the contributory factors for AEs, providing a deeper understanding of how and why they occur. The last section presents findings relating to the system for reporting AEs within the hospital studied, including facilitators and barriers to the reporting of AEs.

The discussion in chapter five focuses on the contribution of the findings in relation to previous literature. This is followed by consideration of the strengths and limitations of the study and implications for practice and policy as well as research.

Table 1 Showing thesis's structure

Thesis structure in chapters				
1	2	3	4	5
Introduction	Literature	Methodology & methods	Findings	Discussion
<ul style="list-style-type: none"> □ Background to the research. □ Overview of the Nigerian health system. □ Personal motivations for the research. □ Research aims, questions and objectives. □ Thesis structure 	<ul style="list-style-type: none"> □ Review aims and questions. □ Review methods □ Review results. □ Review discussion. □ Review gaps. 	<ul style="list-style-type: none"> □ Research questions, aims and objectives. □ Theoretical underpinnings. □ Qualitative case study design. □ Data collection methods □ Data analysis. □ Member checking. □ Ethical consideration. 	<ul style="list-style-type: none"> □ Understanding the context of adverse events (AEs). <ul style="list-style-type: none"> ○ General physical layout of the hospital. ○ General organisational processes of the hospital. ○ Reporting and learning from AEs. □ Factors contributing to AEs. <ul style="list-style-type: none"> ○ Building and design. ○ Equipment supplies and services. ○ Staffing levels. ○ Organisational culture. □ AEs reporting and management. <ul style="list-style-type: none"> ○ Processes for reporting and managing AEs. ○ Factors influencing AEs reporting and managements processes. 	<ul style="list-style-type: none"> □ Micro/clinical team context level. □ Meso/organisational context level □ Macro/health system context level. □ Strengths and limitations of the study. □ Implications of the findings for micro, meso and macro context. □ Implications for future research. □ Conclusion.

CHAPTER 2: SYSTEMATIC REVIEW

The previous chapter highlighted that little is known about the types or the extent of preventable and contributory factors to adverse events (AEs) in Nigerian maternity care. This is despite the high level of maternal morbidity and mortality occurring in such hospitals and the considerable efforts being made to reduce them. This systematic review was conducted to identify and synthesise available evidence, which might be applicable to a Nigerian context. Other researchers have identified a dearth of literature on patient safety in Nigeria [29]. This systematic review was conducted at the start of the PhD between November 2015 and June 2016. This was then updated between April and May 2019.

2.1 Research aim and questions

The aim of the review was to identify, examine, synthesise and critically appraise the quantity, quality, characteristics and gaps in literature relating to AEs in maternity care in Sub-Saharan Africa, and to examine how it might be applicable to AEs in Nigeria.

The review addressed the following questions:

1. What types of AEs occur in maternity care?
2. What are the contributory factors to AEs in maternity?
3. What is the extent of their preventability?

2.2 Review methods

2.2.1 Eligibility criteria

A review protocol was developed, which sets out the parameters for the literature to be included and excluded. The pre-defined inclusion and exclusion criteria were developed from the PICOS framework [30]. Criteria for inclusion are detailed in Table 2. Primary criteria for inclusion include empirical studies using any research design in the population of women in Sub-Saharan Africa who delivered in a hospital-based maternity unit, those collecting information from healthcare providers (doctors, nurses/midwives and managers), published in the English language between the years 2005 and 2019.

Table 2: Summary of eligibility criteria

	INCLUSION	EXCLUSION
Population	<ol style="list-style-type: none"> 1. Studies looking at childbirth care/outcomes in a hospital-based maternity unit. 2. Doctors, nurses/midwives and managers working in hospital based maternity unit 	<ol style="list-style-type: none"> 1. Women who delivered outside a hospital-based maternity unit (e.g. emergency unit or home). 2. Other patient population and co-morbidities. 3. Doctors, nurses/midwives and managers working in hospital but not in a maternity-related unit. 4. Healthcare assistants, students, patients and patient relatives.
Intervention	Any intervention targeting improving patient safety/quality in a hospital-based maternity unit.	Intervention targeting other outcomes.
Comparison	Studies with or without a comparator.	
Outcome	Studies using any measure of patient safety/quality in a hospital-based maternity unit.	<ol style="list-style-type: none"> 1. Studies using any measure of patient safety/quality outside hospital-based maternity unit. 2. Non-patient safety-related studies.
Study design	Empirical studies using any design, including quantitative, qualitative, reporting epidemiology.	Non-empirical studies including editorials, commentaries, reviews, abstracts, technical reports and systematic reviews (Note: the systematic reviews were used to identify reference list and citations checks for primary studies).
Context	Studies from Sub-Saharan African countries.	Studies from non-sub-Saharan African countries.
Language	Studies published in English.	Studies in languages other than English.
Date	Studies published between January 2005 and May 2019.	Studies published before January 2005 or after May 2019.

2.2.2 Identification of literature

An extensive search was conducted in electronic databases, including EMBASE, SCOPUS and CINAHL. Searching in electronic databases has the benefit of being able to limit the searches by date of publication, and they provide a systematic way of finding titles and abstracts of potentially relevant articles [31, 32].

2.2.3 Search strategy

A preliminary search in the University of Sheffield Star Plus library gateway and Google scholar was conducted to develop and test initial search terms. Comprehensive search terms were then developed using relevant keywords including “Adverse event*” OR “Patient safety” OR “medical error*” “risk management” OR “healthcare quality” OR “incident” AND “Maternity ward” OR “maternity unit” (See appendix for further details of

the search strategy). These search terms were used to conduct an advanced search in the EMBASE, SCOPUS and CINAHL databases to identify relevant studies. The Faculty of Medicine Librarian, an expert in healthcare information searching, was consulted multiple times during the search term development and the database searches [30].

A further supplementary search was conducted. This involved searching the reference list of selected papers and their citations for any relevant studies. Citation tracking was carried out using the Google Scholar search engine to search by keywords or authors [32]. Grey literature was not included in this review as it was expected that there would be sufficient volume of peer-reviewed studies [33]. The reference list search included systematic review papers identified within the search. This process was repeated to update the literature review between April and May 2019. The same search terms were applied in the selected databases to identify articles published after the initial review (see Appendix 1 for a search strategy in Embase).

2.2.4 Study selection

Results from the searches were exported to the Endnote reference management software, which was used to remove study duplicates from the combined databases' results. Selection of the studies then followed a two-stage screening, i.e. at titles and/or the abstracts firstly and then secondly at full text [30]. Full texts of potentially relevant studies were obtained and then thoroughly reviewed against the eligibility criteria. At this stage, both supervisors' advice was sought when there was doubt regarding articles' eligibility. The reason for exclusion of papers was documented. The reference list of one systematic review obtained from the search was checked for any potential paper, and no new paper was identified [18].

2.2.5 Quality appraisal

Assessing the quality or risk of bias in studies is an essential part of the systematic review process [30]. Although some authors might use quality assessment to exclude studies for failing to meet a certain level of quality threshold, others, as in this review, use this process to highlight any potential weakness that could affect the findings' strength but include all relevant studies [34].

Quality appraisal was carried out using quality checklists appropriate for each study design. The mixed method appraisal tool (MMAT) was used to assess the mixed method studies. Different versions of the critical appraisal skills program (CASP) checklists were used for qualitative studies, cross-sectional and intervention studies. A combination of items from different authors was used to assess the quality of the retrospective case note

reviews [35, 36]. One study reporting development of a new tool [19] was appraised for whether its production was based on evidence, piloting, validity and reliability, acceptability, and interrater reliability due to lack of validated appraisal tools. See Appendix 2 for the checklist and quality scores.

2.2.6 Data extraction and synthesis

Each of the included studies was categorised according to research design. Data was then extracted into a data extraction form developed in an excel spreadsheet. The information extracted from the studies included country, study design, type of hospital setting, population and outcome (type of adverse events (AEs), extent of preventability and contributing factors). Data was not double extracted because it was for independent (PhD) work.

The data was synthesised by bringing together evidence from included studies to identify patterns and direction in the findings and integrate them to produce a stronger explanation of the evidence [30]. Factors within studies, such as design, quality and diversity or heterogeneity, determine the method of data synthesis [37]. The high heterogeneity of the included studies led to the choice of a narrative synthesis of the evidence. Main findings were categorised and presented based on the three review questions: types of adverse events (AEs); contributory factors of AEs; and extent of AEs' preventability.

As shown in Table 3, the contributory factors for AEs were further organised and presented according to an established model (Farquhar, Sadler et al. 2011). This model was identified from one of the included SSA studies utilised by the authors to present their findings [38]. It was developed based on key relevant literature/models of AEs [39-42]. Thus, the model was considered comprehensive in encompassing the various contributory factors and potentially avoidable AEs, including maternal deaths. Utilising the "best-fit approach", contributory sub-factors of AEs were mapped drawing on the Framework principle [43]. Those factors not in the original model but identified in the included studies were added to a revised model. At the same time, those factors in the model but absent in the included studies were noted. Symbols were then used to differentiate all these categories. These include; contributory factors identified in model and in literature (✓), those in model but not in literature (✗) and those in literature but not in model (+).

Table 3: Framework of contributory factors to AEs

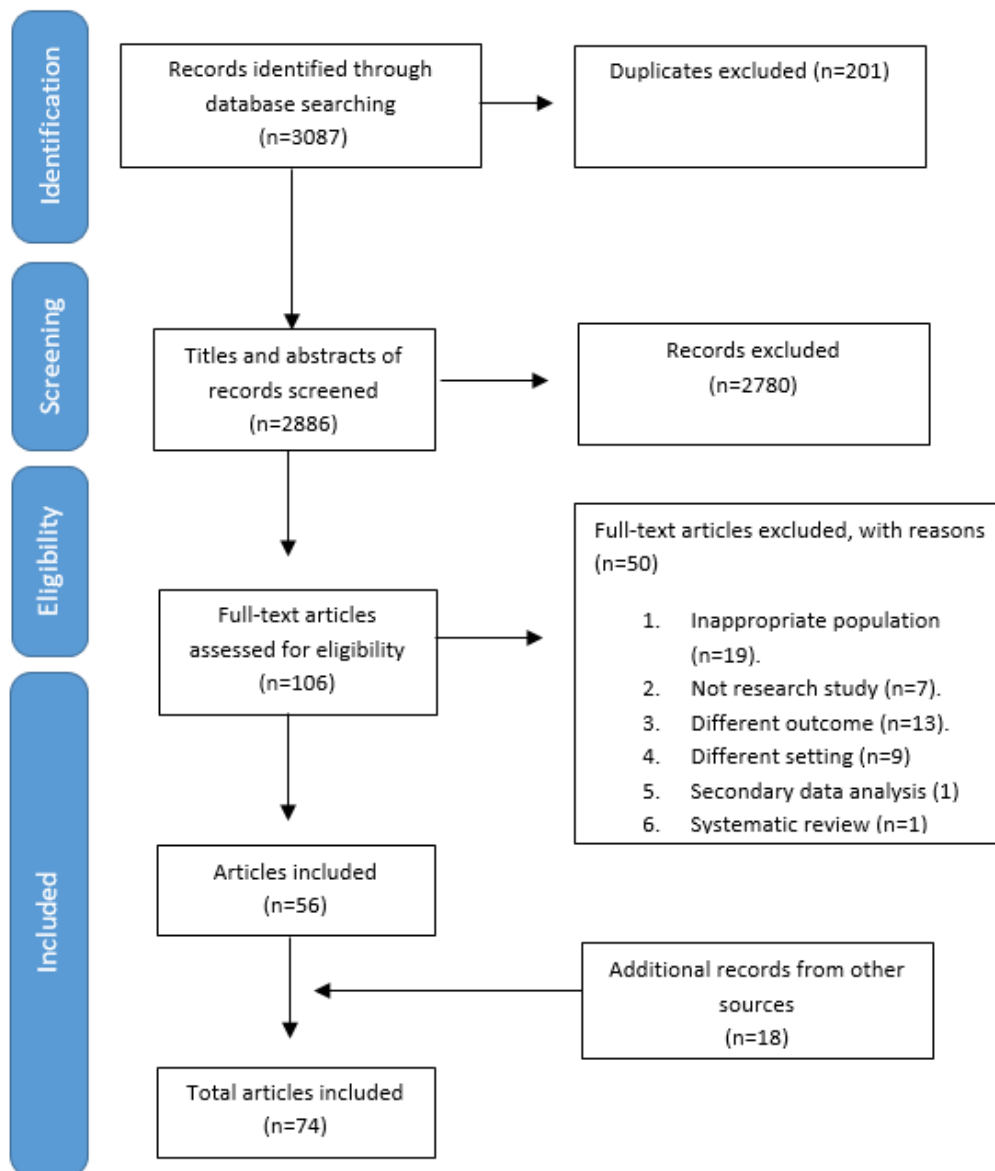
Contributory factors framework	
Organizational and/or management	Presence
Poor organizational arrangements of staff	✓
Inadequate education and training	✓
Lack of policies, protocols, or guidelines	✓
Inadequate numbers of staff	✓
Poor access to senior clinical staff	✓
Failure or delay in emergency response	✓
Delay in procedure, eg, cesarean	✓
Inadequate systems/process for sharing clinical information between services	✓
Delayed access to test results or inaccurate results	✗
Inadequate system for sharing clinical information between services	+
Personnel	
Knowledge and skills of staff lacking (includes failure to maintain competence)	✓
Delayed emergency response by staff	✓
Failure of communication between staff	✓
Failure to seek help/supervision	✓
Failure to offer or follow recommended best practice	✓
Lack of recognition of complexity/seriousness of condition	✓
Technology and equipment	
Essential equipment not available/not maintained/malfunctioning	✓
Failure/lack of information technology	✗
Lack or inadequate blood supply for transfusion	+
Lack or inadequate availability of essential medication.	+
Lack or inadequate supply of consumables	+
Lack or inadequate supply of electricity and water	+
Environment	
Geography, eg, long-distance transfer	✓
Building and design functionality limited clinical response	✓
Barriers to accessing or engaging with care	
Lack of recognition of complexity/seriousness of condition (by either woman or her family)	✓
Cultural barriers	✓
Religious barriers	✓
Financial constraints	+
Family violence	✗
Maternal mental illness	✗
Language barriers	✗
Not eligible to access free care	✗
In model and literature (✓)	
In model but not in literature (✗)	
In literature but not in model (+)	

Adopted from Farquhar et al [44].

2.3 Review results

A total of 3087 citations were retrieved from Embase, Scopus and CINAHL databases and were exported into the Endnote reference manager. Duplicates were electronically removed, leaving 2886 papers for title and abstract review. Following screening at title and abstract level, a total of 106 studies remained. A full text screening was then conducted from which 56 papers met the eligibility criteria. Reference and citation search provided additional 18 studies, resulting in 74 papers being included in the review. See Figure 3 for a PRISMA diagram illustrating the process of study selection.

Figure 3: The process of selection of studies

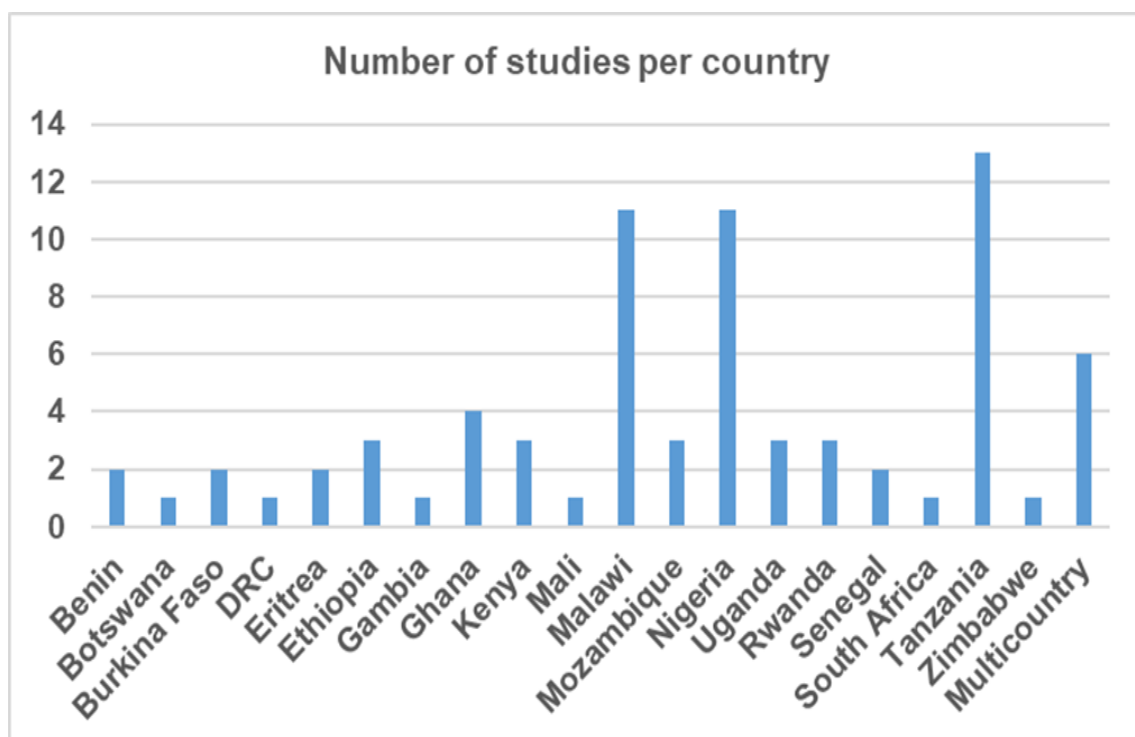


2.3.1 Characteristics of included studies

The 74 included studies from Sub-Saharan Africa were conducted in nineteen different countries (including six from multiple countries). See Figure 4 for a summary of the countries. Malawi, Nigeria and Tanzania had the largest number of publications compared to other countries. While Nigeria and Malawi had 11 studies each, Tanzania had 13. The rest of the countries had between one and four studies (Botswana, DRC, Gambia, Mali, South Africa, Zimbabwe, Benin, Burkina Faso, Eritrea, Senegal, Ethiopia, Kenya, Uganda, Rwanda and Mozambique). This indicates a lack of coverage of all the SSA countries and insufficient literature on maternity AEs, even in countries with some studies.

One of the eleven studies from Nigeria was a multicentre study in federal government-owned tertiary hospitals across several states [45]. Therefore, this may not reflect the situation in other non-federal hospitals in the 36 states of the country. The remaining ten studies were from six different states, leaving several states potentially not included in any study [28, 46-54]. Thus, indicating a lack of sufficient representation in research conducted within the country. As a result, the generalisability of the findings to wider Nigeria has to be made with caution because of the varied state of healthcare across the 36 states. These variations could be due to differences in healthcare access, resources, and outcomes, including maternal and infant morbidity and mortality.

Figure 4: Number of studies per country

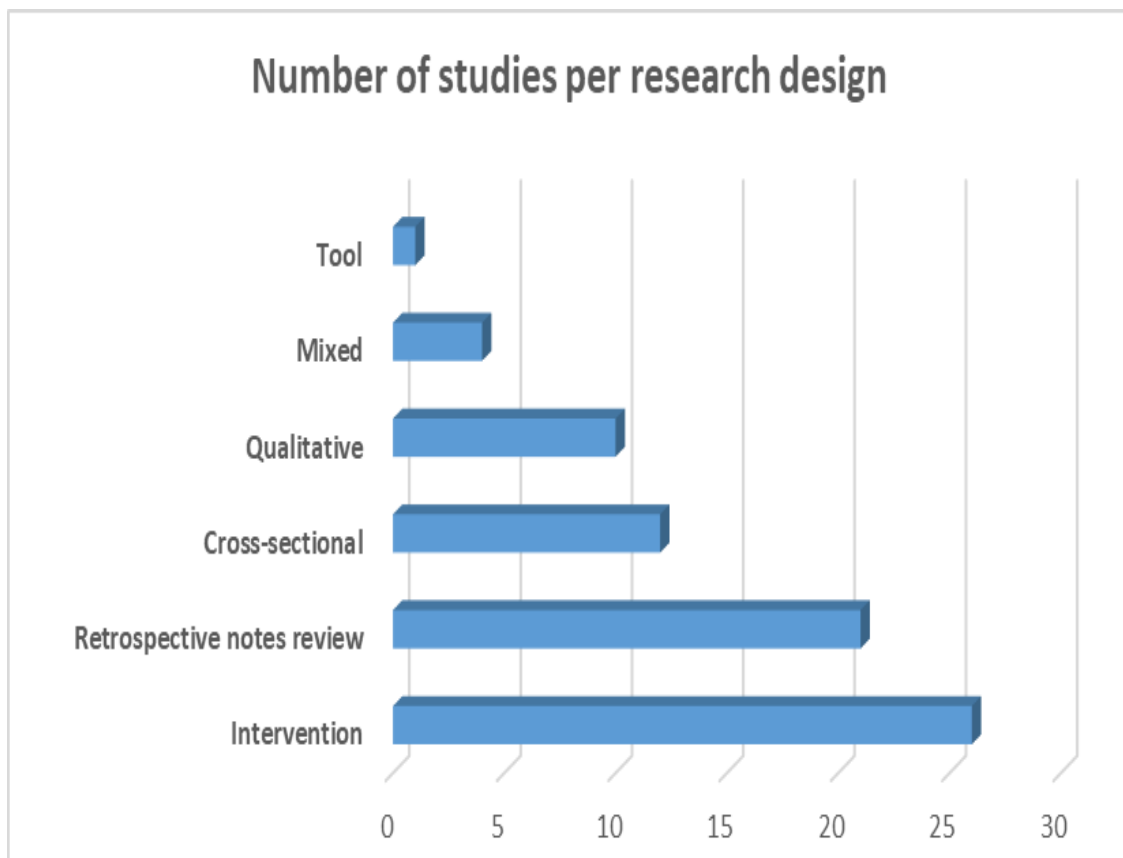


The inclusion criteria was studies based in a hospital setting and particularly within the labour and delivery units. However, there were variations in the level and number of the hospitals studied, as some included all hospitals in one or more district/location they studied (large and small maternity hospitals) and up to 118 facilities [55], whereas others studied a single facility (mainly a large referral/teaching hospital).

Two studies' participants include staff and service users/relatives [56, 57]. Data relating to care providers and managers were included, while that of service users/relatives was excluded.

As summarised in Figure 6, the included papers were of five different research designs. These include case notes review (21), qualitative studies (10), cross-sectionals (12), mixed methods (4), interventions (26), and a tool to measure labour and delivery care processes, validated in Kenya, Madagascar and Tanzania. See appendix 3 for detail of the studies within each research design.

Figure 5: Number of studies per research design



2.3.2 Quality of the literature

The methodological quality for the included studies was assessed based on their designs and full details of the quality scores are provided in Appendix 2.

Case notes review

Overall, the quality of the case notes reviews ranged between good and strong. They all had a clear focus. Their main area of weaknesses lies in the conduct of data collection and analysis. Data collection issues include either a lack of uniform approach for collecting information in medical records and training of reviewers, which may have reduced the reliability of the findings [35]. Nearly all the studies did not sufficiently describe data analysis process to enable replication. While some of the studies had more than one person independently reviewing the records before they collectively agreed on a score, others did not [35].

Qualitative studies

The majority of the qualitative studies were generally of good quality. They all had clear statements of aims appropriate for qualitative design. While the research settings had been sufficiently described in all the studies, only two explicitly clarified researchers' roles within the settings, confirming their lack of affiliation with the study context [57, 58]. The data collection process was another area of weakness, with many providing insufficient detail on the process. The robustness of the ethical processes in two studies was also unclear [58, 59]. Their weakest point was the data analysis process, including who conducted the analysis, how coding and themes were generated, whether there was an effort between coders to agree on codes and themes generated. Presentation of the findings was generally one of the strongest areas of these studies but observation quotes were not provided in two studies that combined interviews and observations, which limited confirmability of the findings [60, 61].

Mixed method studies

There was variation in the methodological quality of the four studies within this group, ranging from fair to strong. While all the studies stated research aims and objectives appropriate for mixed method design, only one appeared to have integrated their data in mixed method technique [62]. A number of issues identified in relation to sampling strategy, data collection instruments and data analysis affected the strength of these studies. For example, one study did not clarify their sampling strategy affecting the findings generalisability [63]. Two of the studies had not provided the source and validity of their measuring instrument, undermining the reliability of the findings [63, 64]. Analysis was missing in one study [63], and in another, the qualitative analysis method was only mentioned but not described [64]. However, all the studies sufficiently described the study setting, strengthening transferability of the findings. They also supported the findings with sufficient qualitative and quantitative data, which will help the reader decide on their applicability [62-65].

Cross-sectional

The majority of studies (10) within this category were of strong methodological quality. They all had clear research objectives, choice of design was appropriate to the research questions, no apparent sampling bias despite the majority using non-probability sampling and samples seemed to represent the population from which they were drawn. However, the samples in some of the studies were not based on statistical power, which may affect the sample representativeness [48, 51, 66-70]. The validity of the data collection instrument was unclear in some of the studies [67, 71, 72]

Interventions

The majority of intervention studies (20) were of fair methodological quality. All the studies had a clear focus. They were based on four intervention components, including audit and feedback cycle, educational training, improvement projects and standard-based management recognition. Their main outcome measures consist of improvement in quality of service/care (components of emergency obstetric care, patient communication and rapid triage), reduction in AEs (primarily maternal mortality, and foetal deaths and uterine rupture), and improvement in resources (building structures, material and human).

All the studies except three had non-experimental designs [73-75]. Main design weakness was the use of an “after study” design by some of the studies [76-81]. This is considered the weakest of the non-experimental intervention designs because of the absence of baseline information to compare the outcomes after the intervention. Only one study reported potential confounders that may have influenced their results [79]. Another weakness was that data was collected by staff working in the study setting in most of the studies, which maybe a source of bias, as they were the ones providing patient care. Three studies addressed this issue by having an external organisation to implement the intervention and collect the data [75, 78, 82], blinded from knowing which group the case is [83].

Tool

The tool developed to measure the quality of labour and delivery care processes in SSA was of strong methodological quality. All potential issues that may undermine the validity, reliability and interrater reliability had been appropriately addressed by the authors [19]. Although Nigeria was not among the countries where piloting was conducted, no acceptability issue was identified because the tool had been tested in many SSA healthcare facilities, and these had many similarities with Nigeria.

2.3.3 Synthesis of the literature

Findings from the included studies were synthesised according to the three review questions encompassing types of adverse events, the contributory factors to AEs, and the extent of AEs' preventability.

Types of adverse events

Twenty nine included studies (with six from Nigeria) provided evidence relating to the type of AEs associated with labour and delivery in Sub-Saharan African hospitals (See Appendix 3). These studies predominantly reported on severe forms of AEs, which include maternal mortality/death, perinatal death, uterine rupture, obstetric fistula and a maternal near-miss. Maternal mortality was the most reported outcome and identified in 15 studies [38, 47, 54, 83-94]. Eleven studies reported a combination of maternal mortality with other outcome, including maternal near-misses and perinatal mortality [45, 46, 55, 95-102]. Three other studies reported specifically on neonatal mortality [28], uterine rupture [103], and maternal near-misses [101].

The maternal mortality ratio is a Millennium Development Goals (MDG) indicator of risk associated with pregnancy measured by number of maternal deaths per 100,000 live births during a specific period, usually one year [104]. The United Nations' Sustainable Development Goals aimed to reduce the maternal mortality rate to less than 70/100,000 live births in every country by 2030 [104]. Thirteen studies reported on maternal mortality ratio and five of them were from Nigeria. As shown in table 4, the findings highlight that figures for maternal mortality varied between countries and within countries, with the maternal mortality ratio ranging between 69 [87] and 2509-2931/100,000 live births [46]. The sizeable variation in the report of maternal mortality ratio between the studies could be due to the heterogeneity of the studies based on research design, context, number and level of facilities and duration of data collection (See appendix 3 for more details). However, the findings across the studies as a whole showed that Nigeria had the highest maternal mortality ratio across the SSA countries.

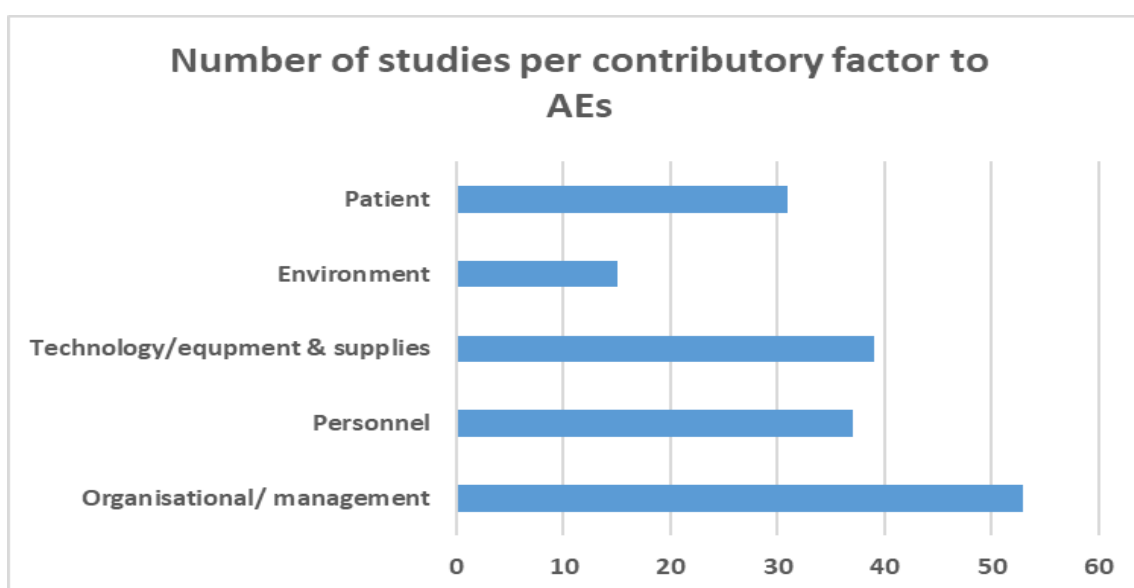
Table 4: Maternal mortality ratio by country

Country	Maternal mortality ratio	Reference
Nigeria	772-2509-2931/100,000 live births	Oladapo, Ariba et al. (2007)
		Ozumba and Nwogu-Ikojo (2008)
		Oladapo, Adetoro et al. (2015)
		Onah, Okaro et al. (2005)
		Omo-Aghoja, Aisien et al. (2010)
Mozambique	254-703 /100,000 live births	David, Machungo et al. (2014)
		Chavane, Dgedge et al. (2017)
Rwanda	69.1-325/100,000 live births	Sayinzoga, Bijlmakers et al. (2016)
		Kalisa, Rulisa et al. (2016)
Tanzania	1541/100,000 live births	Pembe, Paulo et al. (2014)
Ghana	1154/100,00 live births	Tuncalp, Hindin et al. (2013)
Gambia	279/100,000 live births	Cham, Vangel et al.(2007)
Uganda	482/100,000 live births.	Okong, Byamugisha et al. (2006)

Contributory factors to adverse events

The second research question related to factors that contribute to AEs. As described previously an existing framework [44] was drawn on to provide a structure for reporting these factors. The framework has five main categories (see Figure 6) including organisational and/or management; personnel; equipment and supplies; environmental and patient-related factors serving as barriers to accessing or engaging with care. The findings indicate that the organisational/management related factors were the most reported of all the contributory factors for AEs, outlined in 53 studies. This was followed by equipment and supplies (39 studies), personnel (37 studies), patients (31 studies) and then environmental factors (15 studies).

Figure 6: Number of studies reporting contributory factors to AEs



Organisational/management-related factors

Evidence from the 53 studies concerning organisational/management-related contributory factors to AEs related to nine sub-categories. These were: staff numbers; staffing arrangements; educational training; access to senior clinical staff; presence of care policies; protocols and guidelines; emergency response; delay in procedures; staff engagement with service evaluation and improvement; and systems for sharing clinical information between services.

Staff numbers

Eighteen studies reported that shortage of trained staff was an important factor potentially contributing to poor quality of care [46, 47, 51, 55, 60, 62, 69, 79, 83, 87, 90, 98, 105-110]. In one study from Rwanda, poor staffing level was implicated in 48 of the 987 maternal deaths examined [87].

The studies' findings varied regarding the type of staff category that was regarded as being insufficient and the extent of the insufficiency. Some of the studies reported a general shortage across all staff categories, including medical, anaesthetists, nursing and midwifery, laboratory and pharmacy [55, 62, 98]. Others found particular shortages among doctors and midwives, especially those with a higher training level [62]. Two studies from Uganda and Nigeria further echoed reports of insufficient numbers of midwives [51, 111]. The Ugandan study identified a shortage of 47 midwives in one district, representing about half of the minimum number required [111]. The Nigerian study similarly found only two of the facilities they studied (two general hospitals and ten primary health centres) had four or more midwives, as recommended for a 24-hour emergency obstetric care service [51]. However, an older study from Nigeria reported having sufficient 24-hour coverage by suitably qualified staff [47]. The adequate staffing reported in this study could be because it was conducted in a higher-level facility (teaching hospital), which is likely to have better staffing coverage. The potential for lower-level hospitals to be understaffed was identified in one study from Tanzania [62]. The study linked inadequate staffing to recruitment and retention challenges in rural areas because health workers were favouring urban over rural residence due to poor infrastructures, such as lack of electricity connection in houses, poorly equipped health facilities, low and late payment of salaries, family commitments, and socio-cultural biases against the unmarried [62].

Adequate staffing was listed among the critical factors for good quality patient care in two studies [60, 107]. In other studies, healthcare workers viewed lack of adequate

skilled staff to be jeopardising their efforts to provide good quality and timely maternity care [105-108]. For example, one study that evaluated the obstetric triage system's effectiveness in relation to time spent in admission found that a lack of staff was the main reason for delays [79]. Some midwives reported having to select serious cases and leave others to give birth on their own due to staff shortage and an overwhelming number of women [56]. In two qualitative studies from Malawi, staff reported that they felt demotivated when there was no staff to conduct a life-saving intervention for women [59, 109].

Inadequate staffing was also reported to negatively affect staff's personal well-being where they had to extend themselves to attend to women because they could not leave them without help [62, 109]. In three qualitative studies, staff reported feelings of being overworked [106, 107, 109]. Some of the staff described instances where they were solely responsible for many women with complex needs, working more shifts than expected with no off days or working through the night and still being expected to continue working the next day due to lack of on-call cover. They also did not have enough time to rest or even take their day off or breaks [109]. As a result, staff saw their work environment as challenging, affecting them either psychologically [62] or their ability to balance work and family life [109]. Lack of sufficient staffing also prevented staff from enrolling in training courses due to lack of cover [62].

The literature suggests that staff being overworked may also exacerbate the staffing insufficiency. For example, staff being tired was documented as a reason for not attending to a woman by one doctor in a study from Ghana [83]. In another study, a staff member admitted to making fake excuses to get away from work early [109]. Evidence from two different studies reported that staff participants felt seriously challenged by the working environment due to staffing inadequacy and contemplated leaving their jobs, which would potentially worsen staff shortages [62, 109]. However, participants in one of the studies remained in their current work due to hope for a better future, religious faith, supporting networks (family, relatives and friends) and a belief that other places that they could move to would have similar issues to their current work environment [62].

Specific government policies may also exacerbate the staffing situation. For example, a new Malawian policy of encouraging hospital births through providing free maternity services, without addressing human resource shortages, caused an overflow of women and overburdening of staff, including being called in even when off duty, particularly those living near the hospital [109]. A different study in the same country also noted that

staff members saw an earlier locum system to address the staffing problem as ineffective because the work was still done by a limited number of already tired staff [106].

Staffing arrangements

Inappropriate staff allocation within hospital facilities was attributed to ineffective use of skilled personnel as reported in thirteen studies [38, 55, 56, 61-64, 69, 72, 83, 88, 93, 109]. One study associated this issue with about 35% of 52 maternal deaths [38].

Routine staff rotation, doctors' working patterns and inadequate skill mix were identified as contributing to inappropriate staff allocation in some SSA countries. For instance, two different studies from Malawi [109] and Ethiopia [62] found that the practice of routine staff rotation to other units to acquire the varied skills required for different wards resulted in an influx of staff not competent in the management of labour and delivery processes, and movement of competent staff to other units.

Three studies conducted in Ghana, Malawi and Tanzania found a pattern of working during the day only among doctors [83, 93, 109]. While in a different Tanzanian study, doctors were reported to be called in when needed, and in their absence, their tasks were shifted to the nurses and midwives who provided 24-hour coverage [63]. In the same study, nurses and midwives in small villages were found to be away from their duty posts for periods of a couple of hours or days, leaving their jobs in the hands of traditional birth attendants, despite living next to the hospitals in government quarters [63].

Studies from Burkina Faso, Eritrea, Kenya and Tanzania observed inconsistent skill mix between facilities [55, 61, 69, 72]. The studies showed that higher-level facilities had more highly skilled staff compared to the lower ones, and two studies reported doctors working at hospital level only, whereas nurses, midwives and health assistants worked at the lower level hospitals (health centres) [55, 69]. The majority of the lower facilities' health workers included staff with little or no skill, such as auxiliary midwives or traditional birth attendants [61, 72]. For instance, one of the 24 health facilities in a Kenyan district with 646 skilled birth attendants was solely run by traditional birth attendants (TBAs) [72]. Midwives saw the auxiliary midwives as unable to ensure quality care because their training curriculum does not equip them to detect and manage labour and delivery complications compared to others with higher level knowledge and skills [61]. This view was reinforced by the account of an auxiliary who narrated their first experience of working alone with no prior experience of conducting a delivery. They had to seek a TBA's assistance, who showed them what to do [61].

Education/training

Inadequate education or training was an issue cited in twenty studies [28, 38, 51, 54, 55, 59, 62, 63, 65, 69, 71, 72, 74, 81, 83, 88, 94, 100, 111, 112]. While it is the responsibility of hospital organisations to ensure that staff employed have adequate knowledge and skills, which are periodically updated, the review highlighted lack of training, training inconsistencies and staff being trained in areas they consider as unimportant. In one study, respondents identified insufficient skills among staff members suggested that this could be translated as inadequate staffing if the available staff did not have appropriate skills for managing complications. They also saw this as potentially resulting in women not receiving safe care [65]. This issue was attributed as a causal factor in 60.5% and 67% of maternal mortality cases examined in two studies in Botswana and Malawi [38, 94]. A different study in Nigeria also associated increased poorly managed obstetrics care with a lack of skilled staff [54].

Some of the studies identified areas of inadequate knowledge and skills among different health professionals. These were in areas of labour monitoring [83], diagnosis [28], treatment [63, 83, 88], and after delivery care [74]. Two of the studies provided specific examples of deficient skills, which included assisted vaginal delivery and manual removal of placenta and retained products of abortion [63, 71]. Moreover, the most cited important area requiring training was comprehensive and basic emergency obstetric care (CEmOC and BEmOC) [51, 65, 69, 72, 110, 112]. The absence of important lifesaving skills might result in care providers not being able to help the women, as reported in one study [61]. The study also noted that this could result in staff applying the wrong procedure/harmful practices, as in their observed case where healthcare providers were pushing on a pregnant woman's stomach with all their weight to aid delivery. The study reported that the care providers said they felt that they had no other option, which confirmed their lack of knowledge and skill [61].

Staff members from a number of studies highlighted having had no refresher course opportunities [59, 65]. For example, health workers interviewed in Malawi said they had never attended any refresher courses since they were employed, except for one of them, who had attended a single course in the last ten years [59]. Three studies from Uganda, Tanzania and Senegal and Mali highlighted an increased disparity in staff qualification, training and skill performance with facility level [63, 81, 110]. For instance, staff working in teaching hospitals in Senegal and Mali were found to have higher qualifications compared to those working in other hospitals [81]. In Uganda, staff working in hospitals were reported to be more likely to manage obstetric complications compared to their counterparts in health centres given that post-partum haemorrhage had been managed

by only 15% of staff in health centres compared to 89% of staff in hospitals [111]. Moreover, a shortage of tutors in small towns in Tanzania compared to nearby urban centres was found to have resulted in a training disparity among clinical officers and midwives, with the consequent variation in experiences and practices resulting in errors and unnecessary referrals [63].

Evidence also highlights that some of the training provided to staff may not be fulfilling their needs. For instance, one multicentre study in Eritrea, which included different hospitals and health centres highlighted that about 99% of staff members felt that they needed additional training to perform their duties, despite their supervision records showing that 95% of them had received refresher training in their current jobs [55]. The study suggested a possible reason why training may not always address staff needs is that the training system is dependent on external funding and “sponsor-driven or project specific”, such as HIV. This means that the current training does not always support training needs in areas such as obstetric emergencies [65]. Another reason given by a different study in Tanzania was that the money budgeted for training ended up in “the wrong pockets”. This was despite staff calls for more training [93, p.898]. A third reason concerns selection criteria [62, 65] and the lack of a standard system for the selection of participants to undertake available training [65]. In another study of 43 districts in Tanzania, there were contrasting views among staff members and representatives of health authorities regarding satisfaction with the selection system and process fairness, with some of the staff reporting barriers, such as unfair selection criteria by the authorities and disqualification based on tenure and educational requirements [62].

Access to senior clinical staff

Ten studies reported inadequate availability of senior doctors in particular [28, 38, 45, 46, 63, 83, 84, 97, 109, 113]. Two studies from Nigeria and Malawi associated some of the poor maternal outcomes they found delays or late arrival of senior staff such as obstetricians and anaesthetists [28, 97]. Two other studies from Botswana and Ghana attributed between 12% and 25% of the maternal deaths reviewed to this factor [38, 84].

While senior staff with the highest level of skill and training were more likely to be available in bigger facilities, such as the teaching hospitals, this problem was also reported to occur even at such high levels of care. Two different studies of maternal deaths in Nigeria, one covering all the Nigerian tertiary public hospitals and the other one a teaching facility, found that a significant number of the women who died (13% and 17%, respectively) had not been seen by a senior doctor (senior registrar or consultant) at the time of the event leading to their death [45, 46]. Lower-level doctors could also be

the most senior staff available in some hospitals, and ensuring their presence is equally important. For instance, a study in Ghana on maternal deaths showed that 3 in 4 cases whereby doctors were needed were not attended to by this cadre in spite of them having been informed about all the cases [83].

Although these studies did not provide reasons for senior doctors' poor attendance to some women, staff in two qualitative studies from Malawi associated this with two problems. The first problem was lack of sufficient clinical staff to care for the many women needing attention at the same time [109]. The second problem was inadequate transport to convey specialists from their home to the hospital at night when on-call [106]. This could be related to staff arrangements as doctors were found to be working during the day only or called in when needed as discussed earlier [83, 93, 109] or called in when needed [63] (see poor organisational staff arrangements).

Care policies, protocols or guidelines

Policies, protocols and guidelines help guide the decisions and actions of practitioners. Six studies reported issues related to their absence or lack of application by staff members [38, 61, 72, 73, 75, 91, 97]. This factor was implicated in 44% of maternal deaths in Botswana [38]. However, the literature generally lacked clarity regarding what specific policies, protocols and guidelines were absent in the facilities they studied. Two studies noted the lack of application of the available policies, protocols and guidelines [61, 72]. However, these studies did not explain why available policies, protocols and guidelines were not adhered to.

Emergency obstetric care readiness

Twenty three studies reported organisational failure/delay in providing an emergency response when required [38, 46, 48, 51, 67, 69-71, 73, 74, 83, 84, 86, 88, 91, 102, 103, 105, 106, 110, 112, 114, 115]. This was linked to 12% and 15% of maternal deaths in the analysis carried out by different studies in Ghana and Botswana [38, 84]. One study also associated it to uterine rupture [103].

The studies reported two main areas of delay. The first is related to failure to prioritise women at greatest risk, with some of the studies highlighting instances of staff failure to offer timely intervention to women with known risk factors such as grand-multiparity and previous caesarian sections [103]. They also observed delays in starting adequate and correct treatment [46, 73, 86]. This was found after diagnosis of uterine rupture [103] and retained placenta [83]. The second area of delay was regarding timely decisions to refer women to hospitals with more advanced obstetric services or call an ambulance [73,

103]. One example of maternal mortality involved the woman spending four hours in labour without progress and with no definitive action taken [83].

The main issues identified by the studies relating to lack of emergency response were a shortfall in the rapid triage system. For instance, one study examining the impact of a quality improvement initiative for reproductive health services and its related outcomes in Malawi raised a concern that health facilities lacked rapid triage systems for evaluating women in labour, which would have enabled them to detect complications and prioritise care [74].

The United nation process indicator guidelines recommend that there should be at least one comprehensive emergency obstetric care (CEmOC) and basic emergency obstetric care (BEmOC) facility per 500,000 people [104]. The guidelines also list elements of care (called signal functions) that should be available in a facility for emergency care of obstetric women. There are eight signal functions in total, of which number one to seven can be performed at the level of BEmOC and all nine at CEmOC. These include: (1) administration of parenteral antibiotics, (2) parenteral uterogenic drugs, (3) parenteral anticonvulsants, (4) manual removal of placenta, (5) removal of retained product of conception, (6) assisted vaginal delivery, (7) perform basic neonatal resuscitation, (8) caesarean section and (9) blood transfusion.

As highlighted in Table 5, eight different studies from various SSA countries reported shortfalls in the expected level of emergency obstetrics and neonatal care services [48, 51, 67, 69-71, 111, 112, 115]. However, it was noted that the shortfall could be worse in lower-level hospitals such as primary health centres (PHCs). For instance, a South African study identified all seven hospitals investigated as to having attained CEmOC status as expected, but not the health centres [70].

Table 5: Status of emergency obstetric care (EmOC) in seven SSA countries

Study	Country	Setting studies	Number and types of facilities studied	Measure	CEmOC/ BEmOC status
Ueno et al (2014)	Tanzania	1 district	4 hospitals, 2 health centres and 2 dispensaries	WHO signal functions	Only 2 out of the 4 hospitals performed all 9 CEmOC signal function and none of the 4 health centres/dispensaries performed the entire 7 BEmOC signal function within the last 3 months
Tobi-west et al (2012)	Nigeria	1 state	10 PHCs and 2 general hospitals	WHO guidelines for assessing the performance of signal functions.	Only one facility qualified for BEmOC and none qualified for CEmOC status
Thwala et al (2018)	South Africa	1 district	4 regional hospitals, 2 district hospitals, 1 tertiary hospital and 8 community health centres (CHCs).	UN-EmNOC signal function	All the 7 hospitals were classified as CEmOC but none of the 8 CHCs attained BEmOC.
Ntambue et al (2017)	DRC	National	53 of 180	WHO standards	Only one facility provided all CEmOC signal functions in the preceeding 3 months and none other provided all the BEmOC signal function.
Abegunde et al (2015)	Nigeria	1 state	20 general hospitals and 39 PHCs.	UN process indicators	6 (0.2%) of the 59 sampled facilities met the EmOC requirements.
Leigh et al(2008)Malawi	Malawi	National	25% of all health hospitals= 94 health centers	UN process indicator	18.5% estimated met need of EmOC
Echoka et al (2013)	Kenya	1 district	40 health facilities (public and private)	UN process indicator	None of the facilities qualified as CEmOC based on the WHO definition because assisted vaginal delivery was not provided in any of them. However, other CEmOC services were provided in 5 of the facilities.
Wilunda et al (2015)	Uganda	2 districts	All health facilities (2 general hospitals, 10 health centres grade 3 and 8 grade 2)	Safe motherhood need assessment	Both general hospitals performed all the 9 CEmOC signal functions while none of the health centres provided all the 7 BEmOC signal functions. Signal function which require manual skill and specific equipment were the least available.

CEmOC= Comprehensive emergency obstetric care.

BEmOC= Basic emergency obstetric care. ¹

Timeliness of procedures

Thirteen studies reported delays in carrying out procedures [38, 46, 54, 79, 85, 87, 88, 97, 98, 100, 102, 103, 116]. The various types of delay included: initial assessment of admitted women [46, 97, 100, 102], starting treatment [100, 102, 116], anaesthetic review [54] and operative procedures such as caesarean sections in obstructed labours [46, 85, 88, 102, 103].

Some of the studies highlighted how detrimental delays could be to women. For instance, procedure delays were explicitly identified as a contributory factor in three maternal deaths in Rwanda and Botswana [38, 87]. This finding is consistent with a different Rwandan study that viewed some of the maternal deaths as preventable [102]. The study concluded that diagnostic and therapeutic delays were the most common preventable factors that could be addressed in maternal near misses (66%) and maternal deaths (11%). Moreover, another study reported that a third of women experiencing a near-miss had encountered delays in diagnosis and care [98]. The time interval between diagnosis and definitive treatment could make a significant difference in women with emergency obstetric needs. Four different studies from Tanzania, Uganda, and two from Nigeria identified delays ranging between 30 minutes and 4 hours [45, 46, 98]. Other studies identified even longer delays of up to 24 hours, occurring mainly in the evening and at night time [93, 98].

Engagement with service evaluation and improvement activities

Seven studies qualitatively explored health workers' and or managers' views on audit [60, 80, 107, 117-119] and maternal death reviews (MDRs) [81] in their facilities to assess engagement with service evaluation and improvement activities.

Perceived benefits: Although service evaluative processes (audit/MDR) were perceived by both staff and managers as tools that bring about overall service quality improvement [60, 80, 117, 119], their perceptions of the personal benefits differed. The processes were seen by staff as beneficial in promoting their learning, skills, teamwork and job satisfaction [60, 117]. For instance, these activities were regarded as having positively influenced the speed with which they manage cases, how they receive and communicate with women, and their general clinical practices [80]. In contrast, the managers perceived them as helping in gathering and analysing data for evidence-based policy improvement [60].

Staff saw time as an important barrier to audit participation. They mentioned difficulty in finding a suitable time for all those involved in audits to attend the meetings because

they were too busy providing care to women during working hours [117]. Staff were also expected to attend audit meetings when they are off duty, without compensation for their time and travel costs, which was a perceived barrier to engagement for staff on relatively low wages [80, 117, 119].

Two studies from Benin reported on audit meeting leadership. One of the studies found that half of the audit meetings were headed by a physician, and the rest by a midwife or a nurse [78]. However, the type of professional cadre heading audits appeared important for some health care providers. For instance, when discussing audit leadership, one of the participants in the second study insisted that this role must be filled by a trained obstetrician or specialist, in order to identify problems and make sufficient recommendations [117].

The composition of audit team members varied. One study reported that in Benin the team comprised a multidisciplinary member from various health workers [78]. In contrast, a study from Senegal reported that health workers other than doctors were excluded from the audit committee [81]. The authors concluded that the lack of involvement of other professional categories contributed to a lack of motivation to collect information on maternal death or implement recommendations of the audit committee.

The sustainability of the audit/MDRs was reported to be affected by a lack of feedback to staff about what was discussed [60, 80]. The studies also reported that a lack of or insufficient implementation of recommendations from the audit/MDRs was perceived as demoralising for the committee members [60, 80, 81, 118, 119]. For example, three respondents in one study attributed the cessation of audits in a Tanzanian hospital to the demoralisation of the audit committee members. This followed repetitions of the factors contributing to avoidable maternal death, which they had made strategic recommendations [118]. Participants in other studies suggested that the presence of key leaders such as the departmental head or managers and policy makers during the audit process was important to support the implementation of recommendations [60, 81, 107, 118].

Systems for sharing clinical information between services

Four studies identified problems with information sharing system between services [38, 47, 65, 83]. One of the studies also identified this issue as a contributory factor in 20% of the 52 maternal deaths found in Botswana [38]. A different study identified lack of communication and coordination between the health centres and the hospital before and after referrals as hindering the efficiency of the referral system, though the study did not

provide sufficient details about the specific communication and coordination issues [65]. Another study identified problems of inadequate details in referral notes and referred women not being accompanied by staff to provide the necessary information [83].

Personnel related factors (healthcare staff)

This section addresses findings from 37 studies in relation to healthcare staff behaviour adhering to best practices, seeking support and communicating with others. In this review, recognising the complexity/seriousness of the women's conditions is combined with the delay in procedure section within the organisational/management contributory factor, in contrast to the original model where it was within the personnel factor.

Adhering to best practice

Twenty studies reported indications of care providers working outside recommended best practices [38, 46, 56, 57, 60, 61, 63, 72, 73, 80, 83-86, 88, 94, 97, 109, 120, 121]. This was associated with a number of maternal deaths in one study [38]. Many of the studies identified evidence of disregard or deviation from standard or local care guidelines. This included disregarding the available management protocols for obstetric emergencies, postpartum haemorrhage, shock, eclampsia and neonatal resuscitation [73, 80, 97]. For example, one study from Nigeria analysed the changing pattern of critical obstetric care over two consecutive 3-year periods and noted deviations from patient management protocols in 58% of all the cases studied [46].

Various studies identified inadequate implementation of intrapartum monitoring, including systematic partograph recording, aspects of good practice aimed at monitoring labour progress and detecting early signs of abnormality [57, 60, 83-85, 94, 97, 109]. For example, one study in Ghana found that only five out of 13 hospital-based maternal mortality cases were recorded, and only two of them had been recorded to the satisfaction of the panel [83]. One study in Tanzania where birthing care was observed noted that partographs were not filled in regardless of the care provider's training level and that midwives delayed filling in the partograph or sometimes dismissed previous recordings [61]. This study and others raised the problem of retrospective recording of partographs and notes about healthcare events, in addition to the doctoring of reports [57, 83]. Poor recording could result in difficulty reviewing healthcare events, which one study cited as a barrier to the accurate estimation of morbidity and mortality [72]. While most of the studies provided no reason for the poor partograph recording, one study highlighted that healthcare providers neglected this procedure to allow women in labour

more time to progress without intervention believing that most women will eventually give birth, and have positive outcomes [57].

Staff not abiding by best practice could result in inappropriate and misguided actions, as cited in some studies [63, 83, 86]. An inappropriate action cited in one of the studies involved the referral of a pre-eclamptic woman with severe anaemia, pneumonia, and hypertension to another hospital without visible effort to address the problems [88]. Whereas an example of misguided action was where an unorthodox method of using ice packs instead of syntocinon was used in a case of obstetric bleeding [83]. However, this could be due to organisational/management related factors such as lack of knowledge and skills to manage these conditions or supply inadequacies such as lack of specific medications. Findings from some of the studies corroborated this view. For example, healthcare workers admitted to taking shortcuts because of acute staff shortages and heavy workloads [109]. Another study reported midwives' accounts of the complexity involved in attending to different women at the same time, which made them wear three or four pairs of gloves at one time so that they could easily remove the outer contaminated ones to attend to the next woman [56]. This may compromise the quality of the care provided in such a situation, for it was either rushed or abandoned halfway through to attend to someone with a critical problem.

Seeking help/supervision

Failure to seek help or supervision was reported by thirteen studies [38, 54, 55, 63, 65, 88, 94, 97, 103, 106, 107, 109, 119]. One of the studies identified this as an issue in 19 maternal deaths reviewed in Botswana [38]. Various issues posing a barrier to seeking support were identified. Some of these studies identified a lack of availability of support/supervision [107, 109, 119]. Others reported refusal and perceived lack of benefit as the reason for staff members not seeking support [63, 65, 106, 107, 109, 119].

One study highlighted the potential for inconsistencies in help/supervision practices, based on facility level, where by 80% of staff at referral hospitals reported being supervised often, sometimes or regularly as compared with 73% in the community and 90% at health centres/stations [55]. Another study examined staff satisfaction with supervision and observed that 50% of respondents reported not being satisfied with the available supervision, which tended to be (irregular or unscheduled visits by external supervisors focused on record keeping, attendance) and fault-finding [65].

Communication

Fifteen studies reported on failure of communication as a factor contributing to adverse events [38, 47, 53, 56, 59, 61, 62, 69, 73, 80, 85, 106, 107, 109, 120].

Firstly, communication failure at the organisational level, which occurred between staff and their managers or policymakers. While this form of communication failure may fit better with organisational/management-related factors, discussing it here in personnel-related factors provides a complete picture of the communication issues. This issue was found in three studies from Nigeria and Tanzania [53, 56, 58]. The Tanzanian studies include two qualitative studies and reported midwives' views that their opinions were not valued in the hospital and that their work was never appreciated by their superiors [56, 58]. A different study reported conflict between staff and hospital management in Nigeria that had resulted in industrial action and contributed to one maternal death [53].

Secondly, communication problems between staff members of the same or different professional category was found in various studies [38, 47, 69, 73, 80, 85, 107, 109]. This issue was reported to have contributed to 16 maternal deaths (29%) in Botswana [38]. Many of the studies reported poor teamwork among the staff members, which reportedly stemmed from tension and, consequently, an inadequate transmission of information within and between teams. Poor teamwork was cited in one study from Tanzania as a challenge to emergency obstetric care across all facility levels [69]. Tension and poor teamwork between midwives/nurses and doctors were identified as related to perceptions of unfair workload and level of responsibility resulting in disagreements on decision making, with the midwives feeling that their decisions were being undermined by the doctors [69, 85, 107, 109]. Moreover, communication issues were identified between midwives and ambulance drivers due to the latter sometimes not responding to midwives' requests to convey staff on-call from their homes [106]. Communication failure was also identified as occurring between departments [47].

Thirdly, communication issues were identified between staff and women in Malawi, Tanzania and Burkina Faso [58, 59, 61, 62, 80]. Midwives in one study expressed a feeling of not being valued by the women, in addition to reporting negative attitudes from the women who they felt regarded them as not caring [58, 80]. However, midwives in three different studies from Malawi, Burkina Faso and Tanzania acknowledged committing poor, unprofessional behaviour towards women. These behaviours include: unkind attitude [59], slapping [62] and various forms of threats such as evacuation, operation, possible death of the baby, referral to regional hospital or episiotomy by approaching scissors to the perineum [61].

The midwives blamed these behaviours on their stressful work environment and exhaustion from excessive workload, staff shortage and fear of maternal death, for it comes with sanctions [59, 62, 80]. The midwives in one study also explained that they sometimes behaved in such a way to get the women's cooperation to push the baby out because they wanted them to leave with their babies safely [62]. The staff interviewed in one of the studies perceived how a woman is received by the healthcare provider as key to her satisfaction and observed that good reception of women varied among staff [61]. The staff acknowledged that it was difficult for them to tell if a woman is not satisfied with the care as the women did not show dissatisfaction, but some gave blessings and small gifts, and this show of appreciation was considered as an indicator of satisfaction with the care received [61]. Contrarily, staff members in a different study reported that women and family members verbalised dissatisfaction with care, which was sometimes expressed negatively, including complaints and insults [62].

Technology, equipment and supplies

Concern regarding the availability and or functioning of equipment and supplies was reported in 39 studies. Although information technology was part of the original model [44], it is excluded here because none of the reviewed studies reported it as a problem. This could be because technology in the settings studied had been at quite a low level. Supplies is an added factor, which was not in the original model. This factor is the most relevant to this theme and includes four main issues: blood and oxygen, essential medicines, consumables, water, and electricity.

Availability of functioning of equipment

Twenty studies from various countries reported lack of availability, malfunctioning or poor maintenance of equipment [38, 46, 47, 55, 60-62, 65, 69, 72, 73, 85, 87, 96, 98, 100, 102, 106, 107, 110]. This issue was associated with maternal mortality in studies from Rwanda [87, 102], Botswana [38], Gambia [85] and Nigeria [47]. It is also reported to have resulted in a lack of or delayed procedures [47, 69]. For example, lack of a resuscitation tray and blood pressure measuring machine was identified as one of the reasons why signal functions were not performed in the majority of their study settings [69]. A list was formulated regarding what equipment was lacking or malfunctioning from studies that mentioned this issue. This list includes: blood service equipment, ultrasound, vacuum, suction, dialysis, resuscitation tray, sphygmomanometre, scissors, foetoscope, long needle holder, telephone, and appropriate protective barriers from potentially infectious bodily fluids [47, 61, 62, 65, 69, 85, 100, 111].

One study found that some types of equipment were not just lacking or malfunctioning, but were obsolete or not available for use (Ziraba, Mills et al. 2009). This study, conducted in 24 facilities in Kenya found that the manual vacuum aspirator, considered safer than curettes, was available in only eight health facilities but curettes in 18 facilities. The study also reported that some equipment was not in working condition or was locked up somewhere, though the authors did not provide details [72]. Facility level availability inconsistencies were also found in two studies from Uganda and Eritrea, where hospitals were better equipped than health centres [55, 111].

Availability of supplies

Supply related issues were reported in 34 studies. This issue relates to the non-availability of blood and oxygen, essential medicines, consumables, and electricity and water.

Blood and oxygen were the most commonly reported supply problems after essential medicines and was identified in 23 studies [28, 38, 46, 47, 53-55, 61, 69, 83-88, 90, 91, 96, 98, 100-102, 116]. Lack of or insufficient blood and blood products was cited in 16 studies as a contributory factor to maternal mortality. However, lack of oxygen was associated to maternal death in only one study from Nigeria [47].

One study from Nigeria conducted a six-year analysis of obstetric care in a hospital setting and found that lack of blood for transfusion had worsened over the years [46]. The availability of blood varied within countries and between the hospital facility levels [54, 55]. For instance, in one study covering 118 health facilities, including 18 hospitals in Eritrea, 47 health centres and 53 stations, only 12 hospitals provided blood transfusion [55]. However, one study from Nigeria indicated that blood supply service availability might not be the only determinant of timely transfusion [54]. The authors found only one of the hospitals in their study with a blood supply service that was unaffected by delay. Staff in a teaching hospital with a well-established blood bank reported blood being difficult to obtain because of a reported "poor attitude of haematology staff", but the authors did not specify what this meant (p.572). Staff in the hospital with no blood supply problem revealed using encouragement strategies to get the women's relatives to donate blood in advance, in case of emergency.

Blood supply issues were identified as a reason for referring obstetric service users to another facility in two studies from Tanzania and Burkina Faso [61, 90]. The Tanzanian study observed that many women who died in one hospital were purposely referred there for blood transfusion [90]. While it is not clear from the study whether these women

received the transfusion or not and whether their deaths were associated with the blood issue, other studies indicated that not all those who needed transfusion got it. For instance, one study from Rwanda reported that out of 134 women with severe haemorrhage, only 52 (39%) had been transfused with one or more blood units [101], though the study did not clarify why the other women who also needed blood transfusion did not receive it. Lack of blood in the blood bank [98] and malfunctioning blood service equipment [85] were the reasons given in two studies for some women who needed transfusion not getting it.

A lack of or inadequate supply of essential medicines was raised in 25 studies from various countries. [28, 38, 53-55, 59, 61, 62, 67, 69, 71, 72, 80, 83, 85, 95, 96, 98, 99, 102, 106, 107, 114, 116, 122]. While one study reported availability of all the essential drugs for maternity care [55], many others identified various issues related to this. Hospital staff reportedly saw lack or inadequate supply of medicines as an issue challenging their work [59]. An adequate supply of essential medicines is listed among the prerequisites for improving maternity care quality [107]. Five classes of medicines necessary in obstetrics and obstetric emergencies were reported as lacking or inadequate. These include, oxytocin, anti-convulsants, antibiotics, intravenous fluids and anaesthetics medicines.

Oxytocin is used before delivery to induce labour and immediately after delivery (third stage of labour management) to prevent postpartum haemorrhage (PPH), as well as in PPH condition. Anticonvulsants, specifically magnesium sulphate (MgSO₄), are used in pre-eclampsia and eclampsia to control seizures. One Tanzanian study, covering four hospitals, two health centres and two dispensaries, found that maintaining a constant supply of essential drugs like MgSO₄ was a problem at all levels of health care [69]. One study from Ghana highlighted that the unavailability resulted in a number of women missing out on essential medication [83]. This study on maternal mortality highlighted that four out of seven cases of eclampsia did not receive MgSO₄, despite it being noted in one of the cases as the most appropriate treatment [83]. The unavailability of anticonvulsants was found to increase with parenteral preparations [67, 69]. This finding in Tanzania is corroborated by a Kenyan study, which reported that parenteral MgSO₄ was available in only 7 out of the 24 facilities studied [72]. In one study, lack of anaesthetic medication was listed among the reasons for delay in operative procedure [98].

One of the reasons identified for inadequate supply of medicines is organisational purchasing bureaucracy [114] (Onah, Okaro et al. 2005). The authors in one of the

studies did not clarify what organisational purchasing bureaucracy means [54]. However, the other study from Mozambique reported that the hospital management in their study faced a dilemma in obtaining MgSO₄ because it was not listed among the essential drugs in the country; thus, the hospital had to lobby the ministry of health's pharmaceutical centre to have it included in their shipment (Santos, Diante et al. 2006). Additional reasons for difficulties accessing medicines include the hospital pharmacy door or medicines cupboard being locked [98]. Others were linked to inability of service users and/or their relatives to provide or pay for the medicines where health care is not free, as in Nigeria [53, 54].

Consumables are goods/ items needed for regular use [123]. A lack or inadequate supply which hindered normal working activities was reported in ten studies [28, 54, 58, 61, 63, 69, 80, 85, 96, 98]. Various supplies and consumables identified include blood bags, intravenous cannulas, syringes, gloves, scissors, cotton wool, sutures, delivery packs, sterile materials, and linens. While the insufficiency of the items listed varied with country, this was cited as a source of care delays in five countries, including Tanzania [58, 63, 69, 96], Burkina Faso [61, 80], Nigeria [28, 54], Uganda [98] and Gambia [85]. Moreover, four of the ten papers reporting this issue were from Tanzania and two came from Nigeria.

Findings from the studies also provided insight into how hospital staff members were managing the lack of supplies and consumables. In one of the studies from Burkina Faso, a nurse-midwife stated having had to send messages to the village clinics to notify women to bring along gloves and cotton wool when coming for delivery. This was so that they could be attended to if the hospital ran out [61]. This is similar to the account in a study from Nigeria that women and or relatives were asked to buy medicines from pharmacy shops outside the hospital [54]. In contrast, one study from Tanzania reported the illegal sale of medicines to service users by hospital staff [63].

Seven studies reported a lack of or inadequate supply of water and electricity in four different countries, including Tanzania, Nigeria, Gambia and Burkina Faso [28, 46, 58, 61-63, 85]. Most of the studies except the Burkina Faso study provided little detail regarding these issues and how the care provided to women in maternity care was affected [61]. The study found variable water availability and electricity among four different health centres in Burkina Faso. While some of the facilities had electricity and running water, in others, staff relied on their torches as the only light source. This means there was insufficient lighting for labour and delivery assessment and care. The staff also had to fetch water from a well at about 1Km distance. Additionally, care providers in this

study reported that the water supply issue had led to limited handwashing and cleaning of equipment and delivery room between women [61], thus increasing the infection risk.

Environment and service users-related factors

While environment and service users-related factors are treated as two different categories in the framework [44], these are combined here because they were the least prominent in the studies reviewed. They are also issues that are very much outside the hospital organisation domain.

Distance and location of healthcare facility

Twelve studies reported that the distance of healthcare facility from the women's home or referring facility as a contributory factor to adverse events [38, 55, 61, 65, 67, 69, 72, 83, 85, 96, 102, 106]. This was implicated in one maternal death in Botswana [38].

Different studies found that women, particularly those living in rural communities, had to travel a great distance to urban areas for comprehensive emergency obstetric care (CEmOC) [55, 67, 72]. This is because most hospital facilities offering this service were located in urban communities. The distances that women had to travel between these locations ranged from 5 to 191km [55, 67, 72]. Journey times ranged from an hour to a number of days [55, 65, 96, 106]. For some women, the problem was further compounded by a lack of transport [85, 96], bad roads [106] and personal security issues, especially at night time [72]. The transport issue was a problem even in places where the normal journey time to the referring facility was less than one hour [65, 72]. Studies reported that the ambulance system in many of the settings was unreliable due to unavailability, insufficiency, breakdowns, or lack of drivers [55, 61, 69, 72]. One study also reported a discrepancy in the ambulance system, with urban and semi-urban centres provided with timely free patient transport, while rural women had none [61]. According to one study from Tanzania, the mean waiting time for transportation to the hospital could be as long as 83 minutes as ambulances were not readily available [96].

Building and design issues

Seven studies reported building design issues, including lack of physical space, theatres, intensive care facilities and toilets [47, 55, 61, 69, 98, 100, 102]. Two studies conducted in Tanzania and Eritrea indicated that insufficient physical space limited the size of the labour and postnatal wards, and consequently the bed spaces [55, 69]. While the issue of physical space was found to vary with facility level, the two studies reported conflicting findings. It was observed in one of the studies that this was more of a challenge in the

lower-level facilities [69]. However, the second study, which looked at 118 facilities, reported this as an issue in the higher level facilities [55]. For instance, they found hospitals to have higher bed occupancy compared to the health centre. On average, all hospitals beds were occupied in at least 83% of hospitals compared to 17% of health centres and 4% of health stations.

The lack of or insufficient space in the theatre and/or intensive unit was reported in five studies [47, 55, 98, 100, 102]. One of the studies, which looked at several facilities of varied levels (118), reported that a theatre facility was available in only 15 of the settings, while only one facility, the national referral hospital, had an intensive care unit for maternity women [55]. Another study that found the intensive care facility to be available reported it being sub-optimal, though there is little detail as to what this meant [47]. The theatre issue was also linked to delayed surgical procedures [98].

Accessing or engaging with care (service users-related factors).

This is addressed in 31 studies from this review [28, 38, 45, 47, 53, 54, 59, 61, 69, 72, 74, 78, 80, 83, 85-88, 90, 91, 94-100, 102, 106, 116, 119, 124]. The original framework listed issues including substance abuse, lack of recognition of the complexity or seriousness of the condition, cultural barriers, religious barrier, and financial constraints [44]. However, this review only reports issues related to women's conditions on arrival, cultural barriers, religious barrier, and financial constraints, because the others were not identified as a problem in the included studies.

The studies indicated that a significant number of women attending hospital in different SSA countries arrived in poor health [28, 83, 85, 86, 90, 119]. The evidence demonstrated that these women were at greater risk of AEs [86, 90, 95, 96, 98, 102]. For instance, in one Tanzanian study, nearly 81% of the women were said to have already developed complications before getting to the hospital [96]. Two more recent studies in the same country showed a decrease in the number of women arriving ill, however, 55% [90] and 70% [95] are still high figures. This difference might not be an actual reduction but the result of variation in the hospital settings. An even higher prevalence of women arriving at hospital in critical condition was reported in Nigeria (92%), with almost half of them coming during the night [45]. Arriving late was found to increase the risk of maternal mortality by threefold (95% CI: 1.3) [96], and was attributed to 9% of near-misses and mortalities in one study [102]. The illnesses that the women commonly presented with include: hypertension, bleeding, anaemia, pre-eclampsia and eclampsia, ruptured uterus and infection [28, 38, 53, 85-88, 94-98, 124].

Despite the role of ANC in preventing, identifying and treating an impending health threat in pregnancy, the review highlighted evidence of a lack of, or poor attendance at this service among many women presenting at health facilities for births. For instance, one study in Gambia found only 50% of the women attended ANC in their third trimester [85]. However, five studies reported that a large number of women had never attended ANC at all. One of these studies, in Tanzania, reported that 14% of the women they studied had not booked ANC [96]. Of particular relevance to the current study, the other four studies from Nigeria reported even higher numbers of women who had not booked ANC compared to the Tanzanian study. Their figures range between 21% and 75% [28, 45, 47, 53]. The findings of poor or no ANC attendance highlight how extensive the problem is in Nigeria and the potential for many women to present in a poor state of health.

Eleven studies identified cultural and religious beliefs and practices as preventing women from seeking timely hospital care [28, 38, 59, 61, 83, 85, 87, 98, 100, 106, 116]. Only one study identified specific religious belief as a contributory factor to AEs, which they linked to one maternal death [59]. This issue resulted in a rejection of a blood transfusion. Cultural issues were most dominant. For instance, cultural beliefs and social norms in Malawi contributed to women avoiding hospital delivery [59, 106]. These include the view that bleeding and convulsions are part of a normal delivery process but not signs of an obstetric emergency. An obstructed labour was also believed to be the result of witchcraft that would lead to death if a caesarean section were conducted. Furthermore, in Burkina Faso, it was a “sign of pride for a woman in that community to endure labour pain and not seek help until the “cutting of the cord”, and this delayed hospital arrival [61].

Four studies identified a cultural practice whereby a key decision-maker in the family decides whether a woman should go to the hospital or not as impeding timely access to care [28, 85, 98, 100]. A delay in seeking care was reported to occur when the decision-maker was absent [85], which had contributed to near-misses where the woman had to wait for permission to go to the hospital [98]. This issue had delayed consent for surgery, cited as the contributory factor in one intrapartum stillbirth reported in a study from Nigeria [28].

Other cultural practices included a heavy reliance on traditional birth attendants (TBAs) or traditional doctors for pregnancy and delivery [38, 59, 83, 87, 100, 106, 116]. One study found that in 9% (53/564) of maternal near-misses and mortalities, a woman or her relative had consulted a traditional doctor, and 49 of these admitted using traditional remedies [100]. Some of the traditional medicines used by the TBAs were identified as harmful [83, 106]. For example, unsafe quantities of herbal oxytocin had been

administered to hasten labour [59]. Traditional medications from the TBAs were also found to be used secretly even while the women were in hospital [106].

Finally, the literature showed that healthcare for mothers during delivery is generally not free in Sub-Saharan Africa. Thus, lack of money and the need to pay at the point of service made accessing timely care difficult for some families, as identified in 12 studies [28, 38, 45, 47, 53, 54, 61, 72, 80, 85, 91, 96]. Fees for transportation to healthcare facilities and hospital expenses such as prescriptions and hospital admission were also shown to be challenging for women with financial constraints in Nigeria and Burkina Faso [54, 80]. Poverty was identified by care providers as a barrier to seeking appropriate care and the main reason for women patronizing health facilities of lower status, according to one Nigerian study [47]. Financial problems may also be a factor in ANC booking, and the poor maternal condition on arrival discussed earlier, as well as the reliance on traditional birth attendants. One study from Nigeria identified inability to pay as a leading contributor to substandard care for women with severe maternal outcomes [45].

Extent of preventability of adverse events

This section presents evidence related to the extent to which AEs identified were considered preventable and the outcomes of interventions conducted to minimise AEs.

Evidence from seventeen studies highlights variations regarding the extent to which AEs identified were considered preventable and the terminologies used to denote (measure) this.

As mentioned in chapter one, significant numbers of AEs are considered preventable with ordinary standards of care. As shown in table 6, evidence from seventeen studies indicates that the extent to which identified adverse events are judged preventable is high and varied among the studies. The extent of preventability in this review ranged from 35% in Ethiopia [86] to 100% in Ghana [83]. However, this variation in the extent of preventability figure among the countries is also noted within the same individual country. For example, the extent to which studies from Nigeria found AEs to be preventable ranged from 50% in all the public tertiary hospitals [45] to 70% in the Enugu teaching hospital [53]. However, the difference in the extent of preventability of AEs in the latter study could be due to differences in studies' publication dates, higher quality maternal care or variation in the severity of cases received at the hospitals studied.

The considerable variation in the extent of AEs' preventability among and within countries could be related to differences in the levels of the hospitals studied. While some of them are primary centres managing uncomplicated cases, others are referral/teaching hospitals that received pregnant women with comorbidities. It could also be because the studies focused on cases with severe patient outcomes, primarily deaths, as one of the studies noted deficiency in care among women who died compared to those with maternal near-misses [45].

Table 6: Extent to which the identified adverse events were preventable

S/N	Study	Country	Setting	Data collection duration	Data source	Type of AEs	Extent of preventability
1	Adusi-Paku, Antwi et al.(2015)	Ghana	1 regional hospital	January- December 2012	CNR, physical inspections, key informant and staff interviews	Maternal mortality	45.4% inadequate care
2	Hailu, Enquenelassie et al. (2009)	Ethiopia	5 Public	December 2005-May 2006	CNR, interviews with health workers	Maternal mortality	35.2% avoidable
3	Madzimbamuto, Ray et al.(2014)	Botswana	Nationwide (all levels of care)	2010	CNR	Maternal mortality	47.27% avoidable
4	Ozumba and Nwogulkojo (2008)	Nigeria	1 teaching hospital	January 2003-December 2005	CNR	Maternal mortality	71.42% avoidable
5	Sayinzoga, Bijlmakers et al. (2016)	Rwanda	Nationwide facility based	January 2009-December 2013	CNR	Maternal mortality	61.1% substandard care
6	Thorsen Meguid et al. (2011)	Malawi	1 district referral hospital	1st January 2011-30th June 2011	CNR, Interviews with health workers	Maternal mortality	85.7% health system malfunction
7	Oladapo, Adetoro et al. (2015)	Nigeria	42 tertiary	1st June 2012-14August 2013	CNR	Maternal near-miss & mortality	49.6% care deficiencies in NM and more common among MM.
8	Dumont, Tourigny et al. (2009)	Senegal	5 reference hospitals	May 2004- July 2005	CNR, focus group discussion, interviews with staff, questionnaires and participant observations	Maternal mortality	48% avoidable
9	Sorensen, Elsass et al. (2010)	Tanzania	1 regional hospital	July-November 2007 and July - November 2008	CNR, hospital registration books, maternal death audit forms, participant observation and interviews with staff.	Maternal mortality	49% substandard care.
10	Onah, Okaro et al. (2005)	Nigeria	1 teaching, 1 specialist and 4 other hospitals	1st December 2003-30th April 2004	CNR and interviews with staff	Maternal mortality	79.8% preventable
11	Nyamtema, De Jong et al.(2011)	Tanzania	1 tertiary	6th October 2008-8th July 2010	CNR	Maternal near-miss & mortality	94% substandard care
12	van den Akker, van Rhenen et al.(2011)	Malawi	1 district hospital	September 2007-September 2009	CNR	Maternal near-miss & mortality	In 30 cases, 67% substandard care.
13	Dumont, Gaye et al.(2006)	Senegal	1 district hospital	1st January- 31st December 1997-December-2000	CNR	Maternal mortality	91% avoidable
14	Ansong-Tomui, Amar-Klimesu et al. (2007)	Ghana	8 hospitals	January- July 2006	CNR	Maternal mortality	All substandard care
15	van den Akker, Mvagogomba et al. (2009)	Malawi	1 district hospital	20th August 2007-20th August 2008	CNR	Uterine rupture	7 audited with 4 ruptured in hospital all of which were substandard care
16	Benimana and Small (2018)	Rwanda	1 teaching hospital	1st January 2015-31st December 2015	CNR	Maternal near-miss & mortality	65% NM and 10% MM preventable
17	Pembel, Paulo et al. (2014)	Tanzania	1 national hospital	1st January- 31st December 2011	CNR	Maternal mortality	82.3% substandard care

CNR=case note reviews

MM=Maternal mortality

NM=Near-miss

The findings also noted some variations regarding terminologies used to denote (measure) that the AEs were preventable, which possibly resulted in the given variations in the extent of preventability figures. See table 7 for details of the terminologies.

Table 7: Terminologies used to measure/denote AEs preventability

Study	Terminology/measure
Ansong-Tornui, Armar-Klemesu et al. 2007 van den Akker, Mwagomba et al. 2009 Sorensen, Elsass et al. 2010 Nyamtema, de Jong et al. 2011 van den Akker, van Rhenen et al. 2011 Pembe, Paulo et al. 2014 Sayinzoga, Bijlmakers et al. 2016	Substandard care
Dumont, Gaye et al. 2006 Ozumba and Nwogu-Ikojo 2008 Dumont, Tourigny et al. 2009 Hailu, Enqueselassie et al. 2009 Madzimbamuto, Ray et al. 2014)	Avoidable
Onah, Okaro et al. 2005 Benimana and Small 2018	preventable
Adusi-Poku, Antwi et al. 2015	Inadequate care
Oladapo, Adetoro et al. 2015	Care deficiency
Thorsen, Meguid et al. 2014	Health system malfunction

Only two studies provided a precise definition for any of the above terms [76, 90]. They defined "substandard care" as care below acceptable national standards. Fourteen of the studies provided details on how the preventability of adverse events was assessed/measured, using two approaches. The first approach measures the quality of care against national, district or WHO standard of care [81, 97, 99, 103], three delays model [100, 102], or an adapted scoring system of quality of care from Komfo Anokye teaching hospital [84]. Any deviation from the standard is judged as substandard, avoidable, or inadequate. One study that defined substandard care created criteria to judge this using WHO recommendations for auditing maternal death [90]. The second approach is based on clinical expert panel members' judgement that adverse events could have been prevented with different care. This approach is used by the majority of the studies [38, 45, 54, 83, 86-88, 91, 93, 96]. Subjectivity may not be eliminated using this method, as most of those who judged the preventability of the AEs either participated in the care of the cases presented or were staff in the hospitals studied.

Evidence from the included interventions studies identified various efforts conducted to mitigate AEs in the SSA hospitals and their effectiveness. The type of intervention, outcomes reported are summarised in Table 8. Four sets of intervention components were identified in the included studies. These are audit and feedback cycle, educational training, improvement projects and standard-based management recognition. Audit and feedback cycles were found in half of the studies (11/22).

The outcomes measured include improvement in quality of service/care (components of EmOC and patient communication), reduction in AEs (primarily maternal mortality, and foetal deaths and uterine rupture), and improvement in resources (building structures, material and human).

The most reported outcome measured was the proportion of quality of services/care (N=16). Seven studies reported significant improvement in quality of service following the interventions, and another seven studies just reported the outcome without measuring the significance. One study found no significant improvement in the quality of service.

Twelve studies reported improvement (reduction) in AEs for women. Seven of these studies reported a significant reduction in the number of women experiencing AEs. Three reported a reduction in AEs but did not measure significance. Two others reported no significant reduction in AEs.

Seven studies reported on resource improvement after their intervention, of which the majority (n=6) reported just the outcome without measuring significance. Only one of these studies reported a significant improvement in resources.

One of the intervention studies did not report any outcome because it tested the potential of the intervention in the settings [116].

While the evidence suggests that some of these interventions had the potential of reducing AEs, the majority (20) of these studies were not of good quality due to weaknesses identified in areas of their design, sampling, data collection and data analysis. Of significant importance is that only one study reported confounders, which may have influenced their results [79]. Therefore, it was unclear how these interventions worked to bring about the outcomes reported.

2.4 Discussion

This systematic review summarises evidence from the literature relating to maternity care AEs in Sub-Saharan African countries. The discussion will be centred around the review questions: the type of AEs, their contributory factors, and the extent of preventability of these AEs. This section will also consider the limitations of the studies reviewed, and the review process, and the research gaps, which justify the area of focus in this PhD thesis.

Analysis of 74 papers across the Sub-Saharan African countries indicates a lack of sufficient research evidence across all the countries and even within individual countries. Nigeria, which is of significant interest in this thesis, had only eleven studies. Only one of these was a multicentre study of federal government-owned tertiary hospitals in several states [45]. This means the findings may not reflect the situation in the other non-federal hospitals in the 36 states of the country. The other ten studies were conducted in only six different states, leaving several states potentially not included in any study [28, 46-54]. However, many of the studies had provided an adequate description of their study context and there are consistencies in the evidence relevant to the review questions. The findings are deemed applicable to Nigeria because they seemingly bear significant similarities.

The small number of studies from Nigeria provide limited evidence regarding AEs in maternity care in this country. However, expanding the literature to include SSA has provided a more comprehensive picture, which would not have been possible if restricted to Nigeria alone. Despite the methodological diversity and limitations of the studies, insights from them add to the understanding of maternity care AEs within the Nigerian and SSA context. The main findings of this review are summarised in the following points:

- Severe patient outcome, especially maternal mortality, was the main focus and most reported type of maternity care AE.
- Organisational/management-related issues were the most reported aspect of contributory factors for AEs.
- The extent to which the AEs identified were judged preventable was high and varied among the countries and within a given country. However, the review noted the use of different terminologies to denote preventability, a lack of standardised definitions and measures of preventability across the studies.
- Some of the interventions conducted to address maternity care patient safety had shown some improvement potential but it is unclear how they work.

- Few of the studies were of strong methodological quality based on the use of established scoring criteria.

2.4.1 Types of adverse events

The focus on maternal mortality as the most reported type of AE in maternity care in the Sub-Saharan African studies could be related to campaigns intended to reduce global maternal mortality, with the region having the highest global ratio of maternal mortality [125]. Moreover, many of the SSA countries are signatories to a commitment to reduce maternal mortality by 75% by 2015 as part of the 8th Millennium Development Goal [126]. However, realising this target in the SSA region remains an area of challenge because this target is still far from being achieved. It has been reported that SSA had the highest global maternal mortality rate, at 546/100,000 live births compared to high-income countries with about 12/100,000 live births [127]. The findings of this review indicate that some of the African countries had figures below the given 546/100,000 live births, while others had far higher. This variation is found in Nigerian studies reporting maternal mortality. The most recent paper, which was based on 42 tertiary facilities, found an MMR of 1088/100,000 live births. This figure was close to the estimated figure of 917/100,000 in the global report on maternal mortality between years 2000 and 2017, reported by WHO, UNICEF, UNFPA, World Bank Group, United Nations Population Division [125]. While the findings of this review showed that Nigeria had the highest maternal mortality ratio across the SSA countries included, the global report document showed that the maternal mortality ratio of three countries in 2017 surpassed that of Nigeria; Chad 1140/100,000, Sierra Leone 1120/100,000 and South Sudan 1150/100,000 [125]. This highlights why this problem remains the focus of research in the SSA region at large.

In contrast, literature from parts of the world with lower rates of maternal mortality concentrate more on other types of adverse events in maternity care that are generally associated with less severe outcomes. such as a third and fourth-degree perineal tear in the UK [128], Finland [129], and Ireland [130]; inappropriate use of medication such as oxytocin in the UK [131] and Sweden [132]; misguided action such as pushing the top of the woman's abdomen in Canada [133]; hospital acquired infections and retained vaginal swabs in Ireland [134].

Additionally, the Sub-Saharan African studies reviewed were limited in their reporting on women who suffered maternal mortality as sub-groups. For instance, a significant number of the women who died were reported as poor antenatal attendees (did not book/booked late for antenatal care) and suffering from other health conditions on arrival

at the hospital, which could have decreased their survival chances [135]. Similarly, information is lacking on low-risk women (those who were well on arrival and booked for antenatal care) who were not expected to suffer maternal mortality but did. Knowing why and how each category was affected by AEs could be useful evidence in strategising care plans for pregnancy and delivery. The review identified multiple contributory factors in the system of care, which would lead to other AEs.

2.4.2 Contributory factors of adverse events

A range of contributory factors for adverse events relating to maternity care were identified and categorised as organisational/management, personnel, equipment and supplies, or environment and service uses-related. The findings also highlight the context in which maternity care was provided and in which AEs occurred. Overall, these contexts had significant weaknesses that increased the risk of AEs for maternity service users. Analysing the findings through the systems lens suggests a potential inter-relationship between the contributory factors. This means some of the contributory factors could facilitate other factors' occurrence. Activities of staff around the sharp-end of service delivery appear to have the most significant impact. However, these may have been the result of distal factors at the organisational/management level, for example, staff shortages, poor staffing arrangements, poor access to senior clinical staff and lack of or inadequate staff training. This means it is necessary to look deeper into the system not just at the point of care provision.

The hospital staff shortage highlighted in the review is a global phenomenon, not only affecting SSA [136]. Although not as severely affected as the Sub-Saharan African region, high-income countries such as the United Kingdom also experience this problem. Suboptimal care identified in the Mid-Staffordshire hospital scandal was attributed to staff shortage [137, 138]. It was also cited in the report on "the safety of maternity services in England" [139]. Staff shortage threatens patient safety and creates a barrier to providing quality care for women [59]. This also creates stressful working conditions for the staff, affecting their physical, psychological, and social wellbeing. It has also been associated with reported negative attitudes of midwives towards the women they cared for [107].

Little is known from the literature reviewed on the efforts the SSA countries are making in order to address staff shortages in hospitals. One study from Malawi [106] reported the introduction of a locum system to improve hospital staffing levels, but found the system ineffective as those available for locum work were already tired staff who needed the money. However, a lack of availability of healthcare staff may not be the case in all countries. For instance, there was a report of large numbers of unemployed health care

staff in Kenya despite the need for about half as many again as those already employed [140]. This could be due to the insufficient financial resources to employ more staff.

The literature review highlights evidence indicating that poor organisational arrangement of staff and communication problems could result in low staffing levels, poor access to senior clinical staff, failure or delay in emergency response, delay in procedures, failure to seek help or supervision. For example, the staffing arrangements, whereby doctors worked during the day only or were called in when needed, could either signify an avoidable staff shortage or an actual staff shortage [63, 83, 109].

Furthermore, the findings demonstrated that a number of women suffering AEs had not been seen by senior clinical staff [83], which again could be as a result of poor staffing arrangements or a lack of adequate cover [109]. This could also be a factor in delayed emergency responses or procedures, as well as the absence of help or supervision identified. Some of the behaviour of staff, such as unauthorised absences observed among midwives, could also worsen staff shortages [63]. Some of the studies also reported inappropriate behaviours such as the illegal sale of drugs, delivery supplies and payment for services [63], and disrespect of women's rights [107]. These behaviours could be minimised with appropriate support and supervision.

Despite health workers being required to update their knowledge and skills by professional bodies such as the Nigerian Nursing and Midwifery Council (NMC) and the Medical and Dental Council of Nigeria (MDCN) [141, 142], some of the studies highlighted a lack of staff training, knowledge and skills as contributing to misdiagnoses [28] and inappropriate medication [83]. Inadequate training was listed as a significant factor in health care workers' dissatisfaction with their jobs [143, 144].

The general healthcare context of maternity care in SSA countries was characterised by inadequacies of basic equipment, medicines, consumables, electricity and water supplies. These findings presented in this review are consistent with a systematic review of the "third delay in developing countries", in which basic medical supply shortages are identified as delaying emergency procedures and increasing risk [145]. While the review considered the implication of these shortages at the proximal or sharp-end of care, the findings of the current review suggest the need to look deeper into the organisation/management. In Nigeria, hospital management influences the type and quantity of drugs purchased for their hospitals. Similarly, in Mozambique, the management of one hospital lobbied the ministry of health's pharmaceutical centre to include magnesium sulphate in their shipment [114]. The system of "pay at the point of

service” [28] that operates in Nigeria and other SSA countries makes the availability of medical supplies during care dependent on the service users’ financial ability to pay for the required supplies. However, the organisation/ management can hasten the process of making supplies available at the frontline, particularly in emergencies and for those with financial constraints, as was done in other SS settings [91].

Organisation/management may seem to have little or no control over other contributory factors: geography (long-distance and transport issue) and women/patient-related factors, but their continued effort in health promotion activities in the clinics, communities and media, could change some of the women’s behaviours such as poor antenatal booking/attendance, delayed arrival and other cultural and religious practices, particularly those linked to delay in seeking care [146]. Women’s experiences could also be improved by ensuring that staff observe simple patient rights such as respect, informed decision making, and care involvement [147]. This highlights the need to create an opportunity for women’s engagement with service evaluation and improvement activities to understand their concerns and improve services.

The systems for staff engagement with service evaluation and improvement activities were found to be poor. This was due to communication failures between the organisation/management and staff and exclusion of certain staff cadres or ranks in these activities, such as audits, maternal death reviews [60, 80, 117, 119]. Most staff in the literature were particularly displeased with the lack of anonymity, respect, and the existence of blame culture [80, 81, 93]. In countries with stronger healthcare systems, the UK, for example, the contributions of staff were generally valued [148]. This is because of the realisation that better quality care is found in hospitals with better staff engagement. (King’s Fund [149]. Therefore, it is important to consider better engagement with staff and make them feel more valued.

2.4.3 Extent of preventability of adverse events

The extent to which the AEs identified were judged to be preventable varied across the SSA studies and within individual countries. While the findings are not expected to be the same, the use of different terminology to denote preventability, lack of standardised definitions and measures of preventability across the studies could explain the considerable variation observed. Preventability ranged between 35 [86] and 100% [83]. These figures are similar to those reported by a large study of eight developing countries (Egypt, Jordan, Kenya, Morocco, Tunisia, Yemen, Sudan and South Africa) [5]. Their

review of 15548 patients record found AEs ranging between 2.5% -18.4% per country, with the majority (83%) viewed as preventable [5].

This variation can be explained by differences in the healthcare systems of the countries studied [150]. Health systems consist of all organisations, institutions and resources necessary to meet the healthcare needs of the population [151]. Another possible factor could be variation in the quality of care practices of different healthcare workers, as discussed in some of the studies reviewed [63, 64, 83, 109]. Finally, methodological differences among the studies could also be a reason [5, 152, 153]. Even in those studies using the same design, such as case notes reviews, some studies failed to adhere to all of the steps required, including reviewer training, use of an extraction form and reviewer consensus, which contribute to ensuring the reliability of the results [117]. This may have resulted in overestimation/underestimation of preventability.

This systematic review has highlighted the issues and gaps in the existing literature, and served as a stepping stone in identifying the types, contributory factors to AEs in maternity care and the extent of their preventability. The review indicates a gap regarding what underpins the contributory factors to AEs occurrence and how or why the hospitals' existing mechanisms work or not in dealing with and preventing AEs occurrence.

2.4.4 Limitations of the review

The search terms used in this review did not include specific individual AE or Sub-Saharan African country, which may have excluded some potentially relevant studies. However, the search terms used were developed from previous published studies making them sensitive to capture relevant literature. Exhaustive reference and citation searches were also used to ensure the inclusion of all relevant studies. Not including individual country or Sub-Saharan Africa in the search terms but selecting them after searching the database at the screening stage, which appeared most appropriate and in-line with other studies [154, 155].

One reviewer conducted the literature search, quality appraisal, and data extraction. This could have led to the omission of some studies or selective reporting of findings. In addition to supplementary searches (reference and citation searches) to ensure all relevant studies were included, a uniform abstraction sheet was used to extract information from the studies. Supervisors also double-checked some selected papers and reviewed extracts to check for potential selection and reporting bias.

Another potential limitation of the review was the lack of an established quality appraisal tool for the case note review studies. However, a checklist was developed based on identified literature, which was consistently applied to all studies.

2.4.5 Limitations of the studies

The main limitations found in the studies reviewed are listed as follows:

1. The studies were limited in their reported outcomes as they mainly focused on maternal mortality.
2. The studies fail to consider women as sub-groups, thus not exploring which different groups were affected by the reported AEs.
3. The studies were inconsistent in their definition, use of terminologies and measurement of preventable adverse events, limiting the extent of their comparability.
4. While organisational/management-related issues were the most reported aspect of contributory factors to AEs, there remains a gap in the literature on how and why they occur.
5. Most of the studies used retrospective approaches to identify adverse events, the extent of preventability and/or contributory factors, relying on documented events and recall of events that could have omitted some significant aspects.
6. Some of the interventions conducted to address maternity care patient safety had shown some improvement potential but it is unclear how they work.

In conclusion, a high level of preventability of maternal mortality in maternity care is suggested across the studies, and are affected by a variety of factors. However, there is a gap in the existing literature regarding contributory factors to AEs. Although the studies categorised contributory factors of AEs, none of them sought adequate explanations regarding how and why these events occurred. The influence of organisational/management issues in this context was found to be substantial. This is consistent with evidence from the UK NHS, which links patient safety issues to multiple failures within the organisation [156]. While some of the interventions attempted in the SSA context had shown some potential, it is still unclear how these resulted in the outcomes. An in-depth understanding of the context in which these interventions are being introduced is essential. Nigeria has the largest population in Africa, with a weak, deteriorating health system and falling healthcare standards, signifying urgent need for improvement [25]. The limited research within the Nigerian context makes it a suitable setting for further exploration. The proposed research explores organisational factors underpinning adverse events (AEs) in maternity care in a Nigerian teaching hospital. The findings will be used to highlight key areas that

could be used to inform future organisational management interventions applicable to this or similar settings.

CHAPTER 3: METHODOLOGY AND METHODS

Chapter two highlighted a gap in the existing literature relating to contributory factors to adverse events (AEs). While the studies categorised AEs contributory factors, none of them sought adequate explanations regarding how and why these events occurred. The influence of organisational/management issues in this context was found to be substantial. The proposed empirical research explores organisational factors underpinning adverse events (AEs) in maternity care in a Nigerian teaching hospital. The findings will be used to highlight key areas that could be used to inform future organisational management interventions applicable to this or similar settings.

This chapter begins with restating the research questions, aims and objectives and considers the theoretical underpinnings and methodology of the research. It then outlines the methods used to collect and analyse the data, including selecting the study site and sampling processes. The chapter then outlines ethical considerations.

3.1 Research questions, aims and objectives

Research questions

1. What organisational and/or management-related factors potentially contribute to AE in the maternity unit?
2. How are the potential and/or actual contributory factors of AEs identified, reported and managed?

Research aim:

This study aims to understand the organisational and/or management-related factors contributing to AEs within a case study hospital maternity department in Nigeria.

Research objectives:

1. To observe the activities of frontline maternity staff in a hospital in Nigeria, to examine the systems, processes and actions that could and/or potentially result in AEs.
2. To examine the processes of identification, reporting and managing AEs in a Nigerian hospital maternity service.
3. To explore frontline maternity staff and hospital managers' views on their experiences of AEs, potential contributory factors and systems to manage AEs.

3.2 Theoretical underpinnings

Researchers are guided by a combination of theoretical principles; ontology, epistemology and methodology, which are simplified by Scotland [157] as follows. Ontology is concerned with reality or knowledge and is about the researcher, the researched and the readers' perceptions of reality or knowledge. Epistemology is about how reality or knowledge is made known to the researcher and concerned with the process undertaken by the researcher to gain knowledge. A researcher's approach to ontology, epistemology and methodology is determined by their philosophical assumption of reality. The different types of approaches that have been identified include but are not restricted to positivism, constructivism and critical realism [158, 159].

This study's philosophical assumption is guided by a systems approach, which provides the theoretical framework that guides this thesis [160]. Systems approach developed from many early scientists' efforts to find an alternative theory to the reductionists and mechanistic views of the industrial revolution [161]. The reductionism views the world and all it contained as an assembly of small and distinct parts, which fits examination in isolation, essentially to have a more profound specific understanding/knowledge of smaller and more well-defined items than larger and less-well defined ones. This contrast with the systems approach, which views a system as the sum of its parts; therefore explanations/understandings cannot be reduced to accounts of individual constituent parts. The systems approach seeks to provide explanations/understandings by looking at the whole system.

One of the early proponents of systems approach is a biologists', Ludwig Bertalanffy, who in 1968 came up with the concept of General Systems Theory (GST) [162]. Bertalanffy's GST concept was based on his holistic view of an organism, i.e., its entirety, emphasising an interactive relationship between components rather than individual components. Bertalanffy proposed applying the GST view to other studies of the human psyche, social institutions, and the global ecosphere as he considered it relevant to many fields. Bertalanffy's GST from biology aligns with Laszlo's understanding of systems approach. However, Laszlo, a humanistic researcher, extend the systems approach to consider the influence of the environment on human interaction. According to Laszlo's systems philosophy, a causal effect results from human beings' social interaction with their environment (context) [163]. This means the context helps illuminate the condition that promotes or impedes the operation of causal mechanisms underpinning reality or knowledge [164].

Many healthcare researchers recognised the importance of systems approach, proposing that improvement in healthcare outcomes should be based on a systematic consideration of the whole system within which those outcomes occur [165]. Such a need to understand and appreciate the context remain significant in researching healthcare adverse events. Reason's work on adverse events highlighted the significance of the systems approach in understanding adverse events. His influential work clarified that latent conditions (such as policies or decisions at the senior managerial level within, for example, a hospital organisation) could create inherent weaknesses (such as low staffing, time pressure, fatigue and inadequate equipment) and when these combined with active failures (e.g. slips, lapses, mistakes, procedural violations) adverse events (AEs) results [160].

This study, guided by systems approach, adopts a proactive approach to develop a deep understanding of these latent conditions within the study setting and identify solutions that could be transferable to similar systems. The systems approach provided a conceptual framework for organising my ideas around the potential contributory factors for maternity care adverse events.

Drawing on the systems approach principle helped address some of the limitations of previous studies as listed in Chapter Two (2.4.5). For example, many studies rely on a reactive approach, focusing on severe patient outcomes (mostly maternal mortalities). This approach identifies AEs and/or their contributory factors after they occurred and potentially misses important contributing factors to AEs, especially those at the organisational/management level. However, this weakness is addressed in the current study's proactive (prospective) approach. The proactive approach helps capture contributory to AEs factors before they occur rather than afterwards.

Another limitation of previous studies was the lack of detail on how and why the contributory factors to AEs occurred. The systems approach adopted in the current study provided a better understanding of the contributory factors to AEs. This allowed an in-depth exploration of different components of maternity and the general hospital context to identify how and why AEs and/or their contributory factors occur. In addition, using a combination of observations and interviews helped provide more reliable real time information than retrospective accounts.

3.3 Case study design

A qualitative case study design involving multiple data collection methods was employed to explore the processes and systems that may contribute to AEs for women attending for delivery in one Nigerian teaching hospital's maternity unit. A maternity unit is a complex environment, and contributory factors to AEs may be multiple and interlinked. Therefore, a qualitative approach was chosen to enable the researcher to understand and analyse complex factors and processes within the selected setting [166-168]. This approach seemed most appropriate in enabling an in-depth understanding and analysis of how these factors are related, and how staff attached meanings to them.

The use of case study design is rooted in anthropology, psychology, sociology, political sciences, and, latterly, health service research [169]. It is useful for understanding complex social phenomenon in the case's natural context [169-171]. A case can be a specific individual, group, organisation, community, nation or decision, policy, process, incidence, event or any other thing which could be taken as one or multiple [170, 172]. In this study, the O&G department of one Nigerian teaching hospital was selected as the case study.

A case study design was selected because of its three features; holistic, intensive and flexible [169]. Its "holistic" nature, which seeks to preserve a case's uniqueness, makes it ideal for studying complex phenomenon within a real-life setting, such as a hospital [158, 169, 173]. It means that the phenomenon of interest in the case study, i.e. contributory factors to AEs, are inseparable from the setting in which they occur. Thus allowing the researcher to make sense of the context in which AEs and their contributory factors arise. This feature distinguishes the case study design from others, such as experiments, which purposely separate the phenomenon from the context [173]. The intensive nature of a case study differentiates it from other types of designs because it provides the potential for answering the what, how and why questions [169, 174]. This makes it possible for researchers to "explore" a phenomenon not well understood, provide "explanation" by covering a great deal of depth on the issue and use the findings as an "instrument" of change [175], all of which were goals for this research. Lastly, the case study's flexible nature makes it applicable to any research approach [166, 173, 176]. This flexibility also allows the use of multiple data collection procedures and different perspectives, which enhance data confirmability and in-depth understanding of the problem in question [166, 171, 173, 176].

Although the data collection methods used in this case study were similar to a typical ethnographic approach, it is worth noting that this study is not an ethnography. The difference is that an ethnographer spent a longer duration of time in the field compared to in a case study. The ethnographer also have a close relationship with the observed, which was not the case in this study, where the focus was mainly on the insight they provide on the phenomenon i.e. contributory factors to AEs [177, 178].

At the time of the research, approximately 21 of the 55 public tertiary hospitals across the Nigerian states were teaching hospitals. Northern Nigeria had eight of these teaching hospitals, and this study was conducted in one of them. A teaching hospital was selected for the study because such facilities are training grounds for almost all healthcare workers who provide specialised care, and are expected to provide exemplary care standards that can potentially be filtered to other hospitals. Therefore, findings from a teaching hospital could be useful in establishing the highest care standards that could be rolled out to other hospitals. Therefore, ultimately supporting the national effort to reduce maternal mortality [73].

While the name of the hospital and the state where it was located are protected for anonymity reasons, four factors underpinned its selection for this case study. Northern Nigeria had the worst indices for maternal and infant mortality, and antenatal healthcare facility births, compared to the South/West zones and in the whole country [27, 179]. Therefore, selection of a case study in this area could potentially contribute towards improving this situation. Secondly, the need to spend an extended period (12 weeks) in the research setting influenced selecting a location that is nearer to home. Although I did not live or have family within the town where the hospital was located, being in the North made it a more familiar context and easy to find secure accommodation. Having a safe location to live, and transport to and from the hospital by known individuals during data collection was essential because there can be serious concerns regarding personal safety in Nigeria. Familiarity with the local language and culture was seen as necessary to promote rapport with the study participants and help gain their confidence to participate [166].

Lastly, the hospital's senior management staff indicated their willingness to support access to their maternity unit following an informal conversation with them. Selection of study sites based on an earlier agreement for access has been a common practice by others observing healthcare settings [180-182]. Following the verbal agreement, written permission to conduct the study was obtained from both the hospital and the University research ethics committees after a rigorous process (see 3.6.1 for more detail).

Understanding the context in which the contributory factors occur strengthens this study's findings; thus, a thick description of the setting is provided in the findings section. In summary, the maternity unit of this hospital is within the Obstetrics and Gynaecology department. It had three in-patient wards, which comprised the Labour, Obstetrics and Gynaecology wards, and a Gynaecology Emergency. Initially, the plan was to conduct the study in the Labour and Obstetrics wards because they provide maternity services, i.e. pregnancy, delivery and aftercare. However, I decided to include the Gynaecology emergency because it was primarily the main entry point for women coming to this department, except when they were admitted from the clinic. I thought that including the Gynaecology emergency may reveal potential AEs and or their contributory factors that may affect the women coming to the department, which may not be present in the other wards. The Gynaecology ward was excluded because it generally dealt with gynaecological conditions but not labour and delivery.

Selecting a gatekeeper before fieldwork has been shown to not only help in negotiating access to the research context but is also crucial in establishing and maintaining positive relationships in the research field [166, 181, 182]. A senior staff member who assisted with gaining access to the setting was the main gatekeeper for this research. This staff member introduced the study to senior staff in the Obstetrics and Gynaecology (O&G) department and hospital management. In this study, the gatekeeper was especially useful, offering strategies that helped recruit some particular staff that would otherwise not participate. They invited me to the hospital's multidisciplinary patient safety team and clinical governance meetings, which I would not have known were taking place. Some of the staff in O&G provided an introductory tour around the hospital and O&G department's key areas to see the wards and meet with all available key staff. The majority of them supported me to reach the participants and information I needed.

As part of negotiating access, information about the study and how it would be conducted was provided to the staff verbally and through various visual processes including posters, fliers, information sheets and consent forms (See Appendix 4-7). Providing this information remained an ongoing process throughout the fieldwork time. More detail on how this was conducted will be provided in the following section. A key issue made clear during all stages of communicating information to potential participants was that my presence was to examine systems and processes and not to evaluate their individual practice. Since I was not a staff member and wore no uniform, my presence and researcher role were made visibly clear by having a nametag with a researcher written on it during all the observations.

3.4 Data collection

3.4.1 Sampling

The selection of participants for observations and interviews was purposive. This is a form of non-probability sampling based on deliberate inclusion of participants for their particular knowledge [158]. This study included senior hospital managers, doctors, nurses/midwives, and some additional staff perceived to have information related to the systems and processes that would help illuminate the contributory factors to AEs. Observations in O&G mainly included doctors and nurses/midwives as frontline staff are considered a valuable source of information that can inform patient safety improvement [183]. There were also a few instances where support workers (healthcare assistant or porter) were briefly observed when their activities directly related to the research objectives. Establishing the precise number of participants at the outset of a qualitative study is generally impossible [164]. This was the case with this study, and sufficient sample size was achieved with data saturation i.e. when a total of 32 different hospital staff members were interviewed.

The study used two different qualitative data collection methods (observation and interviews) to obtain a rich and comprehensive examination of the hospital, with both data collection and analysis also guided by a systems approach (Reason 2000).

Data were collected over a 12 week period (between 4th April 2017 and 30th June 2017). This data includes 126 hours of observation in the research context and 32 in-depth-interviews with a range of staff members. Both data collection methods were applied simultaneously, addressing the research questions, proving understanding and confirming issues as they emerged. The specific process employed for data collection is below:

3.4.2 Non- participant observation

Observation is regarded as a form of data collection whereby the researcher becomes the data collection instrument [184]. Observation is recommended as an appropriate method for studying patient safety issues in hospitals with poor medical records such as those in Nigeria [185]. The context of care in O&G is complex and dynamic, and a more holistic perspective on this setting could be better achieved when the researchers embed themselves into it [186]. By spending time in the hospital setting, the researcher can directly study, observe and understand how and why staff actions may differ from their accounts of their actions given in other self-reported research methods such as questionnaires and interviews [159, 164, 182]. Observation is instrumental in highlighting

the processes and structures underpinning healthcare [182, 186], and will potentially highlight how and why the contributory factors to AEs occur.

Gold (1958) [180, 187] described four ways in which a researcher can observe a setting. These include;

1. The complete observer: who maintains some distance, does not interact and their role is concealed;
2. The complete participant: who interacts within the social situation, and their role is also concealed;
3. The observer as a participant: who undertakes intermittent observation alongside interviewing but whose role is known;
4. The participant as an observer: who undertakes prolonged observation and is involved in all the organisation's main activities and their role known.

Other authors distinguished the observer role as either participant or non-participant. The participant-observer is actively involved in the clinical activities of the setting. In contrast, the non-participant-observer is purely in a researcher role and does not partake in the care provision [181, 182]. These given descriptions of non-participant observer and observer as participant roles are similar. However, Wind [188] regarded these terms as inadequate, in failing to acknowledge the negotiated interactions undertaken during the fieldwork and proposed a negotiated interactive observation term. While the Wind [188] definition well matched the role adopted in this study's data collection, the non-participant observation term will be used when referring to this role because of its well established use in observation research.

Despite my background as a nurse/midwife, I was not involved in the context's clinical activities and the staff were aware at the outset that my role would be as an observer only. However, there were moments when it was appropriate to assist in a non-clinical way, for example, passing instruments or documents. This role enabled me to have adequate time to observe what was happening and take field notes without being too engaged in providing care, which is one of the advantages of non-participant observation [164]. The researcher not being a part of the hospital staff could also make the participant perceive them as not having a preconceived opinion. Therefore, they could feel safe to divulge complex organisational information that could shed more light on the context's systems and processes [189].

One major weakness of observation is the Hawthorne effect, referred to as people adjusting their behaviour to a perceived desired action when being watched [189, 190].

However, similar to others, this study noted that Hawthorne effect appeared to be short-lived in a busy clinical setting when staff become used to the researcher's presence, especially when most of them are often too busy to maintain behaviour different from their usual behaviour for a long time [180, 191]. Moreover, in this study, the staff were aware that the research was focused on the whole system and not them as individuals, which may have helped make them feel relaxed about my presence. For the staff to feel comfortable with my presence, I engaged them in non-research conversation such as weather or Nigerian current affairs during their less busy times, which seemed to have helped.

Observation data may be collected in a structured or unstructured format [158, 192]. While data collection in structured observations is systematic, applying checklists or specific questions, the observer in the unstructured observation can record naturally occurring phenomena and are not restricted to previously identified concepts and actions. This study adopted the unstructured approach of being open to what may be observed, not restricting the observations to a predetermined behaviour or action [158, 180]. Data from informal conversations and examination of relevant documents were incorporated within the observation part of the study.

Informal conversations

Observations allow for informal discussion between the observer and the observed. This helps to make the respondent more at ease, build rapport, clarify any unclear aspects of the observation, and confirm interpretation of events [193]. Staff were asked questions about care or work-related activities being observed while carrying out those tasks if deemed convenient for them or later when they were seated at the nurses' station or free. Staff were also asked for further information or views relating to issues identified in previous observations and interviews.

Examination of relevant documents

Documents are data sources that have been recorded without the researcher's input [194]. Researchers generally use documents based on their text value, i.e. as an object or as a source for their content value [195]. In this research, documents were used as a source, examining relevant hospital documents such as incident reports, patient charts, duty rosters, job schedules and doctors presentation to better understand staff activities and the context of care [184, 196]. This source provided additional in-depth data that complemented the other data [194]. The specific information collected from the documents were written in the observation field notes. The data from the documents

helped inform observations and interviews by confirming or contradicting staff responses and provided direction for a subsequent area of focus.

The observation adopted a "three-stage funnel process", as Adler and Adler (1994) describe [197]. This comprised a "descriptive observation", which involved conducting observation with an open mind to see what things might occur. Then "focused observation" characterised by concentrating observation on specific issues. Finally, "selected observation" in which the observer narrows their attention to highly specific occurrences. However, these processes are acknowledged as not being mutually exclusive [197]. Therefore, I remained flexible in applying them during the observation, given the complexity of a busy O&G department. The observations were conducted in an open environment within the O&G department (three in-patient wards and meeting rooms) and hospital auditoriums. However, two brief informal conversations with laboratory staff took place at their offices in the laboratory grounds.

I began with a period characterised by more descriptive observation. This comprised of a one week observation of between 2-5 hours each in the Labour, Obstetrics and the Gynaecology emergency ward and of staff meetings. The observations generally captured activities of a range of staff such as consultation, ward round, handing over, medication, vital signs, management of labour and delivery processes; and staff conversation when seated at the nurses' station. This observation provided an initial understanding of the system in which care is provided to women within this department; familiarised me with the staff, and built trust that would encourage staff to consent to participate in further observations and interviews [197]. It also provided me with ideas regarding the areas to probe further. See appendix 5 for a breakdown of observation activities.

The introductory observation phase was followed by both focused and selective observations of three weeks in each ward for 2-4 days per week, an average of 3.6 hours per day. I was flexible with the observation time allocated for each ward, whereby I sometimes followed up specific issues from one ward to another for deeper understanding. For example, as shown in the observation activities and time in appendix 5, in week 4 (03/05/2017), the observation moved from the Gynaecology emergency to the Labour ward. I was able to conduct two-night time observations, one each in the Gynaecology emergency and Labour ward where I spent the longest time (about 9 hours) as leaving in darkness would be a risk to personal safety. This extended observation generated valuable data that may not have been obtained in day time observation. Personal safety made it unfeasible to conduct further night-time observations in these

wards and the Obstetrics ward. Therefore, it is acknowledged that only two night-time observations were made, but a range of days and time of the day were covered as indicated in appendix 5.

During the focused observations, most attention was paid to organisational and management issues contributing to patient safety concerns. The observations examined areas of staffing, workload, emergency response, communication, support and supervision, guidelines and protocols, evidence-based practice, equipment and supplies, communications, reporting, handover, ward round, women/patient monitoring, medication, ward round documentation (incident reports and nurses/midwives' job allocation, staff rotas, available care policies, guidelines and protocols), and service improvement activities (clinical governance, mortality meeting, labour ward statistics, post-call summary and nurses' presentation). This observation phase identified the contributory factors to AEs and provided a deeper examination of how and why they occur. The observation focus kept emerging with subsequent observations and interviews with staff. As all staff were aware of the observation-taking place, the process went smoothly with some of them making an effort to explain why certain things were done even when not asked by the researcher. The potential for observer effect on some of the participants' behaviour during the early days of the observations was noted and is discussed in researcher reflexivity in 5.4.

Observation data including informal conversations with staff and notes on the documents examined were recorded in a field notebook during the observation or as soon as possible after. As the observations followed an unstructured format, I tried as much as possible to write down everything I observed pertaining to AEs and/or their contributory factors without any predefined categories. The handwritten notes were then typed and converted into detailed anonymised observation notes at the end of each day or the following day (depending on the observation period), which were then transcribed into electronic files and saved on a secure computer. Each observation period was labelled with date, time, place, participants' codes and events were labelled against each observation [166]. How all identifiable participants' information were anonymised will be described in 3.6 It is important to note that the observation data including events, interactions and verbatim quotes were separated from my own feelings and thoughts about these [166]. I had a separate section to document my feelings and thoughts about the events observed - judgements about participants, linkages between people or events, and subjective reflections.

3.4.3 In-depth interview

Interviews represent conversations with a purpose to gather information [166]. They could be structured and unstructured. Structured interviews are generally short and followed a set of questions, while the unstructured interviews are usually longer, and their questions are generated from the participants responses and probes [158, 166]. Unstructured interviews were undertaken in this study because I aimed to delve beneath superficial responses to collect individual meanings regarding a phenomenon. This type of interview is suitable for exploring complex and sensitive issues, including patient safety, as in this study. The questions were mostly open-ended to allow for a comprehensive response from the participants. However, a broad topic guide was used to ensure that the discussion did not drift from its purpose [198]. Appendix 6 contained the topic guide used and examples of questions asked.

In-depth interviews are often employed in conjunction with other methods of data collection to check out theories, verify, clarify or triangulate knowledge gained [199]. This method was used because it allowed me to explore in-depth, aspects of the contributory factors to AEs observed or mentioned by staff participants and obtain different staff perspectives by enabling them to confirm or contradict the issues [158, 187, 199]. It was anticipated that by checking with various staff members, a complete and accurate picture of the contributory factors to AEs might emerge.

Despite face to face in-depth interviews being regarded as time-consuming and needing a more relaxed atmosphere than telephone interviews, they offer the researcher an opportunity to observe non-verbal responses, such as distress or anxiety so as to probe further for more complete information [159, 166].

Although interviews were conducted simultaneously with the observations, they were delayed until the 4th week of the fieldwork (see Appendix 7 for interview activities). This allowed me to sufficiently get to know the setting and participants and where to focus the interview questions. A range of nurses/midwives (12), doctors (15), key managers and those with senior managerial positions (3) or regarded to have particular knowledge relevant to the research (2) were invited to participate. Once a person agreed to participate, an interview information sheet (see Appendix 8) and consent form (see Appendix 9) were given to them to read in their own time. A date and time most convenient to the participants was then agreed, which was either outside their working time or when they had a lower workload to minimize disruption to work. Their mobile numbers were obtained and used for communication regarding participation.

The interviews were conducted in English because it is Nigeria's official language, and all healthcare personnel speak it to some extent. None of the respondents chose to speak in the local language, despite being offered this option at the interview.

All respondents agreed to be audio recorded, and non-verbal responses such as grin, clasp etc. were noted. The interviews lasted for approximately 25-60 minutes. The audio recording for each interview was transferred onto the researcher's personal laptop and flash drive, which were both encrypted and stored in a safe place. The researcher then transcribed the interviews verbatim and anonymised the information.

This study considered and utilised methods for successful interviews recommended by authors, including flexibility, confidence, appropriate words, neutral (non-judgemental) and non-leading questions [166, 193, 200, 201].

Considering participants' preferences is important, and this study was flexible to adjust the intended interview ground rules such as how, when and where they were conducted. Doctors on-call needed to be free to respond to phone calls during their interviews. Other participants, such as the consultants and senior managers preferred to be interviewed in their offices. This was acceptable because the offices were within the hospital grounds and the interviews were carried out during working hours, which posed no risk to my safety. I also had to work flexibly to accommodate some staff members' religious orientation. This included leaving the interview room door wide open for participants' comfort because their religious belief does not allow two persons of opposite gender to be in a closed room. As much as possible, I also avoided interviews around prayer times. Another challenge associated with the interviews was participants' changing availability. I realised that it was necessary to check again with anyone to be interviewed to ensure that the interview could be conducted on the day and time scheduled.

To acquire sufficient confidence in conducting the interviews, I spent a significant amount of time preparing well ahead of the data collection. Some of the activities that helped in the process include considering the focus and scope of the research questions following the systematic literature review, background reading and training on how to conduct qualitative interviews, as well as developing and testing the interview guide. Starting the interviews four weeks into the fieldwork enabled me to establish and build rapport with potential participants, making the process potentially more relaxing than interviewing someone completely unknown.

The background reading and training I had undertaken provided me with some guidance on refining the wordings of the questions so that they were appropriate, neutral (non-judgemental) and non-leading. To ensure that the interview questions were appropriate, staff were asked questions within the research focus and scope. These included issues related to equipment, staffing and hospital reporting processes, but not personal attributes such as name, age, wage, marital status etc. Judgemental words such as “why” were avoided in the interview questions. Instead, more neutral words were used, such as “what” (What was done to prevent this situation from happening again?), “how” (How about when you think things have gone wrong?) and others (“can”, “could”, “are” and “would”). Attention was also paid to the wordings of the interview questions so that they were open (to allow the respondent to speak freely) and non-leading so they do not make assumptions about what they are expected to say). For example, what are the challenges you are facing in providing safe care here?. See the interview guide in Appendix 6 for more examples of how appropriate words, neutral (non-judgemental), non-leading questions were applied.

The systematic literature review findings informed the initial interview topic guide. The review had identified some areas needing exploration, such as insufficient availability of equipment and staff numbers, but noted that the studies did not clarify how and why these occur (as shown in 2.4.5, review limitation number 4). While the early interview questions explored some of the issues identified in the review, the subsequent ones were based on observations and staff responses. Appendix 6 provides examples of areas covered in the early interviews. For example, the questions covered issues relating to the work environment (context, including nature of the job, care policies, protocols and guidelines, staffing adequacy, workload, equipment and supplies, support provision and training). The use of unstructured interviews provided the benefit of remaining open to discovering new and unexpected findings. Thus the subsequent questions were informed by the issues identified from observations and interviews, and these elicited more explanations and clarifications. For example, during the early part of the fieldwork, one of the consultants announced to the O&G doctors that a piece of equipment (CTG) would be provided to the department by next week. However, this equipment was not provided up to the end of the data collection, and no one seemed to know why. This question was directed to one of the hospital managers, asking them if there were any challenges they were facing regarding the provision of this equipment (CTG).

The questions were as much as possible designed to avoid adopting the person approach [160], which focuses on blaming individuals for errors and less likely to identify underpinning factors. In line with the systems approach, the interview questions were

framed to capture contextual influences, i.e. weaknesses within the processes and organisational mechanisms in which staff operate/care provision occur. For example, the following questions were a sample of the questions asked relating to AEs reporting (as listed in the interview guide in appendix);

- If you notice a situation that you think could compromise patient safety, what are you expected to do in this setting?
- Facilitators of incident reporting: Could you give me an example of how well this is helping to safeguard patient safety and manage the reoccurrence of unsafe care?
- Barriers to incident reporting: What are the things that enable the reoccurrence of patient safety incidents?

3.5 Data analysis

It is usual for qualitative data analysis to begin during the data collection process [168, 171, 202]. Plans for data analysis started early during this study's fieldwork, with preliminary analysis occurring concurrently with the ongoing data collection. This approach provided me with an insight into which aspects of the research questions were addressed and what areas of the questions needed further investigation [181, 202]. The data generated from observations and interviews were imported into NVIVO 11 software. The NVIVO software facilitated the systematic analysis of the data as it allows cataloguing data from various sources, organisation, searching, retrieving, and showing linkages between them [203, 204].

Data analysis adopted an inductive/bottom up approach [205]. Researchers undertaking the inductive approach examine data with an open mind to see what categories and themes emerge [205]. I began the inductive analysis by adopting thematic analysis principles, defined as identifying, analysing, and reporting patterns (themes) within data (themes) within data [206]. In this stage, I followed the six steps of thematic analysis: familiarisation, generating initial codes, searching for themes, reviewing themes, defining and naming themes and writing up the analysis [206].

The familiarisation stage involved becoming immersed in the data [164]. I repeatedly and carefully read through the data to seek patterns and meaning within the data. The process of typing the field notes, reflective notes and transcribing the interviews assisted in the familiarisation process.

Unrestricted or free coding followed the familiarisation process. This was conducted initially on printed copies of transcripts and subsequently on the transcripts in the NVIVO software. Coding means the process of organising data into a meaningful group [159]. Thus, I read the pages of data line-by-line, trying to sum up what a particular data segment conveyed before labelling it with usually one word or short phrase, which explains the phenomenon (what it is), and this became the overarching concept [181]. Some researchers may not review every piece of material at this stage because of the large volume of qualitative data [205, 207]. All the data materials in this study were reviewed so as not to miss commonly repeated data [208]. Although this process was time-consuming, it was worth the effort. The codes generated emerged from the data itself, allowing new phenomena not considered before the analysis to be identified. Some data extracts were assigned multiple codes because I was careful not to apply strict coding at this stage. Examples of the earlier codes include consumables, emergency medicines, oxygen supply, staff training, skill, staffing, supervision, support. Other extracts that explicitly describe the context were coded according to the place, i.e. ward (Gynaecology emergency, Labour and Obstetrics wards) or work environment if they are general. These contextual descriptors later fed into the analysis providing understanding of the context. (See Appendix 10 for a snapshot of codes generated).

The next phase was searching for themes from the coded data. This phase was characterised by a more analytic reading, looking for meaning rather than descriptive, as in the earlier phase. This resulted in aggregating the codes and sorting them into higher-level codes called categories [205]. Codes that did not fit were labelled “other” so as not to ignore any data. This was then followed by reviewing the themes. Here I spent a considerable amount of time examining the content of each category and similar categories to ensure they fitted into their assigned group as an accurate and true representation of the data [159]. This process resulted in the re-categorisation of some of the categories and identification of potential themes. For example, the contributory factor theme equipment, supplies and services was named from grouping the earlier codes, including consumables, emergency drugs, equipment, instruments, oxygen supply and water supply. The theme staffing levels was the aggregate of codes comprising staff training, skill, staffing, supervision, support. Working with the data digitally in NVIVO, was invaluable as it allowed re-labelling and the re-categorisation following the back and forth reading of the extracts. At this stage, I was able to see how the themes related to each other.

The final thematic analysis step was interpreting the themes in relation to the research questions, then telling the story they contained [159, 206]. At this stage, the findings were

organised into three separate but related sections; describing study context, AEs contributory factors and AEs reporting and learning system of the hospital studied.

The findings identified a large number of factors contributing to AES, and many of them were interrelated. The contributory factors identified were relevant to various system levels in the study context, such as management and team, and this needed to be illuminated. I felt that a system framework would provide an optimal structure for organising and presenting this data to illustrate the contributory factors to AEs, show the connections between them and the potential reasons behind their occurrences [205, 208].

The Yorkshire framework of factors contributing to patient safety incidents in hospital settings (YCF) [209] is considered helpful for illustrating the AEs contributory factors. This is because it allows displaying the contributory factors for AEs and the extent of their proximity to active failures/AEs. The contributory factors in the framework are presented as a series of concentric circles. Around the centre of the framework are the much proximal contributory factors (active failures, situational factors and local working conditions). The outer circle highlights more distal/latent AEs contributory factors (organisational and external). Therefore, the categories and themes relating to the AEs contributory factors findings section earlier identified were compared with those of the YCF [209]. They were then mapped against those of the framework after I was satisfied that they fitted [205, 210]. However, there were aspects of the framework that were not in the data, which is not unusual, but it provided the best fit [43]. Mapping the categories and themes to the YCF was straightforward and showed how the framework components interlinked.

Although the data analysis process description may seem like a relatively linear activity, it was realistically tedious and involved much back and forth between different ideas. Supervisory sessions were invaluable in ensuring rigour of the analysis process and checking for potential imposition of the researcher's assumptions in all the steps [181].

3.6 Member checking

Lincoln and Guba regarded member checking as the most crucial technique for establishing the credibility of research findings [211]. Member checking is also known as participants' comments, feedback, validation, or dependability checking [212, 213]. The process involves presenting some or all research participants with either their interview transcripts to confirm if their words matched intended meanings or the initial or final data

analysis to validate the researcher's interpretation of the data [212, 214]. High diversity exists in the uses, outcomes and goals of member checking among researchers depending on their underlying epistemological assumptions.

Some engage the participants to check and correct facts, whereas others engage them in collaborative construction of reality [215]. Member checking in this research was primarily to reduce error, generate robust original data for further interpretation [216, 217]. Member checking in this research involved verifying and testing emergent themes from preliminary data analysis while still in the field. Various staff members had an opportunity to tell if they recognised others' experiences, dispute them, or shed more light on the identified issues. The value of member checking in this research was considered as an error reduction process, which generates robust original data for further interpretation [217].

The process employed minimised some potential financial, methodological and ethical implications associated with member checking [218]. The financial implication may be a need to travel back to the research setting to present the data to the research participants. Methodological issues include potential low response rate in transcript validation; participants may be reluctant to provide honest feedback because of a perceived researcher's expertise, a wide time lag between data collection and analysis could result in participants not recalling their previous response or may legitimately change their perspective on the research topic [212]. The ethical issue may be a need to plan and provide emotional support to participants if going through transcripts/analysed findings when re-engaging them in research, which is sensitive as in this study [212].

3.7 Ethical considerations

As this study required the involvement of human participants, appropriate measures were taken to ensure that participation did not cause individuals any harm [164, 202, 219]. These include, seeking ethical approval from proper organisations, informed consent and maintaining confidentiality. This section also explored emergent ethical issues and how they were addressed.

Ethical approval: Ethical approval for the study was obtained from the University of Sheffield (ScHARR) ethics committee and the ethics committee of the hospital (see Appendix 11).

Informed consent: Informed consent is about ensuring that potential participants fully understand the purpose, methods, and intended uses of the research, in addition to what their participation entails and risks, if there are any [164, 202, 220]. I conducted two presentations to brief the potential participants, i.e. doctors and nurses/midwives in the O&G department, about this study. During these briefing meetings, I provided information about the research and how it would be conducted. It was emphasised that participation is voluntary. Prior to the interview, all participants provided a signed consent form and were offered a personal copy to keep.

Consent for observation studies of clinical settings can be complex [182, 221]. Thus, an opt-out option was used for the observation part of the study because obtaining observation consent for busy clinical setting such as O&G was impracticable. This strategy has been reported in other studies in a similar setting [221]. Posters were placed in strategic areas of the wards and Gynaecology emergency to inform any staff and women coming to the department about the study (see Appendix 12). Women or staff would have the opportunity to opt-out of taking part by informing the researcher, ward manager or attending staff, but there was never such a request throughout the data collection period. Flyers about the study, interview information sheets and interview consent forms were distributed to all in attendance at briefing meetings. Flyers were also placed at visible areas near the nurses' station in all the wards (see Appendix 13).

Informing individuals present in the setting about the study remained an ongoing process throughout the data collection period. Since I was not a staff member and wore no uniforms, my presence and researcher role were made visibly clear by having a nametag with researcher written on it during all the observations [181]. The nametag sometimes caught the attention of the staff coming from other hospital areas who wanted to know about the study. This provided an opportunity to ensure that they agreed to be observed.

Maintaining confidentiality: The confidentiality principle is about ensuring limited access to personal data. The UK General Data Protection Regulation [222] defined personal data as a piece of information identifying a living person or resulting in this situation when combined with other data. This means that the research participants' personal data should not be shared with unauthorised persons. While the principle of anonymity is closely related to confidentiality, it differs in that it means concealing the identities of participants from the data when it is shared beyond the immediate research team [220]. In the case of this study, various strategies were used to ensure the confidentiality and anonymity of the personal data collected. For instance, the fieldnotes contained no identifiable information about staff, as they were generally identified with their rank or

seniority such as a consultant, senior registrar, house officer, senior nurse/midwife, junior nurse/midwife, senior nurse/midwife, but not ward manager, except when referring to them in general terms such as O&G ward managers not linking them to a particular ward. Similarly, any other staff working at the senior hospital management level were identified as senior hospital manager/hospital management staff.

The audio recording for each interview was transferred onto the researcher's personal laptop and flash drive, which were both encrypted and stored in a safe place. The original recording of each interview was deleted from the recorder as soon as it was saved on the laptop and flash drive. In order to preserve anonymity, I avoided asking questions that exposed the respondents' identities, such as name or ward allocated. All the interview transcripts had a coded identifier to ensure anonymity and saved together with the laptop. Moreover, the hospital setting has been referred to as a Northern Nigerian teaching hospital, and any identifiable information on a document included in this thesis, such as the ethics approval, has been protected.

Throughout the fieldwork period, I made it clear to participants during all forms of communication that this study was about the system and not evaluating their individual practice.

Emergent ethical issues and how these were addressed: The issues included obtaining observation consent from some women, raising observed patient safety concerns, managing withdrawal of collected data and personal risks.

Posters in all strategic areas of the O&G department were meant to inform women and their relatives about the study. Additionally, before the observations, attending staff members informed the women under their care about the study and the researcher's presence, then asked if they were happy to be observed. The women's consent was obtained verbally. However, there were a few occasions when some women were not observed because I felt it was inappropriate to observe them as their condition was deemed too sick to provide consent. For example, a woman came to the Labour ward fully dilated and about to deliver.

The fieldwork plan needed to consider how I should approach a potential patient safety breach [181]. I planned to call a senior staff member's attention if I was comfortable with them or report concerns to the gatekeeper. The findings of this study raised many observed practices of patient safety concerns. Such as reprocessing single-use manual vacuum aspiration syringes; use of unsterile instruments in sterile procedures, floors

littered with dirty-blood-stained swabs and gloves; procedure delays, placing multiple unlabelled babies together on the single resuscitaire in Labour ward, mothers and babies sleeping on the same bed; and placing a woman suspected to have tuberculosis with other women and newborns in the Obstetrics ward. All these concerns and others mentioned in the findings chapter have a potentially dire outcome for service users and their babies. However, meeting my ethical responsibility of raising patient safety concerns was challenging because of the risk that this would pose on the trusting relationship I had built with staff, fearing they would decline participation in further observations and interviews. I felt that these patient safety issues had become normalised practices and maintaining a relationship with staff members would support the completion of the study, thus potentially bringing about the needed changes in the study context and other settings. Therefore raising patient safety concerns happened on a few appropriate occasions, such as the suspected tuberculosis case. This resulted in the hospital's multidisciplinary patient safety team planning to design a guideline for admitting a suspected infection case. Moreover, I also assisted the hospital in converting their incident report forms from paper to google forms to enhance user access, with a view that raising the patient safety problems identified during informal conversations and interviews with the staff could sensitise them to report and/or address the issues.

Before conducting the field work, I had decided on how to manage potential requests to withdraw data. Both interviews and observation participants could freely withdraw their responses within two weeks of data collection but not after because the data may have been transcribed and analysed [220]. The staff were assured that their identifiable information would be protected. Such a request was not made by the interview participants but a staff member from a different department requested that some specific information they provided during an informal discussion in the observation should be excluded, and this was accepted. It was also made clear to the staff that they could freely decline answering any of the questions during the interview. One of the interview participants made such a request, and the questioning moved to something different.

As part of the minimising harm process, I also considered how the fieldwork could pose a risk my personal safety [164]. The hospital setting in itself was regarded as an unlikely danger because teaching hospitals in Nigeria are generally safe grounds as there are usually staff and people present at all times. However, it was acknowledged that there might be minimal potential risks, which could cause disruption of the data collection, such as loss of belongings and sickness, including food poisoning and malaria. A number of strategies to address these were adopted (see Appendix 14 for risk assessment form), and the fieldwork generally went smoothly.

CHAPTER 4: FINDINGS

Describing both the context in which the phenomenon occurs as well as the phenomenon itself is essential in case study research [171]. This chapter presents the thesis findings in three sections. The first section begins with providing an understanding of the context of the case study site, and the second section presents the factors that contributed to adverse events (AEs) identified and apparent explanations for how and why they occurred. The final section presents the AE management processes and factors that influenced them.

4.1 Understanding the context of AEs

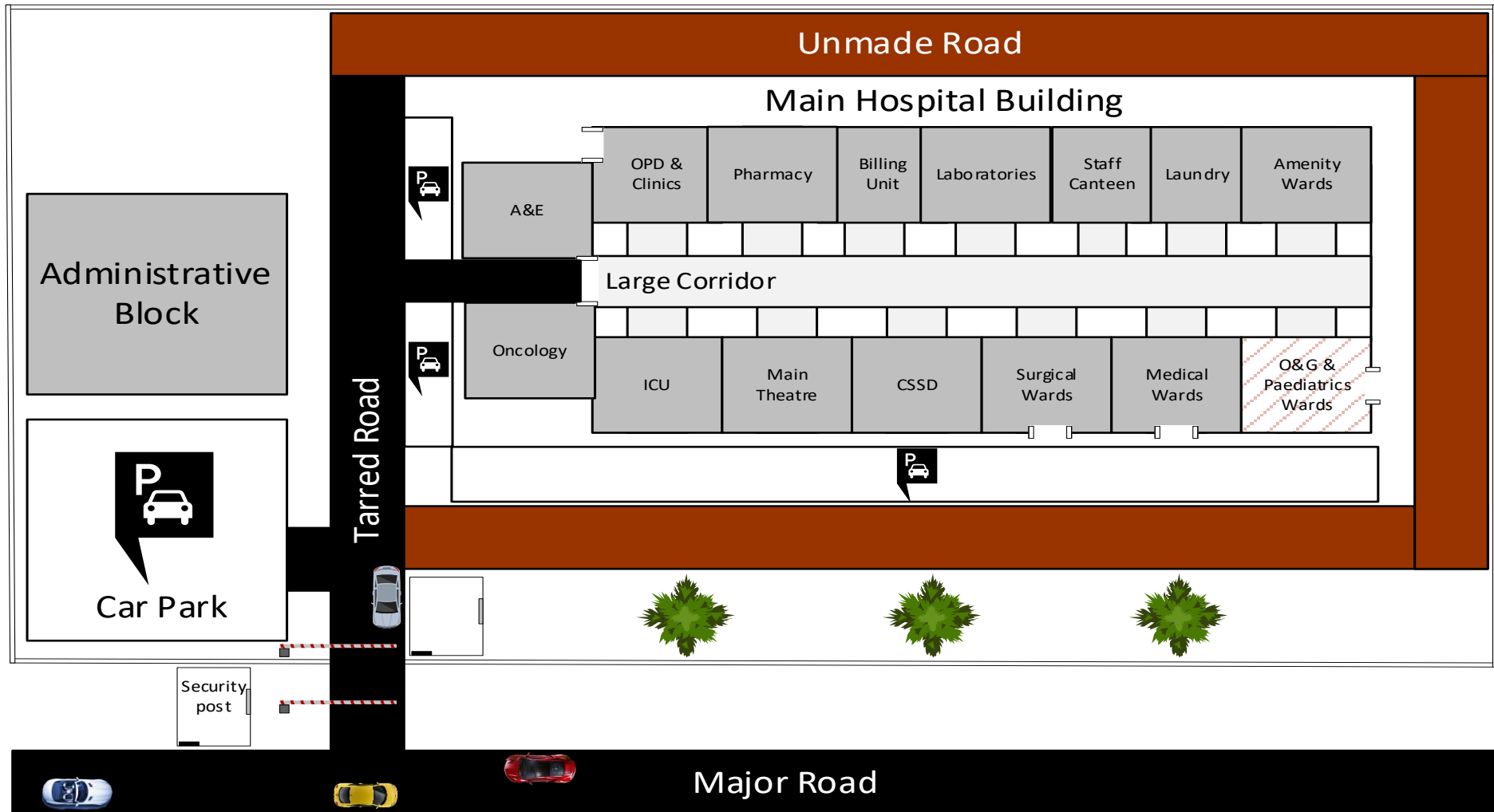
This section describes the research setting to provide a picture of the context in which AEs occurred within the Obstetrics and Gynaecology department (O&G) of the case study hospital. Understanding the context of AEs within a systems approach enables the identification of issues and action to address latent organisational failures/weaknesses [223, 224]. Developing an understanding of the context predominantly draws on the observational data and supplements this with information from the interviews. The description of the study setting is divided into three parts:

1. General physical layout of the hospital.
2. General organisational processes within the setting.
3. Reporting and learning from AEs.

4.1.1 The general physical layout of the hospital

Figure 4 provides a visual illustration of the hospital's general layout, highlighting the O&G department in the shaded area. The hospital was situated by a major road covering about 300 acres of land, fenced with concrete blocks. Entrance to the hospital was through a gate, constantly guarded by security personnel. A tarred road from the entrance provided access to the main hospital and administrative buildings. The administrative building accommodated the consultants' common room, the hospital library and offices for hospital administrators and consultants

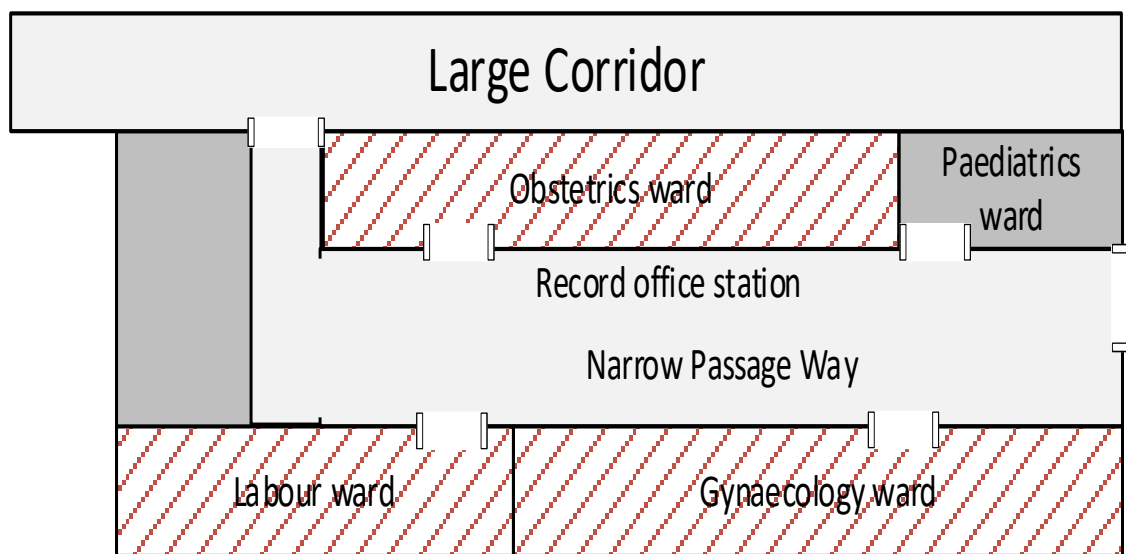
Figure 4: General layout of the hospital



The clinical services included various specialty departments such as Medicine, Surgery, Paediatrics and Obstetrics and Gynaecology (O&G). The supporting services most relevant to this study consisted of the Pharmacy, Operating theatre, Laboratories, Blood bank, Billing unit and Central sterilising Unit (CSSD). Most of these supporting services were located at close proximity of about 150 metres to the A&E and OPD, with the hospital wards a little further away. The O&G wards were at the furthest end of the long corridor, about 400 metres from many of the supporting services and entrances. Staff members identified the distance of O&G wards to these supporting services and entrances as a problem, which will be discussed in section two.

The hospital also had living accommodation for staff, but this could only support a small number of employees, thus the majority of them lived away from the facility site. Many interviewees raised concerns about contacting and accessing staff members living outside the hospital grounds, particularly at atypical hours.

Figure 5: Location of O&G wards in relation to each other.



As illustrated in figure 5, the O&G department had three in-patient wards: Labour; Obstetrics; and Gynaecology. The Labour ward was situated on the opposite side of the Obstetrics ward and next to the Gynaecology ward. Gynaecology emergency is located in the Gynaecology ward. On a corner adjacent to Obstetrics ward was a record officers' station from which O&G and paediatric patients would collect their medical records. A paediatric ward was located close to the O&G wards. Its close proximity to the O&G wards was useful to the O&G staff for obtaining consumables during emergencies. A detailed description of the O&G wards follows:

Women's journey within the O&G

Women were either admitted from clinics run by the department and sent directly to appropriate wards, or they were triaged for admission in the Gynaecology emergency service. This service had an assigned Junior Registrar and a House Officer during working hours. All women in active labour were sent to the Labour ward. Pregnant women who were past twenty weeks gestation with medical conditions, such as hypertension, diabetes and eclampsia or for elective caesarean section were admitted to the Obstetrics ward. This ward was also used for women after delivery. Women for emergency caesarean section were taken to the theatre and sent to the Obstetrics ward afterwards. Women with gynaecological conditions or pregnant but less than twenty weeks were typically admitted to the Gynaecology ward. However, due to bed pressures, the department sometimes needed to admit women meant for the obstetrics ward and these were placed temporarily in the Gynaecology ward.

The Labour ward

The Labour ward only admitted pregnant women who were in active labour. The ward had a delivery suite (highlighted area), call room for house officers and female senior residents, mini laboratory (not functioning) and other rooms and facilities as shown in figure 6.

A long corridor, passed through the Labour ward providing access to a Special Care Baby Unit (SCBU) and Obstetrics Operating Theatre, bathrooms and toilets for both staff and service users.

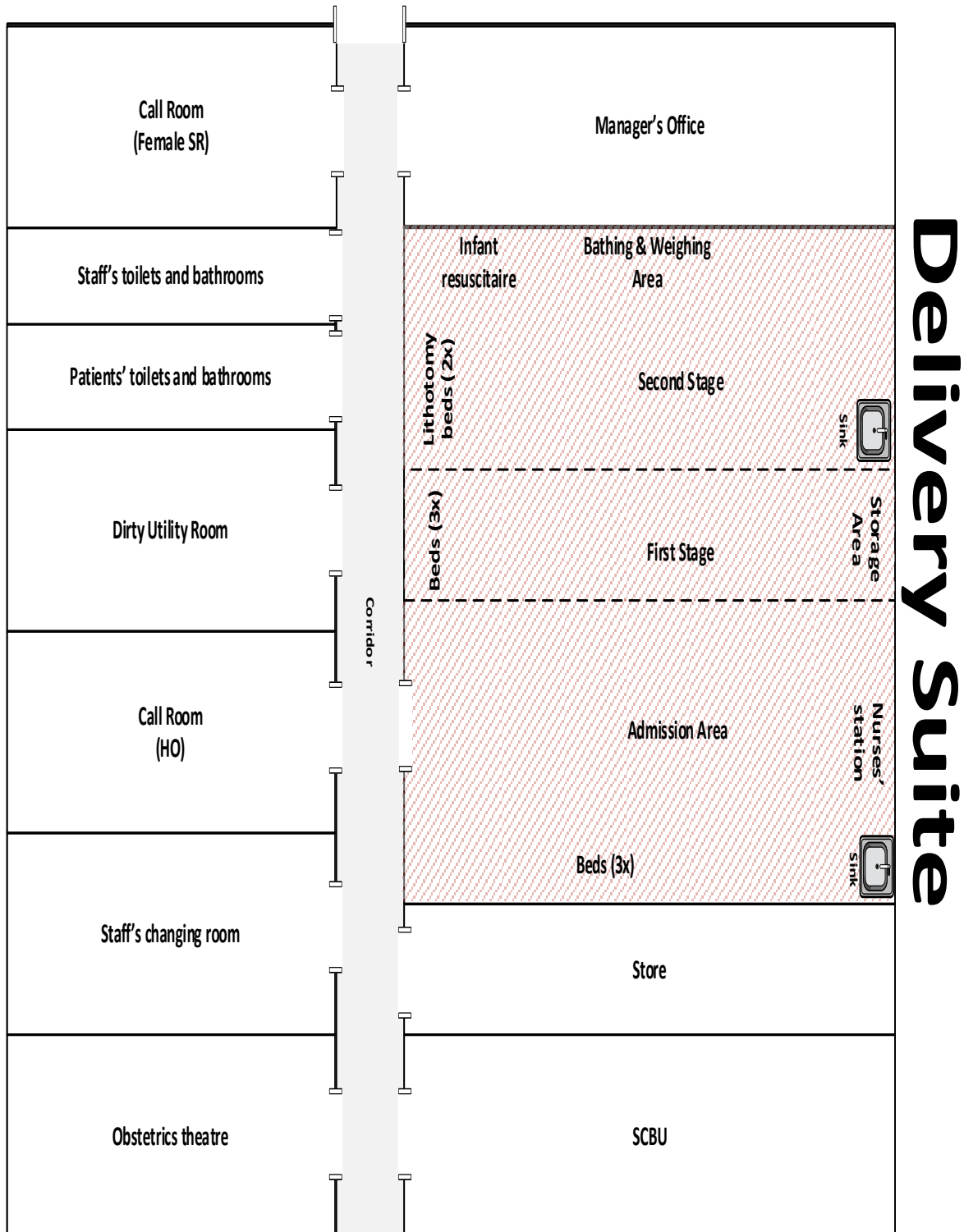
Most of the care activity in the Labour ward took place within the delivery suite. Portable partition screens divided the delivery suite into three separate clinical cubicles (outer admission, middle first stage and an inner second stage room).

The outer admission room was accessed via the delivery suite entrance and had three beds. The nurses' station was located in this room, and there was a working desktop computer and an internal telephone on their desk. Close to the nurses' station was a handwashing basin. Scrub shoes, barrier gowns, facemasks and goggles were kept in the admission room for use by staff and anyone else going beyond that area.

Documents noted on the notice board of the admission room included: various medical professionals' duty rosters, a post-exposure prophylaxis team list, which named staff to be contacted in case of exposure to blood and bodily fluids, and nurses'/midwives' guide

to recognition awards. On the entrance door, there was a poster with instructions on specimen collection and handling. This originated from a collaborative project in which the hospital was involved and which will be discussed later.

Figure 6: diagrammatic representation of the Labour ward



Delivery Suite

The first stage room was oriented such that it linked directly to the admission room and had three beds on the left side. Equipment such as a scanning machine, stationery, consumables and sterile packs were kept on trolleys or in a cupboard around the right side of this room. Data from staff suggested that women placement in the different rooms was based on bed availability, not on labour progress, as initially intended. Some staff members said they preferred placing labour women in the first stage room if beds were available because it offered the women more comfortable beds and privacy.

The second stage room had two lithotomy beds arranged in a similar pattern as the first stage room. These beds tended to be mostly used for assisted deliveries and episiotomy repairs but rarely for normal labour and delivery. An infant resuscitaire, which also served as a temporary cot for new-borns, was kept in the second stage room. Adjacent to the infant resuscitaire was a designated weighing area with a baby weighing scale on a small table. On the wall above the weighing area were different handwritten care protocols. These protocols included magnesium sulphate administration, Apgar scoring, meconium-stained amniotic fluid grading (thick and thin), Nevirapine administration (antiretroviral therapy) and vitamin K dilution. While all the other protocols were on paper, vitamin K dilution was scribbled on a piece of sticking plaster, which could have easily fallen off. The protocols were observed to be not very visible and likely to be missed by staff not regularly working on this ward. Near the weighing area, there were two plastic baby baths, one pink and one blue, for babies born to HIV positive and HIV negative mothers, respectively.

A larger hand-washing basin, mostly used for washing used instruments, was located in the second stage room. On the floor around the hand-washing basin were three medium plastic buckets for disinfecting instruments. A guide for disinfecting used instruments was pasted on the wall above the hand-washing basin. A large plastic water storage container was kept near the handwash basin, according to one of the staff members, in case the water supply failed; however, they could not remember when this had last happened.

There were air conditioning units and ceiling fans hanging in all three cubicles. Lighting was generally good, and this was the only O&G ward that had electricity back up, thus it tended not to experience power failure issues.

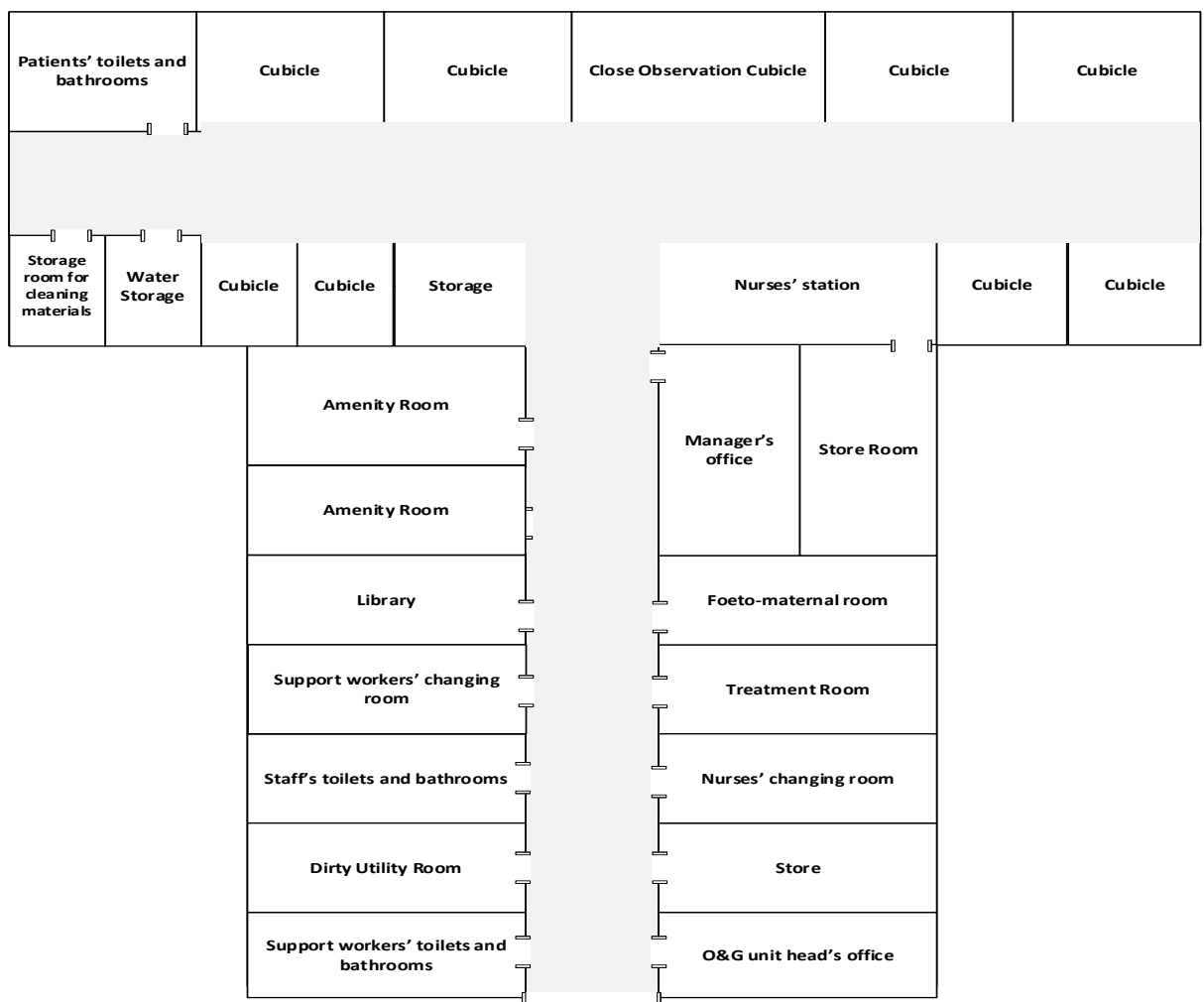
The Obstetrics ward

The Obstetrics ward had a 41-bed capacity and served as laying in for mothers and new-borns after delivery. It also accommodated women before and after caesarean

operations. Other women included those who were post 20 weeks pregnant and those who had delivered but had medical conditions such as hypertension, diabetes and eclampsia.

As shown in figure 7, entry to the Obstetrics ward was through a long narrow corridor with different rooms as listed in the diagram. The corridor then led into a large open ward with a nurses' station in the middle and the remaining space divided into nine cubicles, each containing four or five beds. Directly opposite the nurses' station was a close observation cubicle. There were four cubicles on either side of the nurses' station for other women. Behind the nurses' station was a storage room with a hand-washing basin and shelves on the wall for storing small equipment, stationery and consumables. At the far end of the left side of the ward was a small corridor, which housed three toilets and bathrooms for service users, plus two other rooms. The ward's cleaners used the smallest room to store cleaning materials. The other, bigger room had a large plastic water storage container, kept in case the water supply failed.

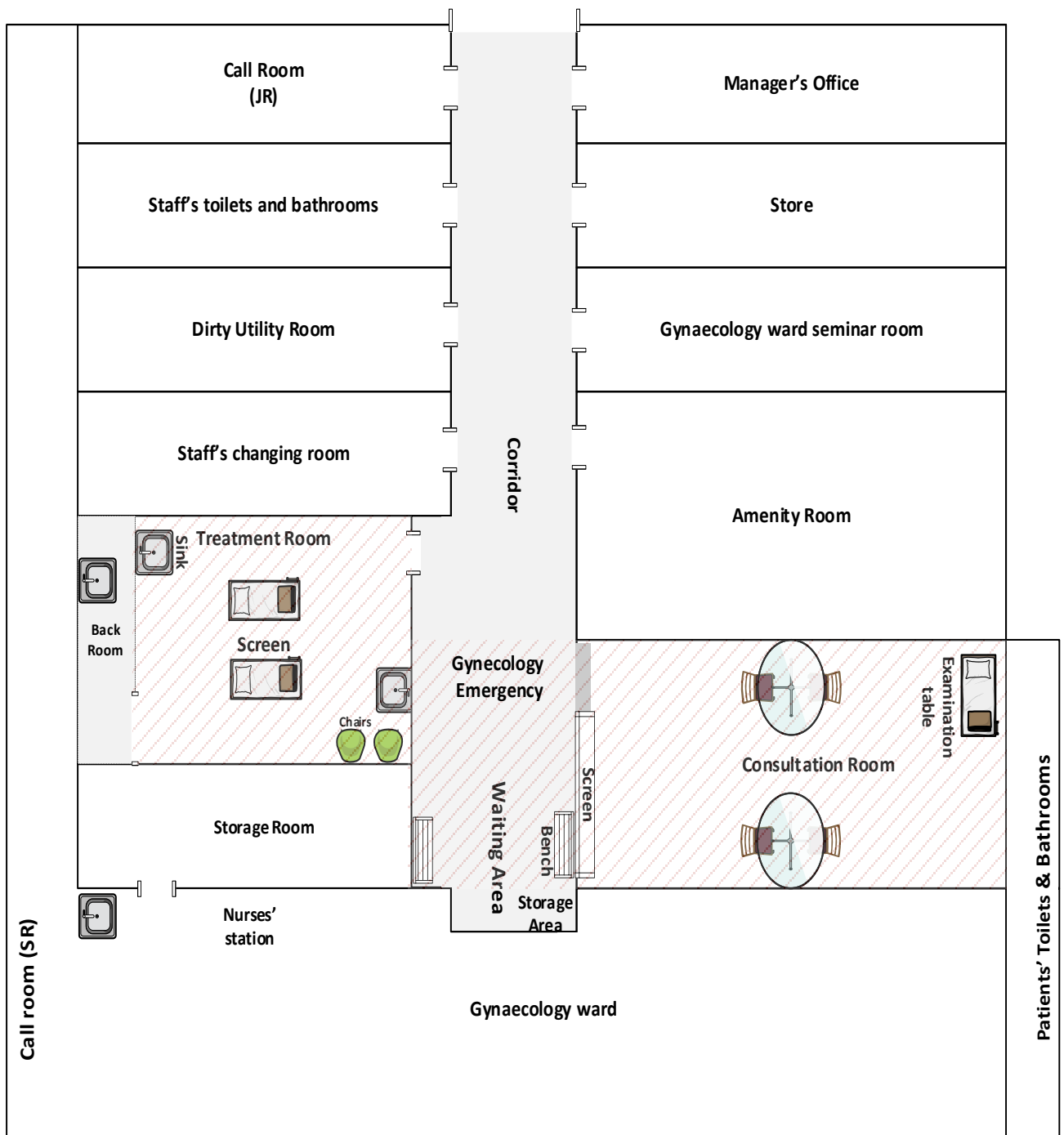
Figure 7: Diagrammatic representation of Obstetrics ward



The Gynaecology ward and Gynaecology emergency service

Entrance to the Gynaecology ward and Gynaecology emergency service extended down a long, narrow corridor, with different rooms as listed in figure 8. The corridor ended in a wider space, to the right of which was a treatment room. The remaining space outside the treatment room, before reaching the nurses' station, served as the Gynaecology emergency area, and is highlighted in the shaded area in figure 8.

Figure 8: Diagrammatic representation of the Gynaecology ward and Gynaecology Emergency service.



The Gynaecology emergency area had a waiting area for service users and a consultation room. The waiting area comprised a small space containing two long benches facing each other. Each bench could seat about four persons; women with emergency needs and their relatives usually sat there while waiting to be triaged. Others, unable to find space on the benches, usually stood around this area.

The consultation room was a small three-walled space, with two screens serving as the fourth wall and door. Inside the consultation room were two small tables, each with two chairs, and multiple women were usually being consulted simultaneously in here. An examination couch was by the wall facing the entrance, with a drip stand and a bedside table nearby. There was a tray on the bedside table upon which was an opened xylocaine injection bottle, a thermometer, a lidded kidney dish containing antiseptic-soaked swabs, and sample bottle racks with a few sample bottles on them. A ceiling fan provided ventilation to the room. The room had a small notice board on the wall with a few documents pinned to it, such as doctors' roster, special postings for doctors, and a protocol for Lassa fever.

The consultation room also had a bin and a sharps/needle disposal box, which was usually kept on the floor near the bedside table. However, there were times when the bin was not there and used gloves and swabs were seen on the floor, as illustrated in the following observation quote:

I noticed that there was no bin in the Gynaecology emergency consultation room. There were about 2 pairs of used gloves and blood-stained swabs discarded on the floor just under the bedside table. A registrar came looking for a bin, when he did not find it, he said "let me just put it here" as he also discarded his gloves on the floor (Observation notes: Gynaecology emergency day 3).

I later observed a cleaner bringing a bin into the room and taking the discarded gloves and swabs. Whether the bins were there or not, the floor was occasionally littered with used gloves and swabs, creating potential for infection. This also occurred in the treatment room and the Labour ward.

The treatment room of the Gynaecology ward differed from that of the Obstetrics ward in that it had two examination couches at the centre. A small space and a screen separated the two examination couches. The couch to the right had an ultrasound machine next to it and was mostly used for women to lie on during ultrasound scans. The other examination couch was generally used for minor gynaecological procedures such as

manual vacuum aspiration (MVA). The floor area around the couches was often observed to have blood on it and to be littered with used swabs and gloves.

The treatment room was usually busy with women admitted for various procedures. One or two plastic armchairs were kept inside the room for women to sit on whilst waiting for one of the couches to become vacant. There were five lidded and labelled plastic buckets for disinfecting MVA syringes and cannulas. These were kept on a concrete platform at the far end of the room. Two trolleys were usually available in this room: one contained a lidded kidney dish for antiseptic-soaked swabs and the other was for specific medical procedure instruments.

Beyond the Gynaecology emergency area was the Gynaecology ward, which accommodated women with any gynaecological condition. The Gynaecology ward was a large open ward partitioned into cubicles with the nurses' station in the middle, as in the Obstetrics ward. There was a handwashing basin in front of the nurses' station and a storage room behind it. The storage room had a fridge, and shelves with stationery, instruments and consumables upon them. The Gynaecology ward and the Obstetrics ward were similar in design except for a few facilities. For instance, the Obstetrics ward had a foeto-maternal room and a library, whereas the Gynaecology ward housed the Gynaecology emergency facility, a seminar room, call rooms and an isolation room. They both had treatment rooms and two side rooms each for women requiring privacy and who had paid higher fees.

The entrances of the Obstetrics and Gynaecology wards had assigned security staff to restrict entry outside normal visiting hours. Entry to the delivery suite was restricted for non-staff at all times, thus women's families and friends were rarely allowed beyond the Labour ward entrance.

During the fieldwork, attention was paid to the physical structure of the research setting with a view to exploring how this might contribute to the occurrence of adverse events. This will be examined in detail in a later section.

4.1.2 General organisational processes of the setting

General organisational processes of the hospital in relation to service provision in O&G will be examined focusing on two key aspects: capacity and systems, and staffing.

Capacity and services

The hospital had a capacity of approximately 500 beds, according to a document obtained from the hospital at the time of this study. The O&G department had three in-patient wards, a 24-hour emergency service (Gynaecology emergency), and specialised services and various clinics such as the ante-natal clinic, which would typically register about 6600 pregnant women each year. On average, the department recorded about 1632 deliveries, 24 maternal and 135 foetal deaths annually. However, these figures might have been inaccurate as a study participant provided this information, but it could not be verified.

Being the only tertiary centre in the state, the hospital served as a referral point for all the other primary and secondary services within its locality, as well as other neighbouring states. Staff perceived that these women referred from other areas formed the majority of those experiencing the AEs seen in the hospital for they should have been referred earlier. For example, a senior doctor identified a lack of feedback between the hospital and the referring facilities as the reason for the continued late referrals:

Sometimes the referral still causes problems because (...) other facilities, primary and secondary, refer patient (women) to this centre, (...) when the patient (women) have started developing complications (...) So, what you can provide in terms of services will not be optimum (Interview No2 SR1).

However, the department appeared to have no presentable data to support this assumption. This indicated the need for the department to improve how it collected and analysed its service users' information in order to identify and address such issues.

The facility was among the 20 teaching hospitals owned and funded by the Nigerian federal government. Government funding of hospitals generally covers physical structures, staffing and equipment. Service users primarily bear the cost of consumables, medicines and services including admissions, surgeries and laboratory investigations. On most occasions, these services are based on "fee for service" which means they are provided only after evidence of payments (receipts) were shown.

The Gynaecology emergency service served as the entry point for all women coming to the O&G department. Whether registered, referred or not, all women in labour, pregnant and sick or having gynaecological problems that needed urgent attention reported to this service first, for assessment, treatment or admission, unless they accessed via the

clinics. In Gynaecology emergency, some women were seen as “outpatients” while others were referred to the appropriate ward depending on their condition.

Emergency life-saving medication and services such as emergency surgery, blood transfusions and diagnostic investigations might be provided first, with the payments made later under the 24-hour national emergency policy. The hospital social welfare department also occasionally assisted service users to obtain essential supplies and services for free through the “service rendered” forms, such as by waiving accrued service fees following an emergency or prolonged hospital stay for those who were unable to pay. However, these supports for service users with no means to pay seemed often to be unavailable, even in emergencies.

Staffing numbers

The hospital, like other Nigerian teaching hospitals, was headed and managed by two consultants (doctors). The Chief Medical Director (CMD) was the chief executive and responsible for the execution of policies and matters affecting the day-to-day running of the hospital. The CMD was the most senior of the hospital managers and usually appointed by the President of Nigeria through the Federal Ministry of Health for four years. The Chair of the Medical Advisory committee (CMAC) oversaw the activities of clinical departments, training and research in the hospital. The Hospital Board normally appoints the CMAC. There was also an Assistant Director of Nursing Services who supervised the hospital’s nursing/midwifery activities and was involved in its procurement processes.

A consultant Obstetrician and Gynaecologist headed the O&G department. As shown in Table 8, the department had 23 doctors, and a varying number of house officers depending on their rotation. The doctors had two forms of working times including “normal” and “on-call” duty. The normal duty lasted about eight hours (8am-4pm). On-call duty could extend up to 32 hours depending on the day of the week and the rank of the doctor. Junior doctors appeared to be on call for more hours than senior doctors.

The Labour ward had a Consultant Obstetrician who oversaw its affairs during working hours. Two residents (senior and junior) and a house officer were allocated to both Labour and Gynaecology emergency for a period of one month. Four obstetric teams (a, b, c, and d), supervised usually by two consultants each, were managing the medical activities of this department. In the wards, women were divided between the teams, and

cared for by their team of doctors during normal working hours (8am-4pm). Medical care during out-of- hours became the responsibility of the on-call doctors.

The nursing activities of the O&G department were supervised by the Unit Head and the Deputy Unit Head who were both Chief Nursing Officers. Each O&G ward had a Chief Nurse/Midwife as Ward Manager, and a team of designated nurses/midwives and support staff. The Unit Heads and Ward Managers primarily performed administrative tasks and worked in the mornings. Other nurses/midwives and support staff worked on shifts of eight to nine hours duration. Typically, two nurses/midwives were on each shift, although it was observed that often the numbers tended to be higher in the mornings.

Gynaecology emergency did not have designated nursing/midwifery staff but called in those from the Gynaecology ward when needed. While the nurses/midwives appeared to be strictly allocated, they were sometimes asked to work in any of the wards to fill in staffing gaps. Table 9 shows the nursing/midwifery staffing ratio to women/patient, which was not consistent across the wards.

Table 9: Staff distribution by profession and women/patient load by ward

Staff type and women/patient load	Labour	Obstetrics	Gynaecology Emergency	Gynaecology
Midwives/nurses	13	17	Not allocated	Not included
Women/patient load	1-9	41	Varied	33
Doctors	23+ varied number of house officers.			

4.1.3 Reporting and learning from AEs

As noted in chapter one, having a recognised framework for identifying, documenting and reporting potential and or contributory factors of adverse events (AEs) is vital for the proactive management of AEs. Before October 2015, the hospital, like many other Nigerian teaching hospitals, had no such established processes. There were a few patient safety related measures in place in the hospital prior to 2015, including an infection control committee headed by a medical laboratory scientist. They also had a nurses' report, which comprised a summary account of each ward, capturing women's

conditions, including those seriously ill, and any issues that affected service and/or care provision. The report was submitted at the hospital compound office after each nurses' shift. It was then collated and forwarded to the (CMAC) for their subsequent actions.

Since 2015 the hospital had implemented multiple improvements in the way they handled patient safety issues. This was following its participation in an 18-month patient safety collaborative project with a UK partner (between October 2015 and March 2017). The project ended just before this study began and various staff members viewed it as something positive.

The collaborative project supported the hospital to change its patient safety culture, which was generally one of blame and punishment. As a result of the project, the hospital adopted a systems approach, which focused upon weaknesses within the system. This was said to have improved the reporting of patient safety issues, as highlighted by the following response of a senior nurse/midwife who said they now reported incidents the way they occurred, without covering up.

We are happy about these (changes). We are now writing incident reports and being open to say (...) what exactly happened during the incident. We are not hiding anything but before, we did hide some of the things (Interview NO16-CNO).

However, not all staff shared this view, as indicated by the response of a senior hospital manager:

The major problem is getting people to accept that you are not reporting anybody, (but) you are helping to fix the system, and that we are not going to punish people as a first line of action (Interview NO23-SM1).

The hospital instituted a Multidisciplinary Patient Safety Team (MPST) headed by the CMAC. The MPST included all medical professional groups, such as doctors, nurses, pharmacists and laboratory technicians. Key tasks of the team were to identify patient safety issues, set the hospital's patient safety targets, and collect, investigate and analyse reported incidents. The team was also responsible for providing solutions to identified patient safety issues, giving feedback to individuals and the hospital community, and following up recommendations to ensure their implementation. Additionally, the team organised a monthly clinical governance meeting and monthly MPST meetings. The MPST also had subsidiary teams comprising infection control and patient safety champions.

Furthermore, the structure of the infection control team was changed. A consultant microbiologist replaced the medical laboratory scientist as leader of the team. Some of the team members were said to have attended an infection control certificate course. The team members included an infection control doctor, infection control nurse and head of public health department. The infection control nurse's role included collecting samples from specific areas of the hospital for routine infection control surveillance and talking to staff and making improvements in areas of infection threat. One specific example of this was in the labour ward, where curtains surrounding women's beds were found to be contaminated with staphylococcus aureus during infection control surveillance. A plan was made to change the curtains to ones made from infection control material as soon as possible.

The infection control lead sometimes followed up certain unusual results with a visit to wards to see women/patients and discuss with the managing team the best antibiotic options for the women/patients. In August 2016, the infection control team oversaw the implementation of a quarterly hospital antibiogram to guide empirical prescription of antibiotics. An MPST member demonstrated the benefit of the antibiogram in the following quote:

It (antibiogram) will be like a guide to the clinicians to decide or select an appropriate empirical antibiotic after they have taken (a) culture specimen while they are waiting for the results. (...) (This) is based on our own local data (Interview NO12 MPST member).

The importance of handwashing was one of the most strongly reinforced infection control measures. There were posters on handwashing in all the O&G wards, particularly around the handwashing areas. While all the wards had multiple handwashing basins, not all of them had running taps and liquid soap. Thus, most of the hand washing occurred in the sinks nearest to the nurses' station, where these facilities were located. The wards also had no functioning hand driers. Staff were drying their hands on their clothing, which was not ideal for infection control. However, this was an improvement from previous times when bars of soap were used and bowls of water were fetched from plastic water storage containers. Replacing taps with lever type (elbow-action) and increasing the number of handwashing areas in the wards were discussed in one of the MPST meetings, as was rolling out infection control surveillance to the wider hospital. Hospital managers seemed to make these improvements gradually because funding restrictions would not allow for immediate widespread implementation.

Over 70 staff from different areas of the hospital were appointed as patient safety champions after they had received training in WHO patient safety modules during the collaborative project. After the training, they were expected to cascade this training in their various places of work. Despite all the O&G ward managers and deputies having participated in this training, many O&G nurses/midwives stated that the training had not been cascaded to them.

Usage of the WHO surgical checklist, debriefing and surgery cancellation register was implemented during the collaborative project. One of the early incidents reported in the hospital related to a theatre staff member's absence, which affected debriefing. Following this, a process was designed to ensure that cover would be arranged when a staff member was not available.

An additional obstetric theatre suite provided to O&G during the research period was among the most listed hospital-wide patient safety improvements. The second suite was seen as a significant patient safety improvement for the department, which had only one before this. In several interviews and informal conversations with staff members, there was substantial excitement about the new suite, which would, it was anticipated, help to reduce theatre cancellations. However, some of them highlighted that additional theatre staffing would be needed because of the new suite.

There were departmental and professional meetings to meet and discuss patient care, professional or work-related issues. In O&G, doctors met three times every week to present the cases they had managed following the previous day's on-call duty. The department also had a monthly meeting to discuss Labour ward statistics and mortalities. According to the hospital's general patient safety guidelines, such meetings should comprise all professionals. However, it was reported and observed that consultants and nurses/midwives rarely attended these meetings. Even the monthly morbidity and mortality and labour ward statistics meetings, regarded as key to the department, were generally attended by junior doctors only, and rarely the consultants and nurses/midwives. I observed the ward managers attending such a meeting only once during the fieldwork period. On many occasions, non-medical staff seemed unaware of these meetings. The meetings also appeared to have a less visible safety-related impact because there was no system to ensure that concerns raised and discussed were resolved.

The nurses/midwives reported having their meetings fortnightly. However, this target was unmet during the research because only two meetings were arranged. The

nurses/midwives attributed the failure to keep to their meeting schedule to a lack of time and difficulties attending meetings outside of their work schedules due to family responsibilities. The two meetings were topic-based presentations, to refresh the staff skills on active management of the third stage of labour and puerperal care. The content generally seemed to be too basic for experienced registered nurses/midwives, and the presentations were difficult to follow because they were long and not well organised. For instance, one of the presenters presented a 48-page document, not PowerPoint. The document was too detailed for busy staff to review and lacked a focus on areas for improvement. The lack of meetings, poor attendance and a system to guide and draw benefits from the meetings can limit opportunities for identifying and appropriately managing safety-related issues.

Observations and reports indicated that O&G staff members also tended to communicate patient safety concerns to their own specific professional superiors. Where the issues involved another profession, those doing the reporting tended to report to a senior member of staff from the other profession. Service users and/or their relatives reported their concerns through various channels including specific staff members, senior professionals, the O&G department or the hospital executive.

AE reporting forms were adapted from the UK National Health Service (NHS) due to a lack of standard reporting procedures in Nigerian hospitals. The hospital encouraged all stakeholders, including staff, service users and relatives, to voluntarily report patient safety issues using the forms. The completed forms were submitted to the CMAC's office for the MPST review. They were then assessed and forwarded to the departments where the issues occurred, for further investigation and explanation. The MPST then analysed the departmental feedback before making recommendations for future improvements.

Compared to all the changes made in the hospital, incident reporting was viewed both positively and negatively by the study respondents. While some of the staff saw incident reporting as important in improving patient safety, others viewed it as impracticable in their work environment, and some held the belief that it was a way to "witch hunt" people. However, other respondents reported that they had confidence in the incident reporting system, highlighting that change was normally gradual when introducing measures such as report forms, as the following quote from an MPST member illustrates:

Well, the acceptability (...), is not optimum, (...). The fact is that you are just introducing something new (...). This is not something that is routine in most (...)

Nigerian Hospitals. (...). We are not getting it the way we want but we are moving towards that direction (Interview NO12- MPST member).

Clinical governance took the form of a voluntary monthly meeting open to all staff and service users, to listen in and contribute to case presentations. On average, two cases were presented in each meeting. The cases were selected by the CMAC from among those that had resulted in serious undesirable patient outcomes (morbidity and mortality) from either nurses' or voluntary incident reports. However, this might not always have been the case, as two of the cases observed during the study were based on family complaints.

Believe me, there're so many cases that should go there (clinical governance) but we do not have the luxury of time to discuss all of them. So, we choose the two which we think are the ones that have been truly badly managed (Interview NO23-SM1).

Preceding the clinical governance meeting, departments from which the cases emanated were notified, so that they could prepare to present their case. Following each case presentation, the presenter identified factors that had contributed to the unwanted patient outcome, and what they should have done differently. Then other staff members asked questions or made contributions regarding actions that would have helped in the patient's management.

It was observed that cases, which potentially had serious AE consequences but had not resulted in adverse patient outcomes, were also presented. Whether service users had been harmed or not, the measures agreed during the clinical governance meetings had led to the development of protocols and policies, which could proactively prevent other service users from harm. These included the "pentazocine policy" that was introduced following a patient's self-injection of a drug left by a staff member on the patient's table. The drug was subsequently managed under the DDA (Dangerous Drugs Act) and kept under key and lock. A policy of no surgery cancellation without the knowledge and agreement of the surgical team members was introduced. This was intended to reduce unnecessary cancellation of surgeries, as one of the improvements made in theatre processes, as well as to promote team working and valuing others' contributions, which was highlighted as an issue in the theatre and had resulted in a surgery cancellation by an anaesthetist. Other protocols and activities, which had been proposed but were yet to be implemented when the fieldwork period ended, included checklists for new-born

examination, catheter insertion and removal, anaesthetists' clinic and routine screening of theatre users for Methicillin-Resistant Staphylococcus Aureus (MRSA).

Compared to clinical governance, the O&G departmental meetings appeared to have a less visible safety-related impact. My observations also indicated that O&G had no observable system in place to ensure that concerns raised and discussed were resolved. One key similarity between the clinical governance and O&G departmental meetings was that most of the participants were doctors, and nurses/midwives rarely attended. At only one of the three clinical governance meetings observed was there a visible number of nurses/midwives; that was when one of their members was presenting.

Observations and informal discussions with staff during data collection provided an enhanced understanding of the contextual situation in which care was provided and weaknesses within the system that may have contributed to AEs. While it seemed that there was considerable scope for improvements in this hospital, it also appeared that they were further along than they had been previously. Two main drawbacks identified regarding the improvement activities included the fact that MPST membership was voluntary and that it imposed additional responsibility on its members. This seemingly limited the amount of time they could spend on such activities, thus potentially delaying incident reports reviews, action plan development and implementation. Additionally, lack of funding imposed significant limitations on the changes that could be made, given that some issues identified, such as equipment or structural changes, could not be funded or only gradually implemented. In addition, patient safety procedures were not embedded within the healthcare practitioners' training curriculum and regulatory bodies. The following MPST member's comment reflects a perception echoed by many of the staff observed and interviewed as they similarly felt that there had been significant improvement:

One day we will get to that optimum level within the context of what we have. (...). I will also add that some of the aspects of patient's safety may not be only within the purview of this hospital's management, but rather probably a national issue (...) (and some) things (have to) be extended to the civil service (and) regulatory bodies (Interview NO12-MPST member).

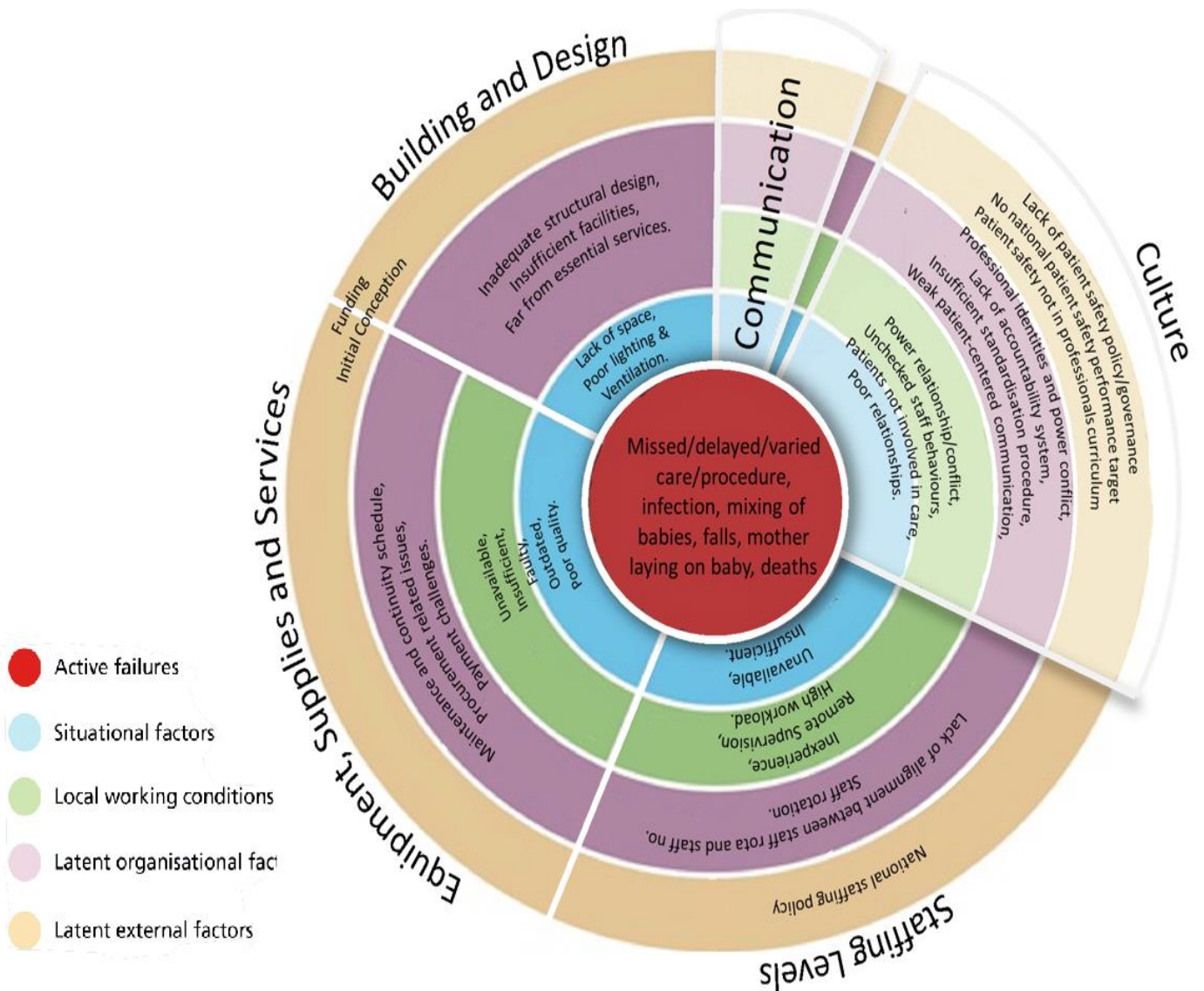
4.2 Factors contributing to adverse events (AEs)

This section presents findings on the potential factors contributing to AEs and the apparent reasons for their occurrence in the O&G department. The Yorkshire Contributory Factors Framework (YCF) discussed in chapter 3 will be used to guide the presentation of the findings [209]. The YCF was selected because it has the potential to be utilised in clinical settings in the identification and prevention of AEs. The framework illustrates contributory factors for AEs and the extent of their proximity to active failures/AEs. The contributory factors in the framework are presented as a series of concentric circles. Around the centre of the framework are the more proximal contributory factors (active failures, situational factors and local working conditions). The outer circle highlights more distal/latent contributory factors (organisational and external). As shown in figure 9, the contributory factors for AEs in the hospital studied are grouped into four categories as follows:

- 1 Building and design.
- 2 Equipment supplies and services.
- 3 Staffing levels.
- 4 Organisational culture.

While the contributory factors are presented as separate categories, it should be noted that they have many overlapping or inter-linked aspects at various levels. For instance, insufficient funding from the federal government was a factor affecting both equipment, supplies and services, and building and design. Similarly, inadequate standardisation of care/procedure influenced the availability of equipment and supplies. Communication is not presented as a contributory factor category on its own. This is primarily because of a lack of sufficient data to make it a separate category. Additionally, instances of good and poor communication found in this study overlapped and fit better in the sub-themes of other categories of the contributory factors to AEs.

Figure 9: Summary of the contributory factors to AEs



Adapted from the Yorkshire Contributory Factors Framework [209].

4.2.1 Building and design

This is the first of the contributory factors for AEs. It comprises four sub-themes in relation to how and why O&G's building and design may have contributed to AEs. These include; structural capacity, facilities, distance from essential services and design and purpose of the hospital.

Structure and capacity

Two main structural and capacity issues concerned the size of the wards and availability of condition specific rooms.

Nearly all of the staff that participated in this study highlighted problems with the structure and capacity of the O&G department. The majority of the staff regarded the ward sizes as generally inadequate to accommodate all the women needing admission. Many of them recounted that referring women to different facilities due to insufficient bed spaces was a frequent occurrence. Although no instances of sending women away for this reason were observed, it was noted on a number of occasions that some Obstetrics ward service users were admitted to the Gynaecology ward due to lack of bed spaces. A senior nurse/midwife from the Obstetrics ward described this during one of the observations:

Due to a high influx of women, those with emergency Obstetrics need were temporarily kept in the Gynaecology ward if they had bed space, but if not, the women have to be referred to a different hospital (Observation notes: Obstetric ward- day 1).

The lack of bed space might have adversely affected women needing urgent specialist care, including those registered for and attending ANC in this facility. This would mean that some of them could have received care in a less specialised facility with personnel who had no access to their medical records, with a reduced opportunity for timely intervention.

Gynaecology emergency was observed and reported by staff members to have the most structural and capacity issues. At the time of this study, the department did not have a designated physical space for this service. A senior hospital manager stated in an interview that the Gynaecology emergency service facility had been set up temporarily inside the Gynaecology ward to hasten service delivery for emergency O&G service users:

Initially, they (obstetrics cases) accessed the O&G through the A&E, and then it was difficult to get access, which results in delays... Because the OBGY (obstetrics and Gynaecology) team is usually at the obstetrics side, which is at the other end of the corridor. So, we were forced to create a Gynaecology emergency, which looks inadequate but is a big improvement from before (Interview NO23-SM1).

After 16 years (up to the time of this research), lack of funds was said to have prevented the construction of an appropriate Gynaecology emergency service.

The O&G department was also observed to lack suitably equipped rooms to accommodate women with complex needs usually expected in a teaching hospital. For instance, the absence of an eclamptic room in the Labour ward and Obstetrics was raised by participants. Pregnant eclamptic women were kept in the isolation room or a cubicle in the Gynaecology ward and only taken to the Labour ward when fully dilated.

We only admit them (eclamptic patients) in the Gynaecology ward. (...) If the woman is fully dilated, she will be rushed to the Labour ward. When we have conducted the delivery and resuscitated her, then we send her back to the Gynaecology ward. They will keep her in an isolation room or a cubicle (Interview NO16 CNO2-Lab).

The isolation room was often occupied by women/patients. Those with eclampsia would then be placed in a cubicle in the main Gynaecology ward, which was notably noisy, thus unsuitable for caring for such patients. Eclamptic patients might also be sent to a lower facility hospital if there was no bed available. The fact that the same isolation room was used in the admission of other women/patients, including those with infectious diseases, could have posed additional risk for eclamptic patients.

Isolation women/patients could be placed on the main ward when the isolation room was occupied, which increased their risk of acquiring or spreading infection. An instance of this was observed in the Obstetrics ward, where a suspected tuberculosis case was kept in the ward with other women, including new-born babies. Staff members identified provision of more condition-specific rooms among areas needing improvement in the hospital.

Gynaecology emergency had the most notable space and structural inadequacies. This could have related to it being established as a temporary measure, as mentioned earlier.

This service had only one consultation room, treatment room, and a small women-waiting area. It also lacked a recovery room for women following minor procedures such as manual vacuum aspiration (MVA). As a result, different staff members were attending to multiple pat women simultaneously in the treatment and consultation room. The waiting area was sometimes used to triage women. Doctors saw this process as an effective way to decongest the emergency area but agreed that a lack of privacy inhibit the disclosure of relevant information or women's cooperating with the proposed procedure. Thus, staff could have missed the urgency of women's' condition and potential opportunities for timely, appropriate intervention. Privacy also appeared to be an issue in all the O&G wards because their design frequently made it possible for other women and visitors to see and hear what was being said or the procedures being carried out on women. This concern was also identified by many staff members from different wards, as demonstrated in the following observation notes of a senior nurse/midwife:

The nurse/midwife raised a privacy issue in their ward, explaining that nearby women can see and hear what is going on around many others' bedsides because the ward is open (Observation notes: Obstetric ward day 1).

Available facilities

Main issues in relation to facilities were related to bathrooms and toilets, water, lighting and ventilation, electricity, telephones and medical records.

The numbers of bathrooms and toilets in the O&G wards were inadequate and they were in a poor state of hygiene. Nurses/midwives from Gynaecology and Obstetrics wards reported the issue of inadequate number of bathrooms and toilets for service users. The insufficiency issue was worst for the Gynaecology ward, which had to share with the Gynaecology emergency service users because they had no designated bathrooms and toilets. This issue was not of significant concern to the Labour ward staff. Their main worry was that the location of the bathrooms and toilets outside the delivery suite was unsuitable and unhelpful to infection control.

The toilet and bathrooms also had non-functioning overhead showers and only a manual toilet flushing system. A bucket was placed beneath a working tap for collecting water, while a large plastic container was used for storing water. Users collected water in a bucket to either bathe or flush, resulting in spillages around the floor areas. Water pooling was also observed in the staff toilets and bathroom areas. The floor was slippery and did not allow proper drainage of the spilled water, resulting in a constant pool on the floor. Water pooling was also observed in the staff bathrooms and toilet areas. I had to tug at

and raise my long dress to prevent it from touching the dirty water. This increased the risk of falls for users, which different staff members said were a common occurrence. The extent of this concern was more evident to me following my personal experience of a fall in the staff bathroom during a night observation in the Labour ward.

The visible poor standard of cleanliness and water pools around the bathrooms and toilets areas could also add significant infection risk. The Obstetrics ward toilets and bathrooms were particularly poorly cleaned, with a constant unpleasant odour and dirty waste, including used pads. Compared to the obstetrics ward, the Labour ward had cleaner bathrooms and toilets, probably because they had fewer users, but it was observed that both had room for improvement.

The hospital was said to have had water supply issues in the past, but most nurses/midwives seemed to feel that the problem had been resolved when the hospital acquired three water tankers. The tankers filled each ward's water tank daily, and the tanker drivers had to sign a register after each delivery. However, one of the consultants saw this water supply system as unable to resolve the water issue. This view resonated with my opinion because there was no back-up for the tankers breakdown.

In one of the MPST meetings, a potential water contamination issue was also raised when it was pointed out that the lid of one of the hospital water tanks had been blown up by the wind, leaving it uncovered.

The O&G wards generally appeared to have inadequate lighting and ventilation because their design was such that windows were situated on only one side of the building. The lighting and ventilation issues were notably worse in the Gynaecology emergency due to it being in the middle of a ward. All the wards relied on electric lighting because they were quite dark even in the daytime, as noted during power outages. Fans were also relied on for air circulation, but these did not appear to protect women and the staff from the discomfort of the sun during the Nigerian hot season. The lack of ventilation also increased the risk of contracting measles infection, which was circulating in many northern states during the fieldwork period. However, the Labour ward, which usually had few women, had a functioning air conditioning unit and fans, making it the most comfortable ward. A house officer highlighted the impact of the lack of ventilation (Interview NO1 HO):

The wards really (strong emphasis) get stuffy, especially during the dry season, and it is very hot in this area. If the hospital can provide at least (...) three or four

air conditioners in the wards...I think it will be helpful (...). The doctors cannot think because...doctor is doing rounds; he/she will be sweating... He/she will be looking for something to cool himself/ herself (Interview NO1 HO).

The hospital's electricity supply was better than that of the surrounding community because it was connected to a unique electricity grid, with access to a more reliable power supply. The hospital also had back-up generators and inverters (electricity-generating devices). The inverters were in the process of gradually being rolled out to the wider hospital, with perceived key places connected first. At the time of the study, the Labour ward and the Obstetrics theatre were the only O&G areas with sufficient electricity because they were among the perceived essential places. Whereas the other two O&G wards, including Gynaecology emergency, were yet to be connected. Therefore, they were the most affected during power outages.

Staff reported that fuel cost prevented regular use of the generators, especially those for the wards, as observed during some occasional power outages. On such occasions, mechanical and non-mechanical care activities were significantly affected, especially in areas of O&G with no electricity backup. The following observation notes the difficulty faced by staff members in providing care during a power breakdown:

Around 1:00 pm, a storm started, and the hospital's electricity went out. So, I decided to check out the O&G wards. The Gynaecology ward was so dark that I had to be careful seeing my way as I walked through the corridor. At the Gynaecology emergency, I found four doctors (one junior registrar and three house officers) sitting with one woman who was being assessed but apparently, everything had stopped because of the darkness. One of the house officers was using her phone's torchlight to write on the woman's folder. The junior registrar told me that they could not do any work because it was impossible to see very well. "You can see; it is not easy to write anything; we are even lucky we have no serious patients" (Observation notes: Gynaecology emergency day 7).

The doctor's statement suggested that the electricity issue would not have an adverse effect on the woman because her condition was not serious. However, history taking, physical assessment, and scanning are essential to diagnosis, and help the doctors to decide on appropriate intervention. The electricity issue would have delayed treatment for women who might have needed urgent intervention. A senior nurse/midwife in the Gynaecology ward explained how power outage affected care provision:

If to say maybe at that moment, you were suctioning a patient, how would you suction again? No light! Or maybe you are scanning. Anything that you will have to use electricity for would be affected. And if it is in the night or early morning when you need to do other things, do some writing or a procedure, and there is no light, it would affect and delay your work (Interview NO25-CNO).

Despite O&G having intercoms at the nurses' station in all the wards, staff members said these were unreliable because they rarely worked. However, even when the intercoms were functioning, many staff members, especially doctors, preferred using their mobile phones when they needed to call or consult another staff member. According to the doctors, mobile phones were faster in reaching the staff member they needed. While some of them did not mind the personal cost of such calls, others did. This meant there was potentially delay in reaching some staff members in the absence of functional hospital phones.

Medical records

Only the Labour ward had a computer for recording women information, and only doctors used it. Various observations and comments indicated that not all the women's records were complete and up to date. For instance, during the first Labour ward observation, a consultant walked in, scrolled down and checked women's records on the computer against those in the nurses' record book and told the house officer that their records were not up to date (17th March - 6th April 2016), and ordered this to be rectified immediately.

Poor women records could result in the absence of vital information about the women and would limit subsequent learning opportunities. Poor record keeping was also apparent during one of the Labour ward's statistics presentations when some of the doctors in attendance disputed that the department conducted only 14 caesarean sections in the whole month of March 2017. Some of them recounted there being about seven caesarean sections on one of the days of the month.

Distance from essential services

As described earlier, O&G was the furthest of the hospital wards from essential services such as the laboratory, pharmacy and radiology compared to the other departments. The lack of an O&G laboratory (unlike other departments) made it necessary for all samples to be taken to the main hospital laboratories, even those that could ordinarily be processed by the doctors themselves (such as haemoglobin). Doctors repeatedly cited

the lack of an O&G side laboratory among the reasons for delays in getting results. Some said the porters got tired from repeatedly walking to and from the laboratory.

We do not have side Laboratories as far as O&G is concerned. I know other departments have them (...), so that contributes (to delays). There are investigations that you want to do, at least something like PCV (packed cell volume) (Interview NO2 SR).

Design and purpose of the hospital

Most of the Nigerian federal teaching hospitals were primarily designed and built for teaching and training purposes. However, this hospital was upgraded from a lower facility to teaching hospital status a few years before the fieldwork. An interview with a senior manager describes how the hospital went through various upgrading stages:

The hospital (...) was designed to be a secondary care but then expanded (...) to provide tertiary care, then later training of residents, and now a teaching hospital (Interview NO23-SM).

Many of the O&G complaints related to the building and design seemed to be known about by the hospital management and were reported as a wider hospital problem. Staff identified the initial design of the hospital's layout and insufficient funding from the federal government as having significantly influenced most of the identified building and design issues. Despite the structural improvements needed for O&G to meet the teaching hospital's demands and the presence of sufficient space within the facility to expand or build new structures, staff said their annual federal health budget would not be adequate to fund this. A senior hospital manager also highlighted that their budget was less than that of other older, more established teaching facilities. On this subject, the manager said an association of federal hospital executives requested the government to change its funding system from number of beds to need-based. This manager expressed hope that this request would be granted in the following year:

We have suggested both to the Ministry and the Budget Office that they should conduct a need assessment for all hospitals. (...) So that you will be given things based on what you need rather than just pushing things to hospitals. "Oh, this hospital has so, so beds...give them these". But once you do your needs assessment, (...) "okay this hospital requires this and that" budgeting will be better (Interview No32-SM2).

Hospital managers and various staff members also reported that requests to the Ministry of Health for additional funding for facility improvements were still awaiting a response.

4.2.2 Equipment, supplies and services

Having addressed the potential contribution of the building and design to patient safety, the next sub-section will examine how and why lack of equipment, supplies and services may have contributed to AEs. The sub-themes to be discussed in this section include; availability of equipment, supplies and services; maintenance and continuity schedule (inventory); procurement related issues and funding and payment challenges.

Availability of equipment, supplies and services

Equipment comprising essential devices for diagnosis and or monitoring women/patients' vital parameters and for supporting care activities, as well as instruments, were observed and reported to be generally unavailable, insufficient, faulty or outdated. The insufficiencies also affected supplies of materials in continuous use and needing regular replacement, including general and O&G specific medicines, consumables and stationery. There were also issues related to certain services, including the blood bank and various laboratories that aided diagnosis and treatment. There were also observed and reported inconsistencies in the availability of equipment and supplies between the wards. Compared to others, the Labour ward was better provided for, whereas the Gynaecology emergency was the worst affected because it had no supply of its own and shared with the Gynaecology ward, resulting in competing demands from both wards.

The identified patient safety implications associated with equipment, supplies and services included inadequate women monitoring, delays in intervention/procedure/treatment, infections, risk of falls in babies, risk of babies being given to the wrong mothers and missed opportunity for specialist care.

Equipment

Four critical devices for diagnosis and monitoring of mothers and fetuses identified in the O&G wards were the vital signs monitors, hand-held dopplers, cardiotocographs (CTG) and ultrasounds. Nurses/midwives from various O&G wards reported that their vital signs monitors such as sphygmomanometers (Blood-Pressure Monitors), thermometers and stethoscopes were insufficient, analogue (using mercury rather than digital) and of low quality. Staff said operating the analogue devices was time-

consuming, and that they broke down frequently, which reduced their availability below the recorded numbers. This potentially risked the wards having no functional devices.

Many staff members reported having to suspend or delay women monitoring as a result of broken/ faulty equipment. This situation was observed in the Labour ward when their last functioning sphygmomanometer accidentally fell and broke when a nurse/midwife was about to measure a woman's blood pressure. The procedure was suspended for some time and could only be completed after borrowing the equipment from the Obstetrics ward. Whilst the woman did not suffer any obvious AE, it was potentially a missed opportunity to detect and intervene early if the blood pressure was abnormal. The sphygmomanometer was repaired a few hours later by combining two halves of the mercury from two broken blood pressure devices from the ward, to get one of them working. This left the ward with only one functioning sphygmomanometer, with an increased risk of having none.

The O&G had only two CTGs, but they were both broken and irreparable. This increased the risk of missed or delayed identification of a change in women's vital parameters, especially for those needing close monitoring. Such a situation was observed in the Labour ward when a first-time mother with history of renal impairment had an unanticipated delivery shortly after a cervical dilatation measured to be 3-4cm. The baby was expelled on the bed without anyone noticing, despite a senior resident being seated at the nurses' station, a few steps away.

Only the Labour ward had two handheld dopplers, but these were working inconsistently or failed to work, as the following observation reflection notes outline:

I am worried that women's monitoring was hampered by a poorly working doppler. Adequate monitoring was not possible even for the women that was recommended to have the foetal heart monitored every 5 minutes. The doppler issue seemed to be known about by everyone as the staff kept commenting about the poor batteries (Observation reflection notes: Labour ward-day 4).

Whenever the dopplers failed to work, staff members used a Pinard horn or an ultrasound machine. However, various staff members, especially Labour ward nurses/midwives, found the use of Pinard horns, as analogue devices, challenging when trying to maintain foetal heart monitoring for 15 minutes. This situation was worse when women numbers were high, due to insufficient staffing in their department.

While all the three wards had an ultrasound-scanning machine, there had been some operation and capacity concerns. The machines were mostly operated by doctors and very senior nurses/midwives. The junior nurses/midwives did not have the necessary operational skills to use the devices. Some junior doctors further claimed that the ultrasound machine in the Gynaecology treatment room was obsolete, resulting in poor machine intensity and visualisation difficulties. The doctors also said all the O&G wards' machines lacked transvaginal scan capacity. As a result, they sometimes had to send women to the radiology department to obtain a more precise machine output or a transvaginal scan. Some of the doctors also associated the hospital radiology department with scan delays; thus, sometimes they sent women to private radiologists, located outside the hospital, for faster results. However, there was an unused modern ultrasound scanning machine with transvaginal capacity in the Obstetrics' ward foeto-maternal office, which remained mostly closed and dusty. A few staff members said it was purchased to generate income for the department, but it was unclear why staff members seldom went into the room and or used the machine, and time did not permit further exploration of this.

The issue of CTGs and hand-held Dopplers was frequently raised during various informal and formal conversations with different staff grades, and observations in doctors' meetings. Sometimes staff members attributed adverse patient outcomes to the lack of these devices. For instance, an O&G consultant recounted making inappropriate decisions on women's management based on their interpretation of the situation, due to lack of appropriate machines that would have provided the information needed to provide appropriate care.

Various staff members, especially nurses/midwives, reported issues with care related equipment including patients' beds, examination couches, baby cots, oxygen cylinder, suctioning machine, air conditioner, hand- dryer fans. The staff felt that the hospital beds were outdated and unsuitable for caring for women with certain conditions because they were non-adjustable to desired positions. Similarly, some of the nurses/midwives in the Obstetrics and Gynaecology wards claimed that their couches were non- adjustable, insufficient and old. This problem seemed to be more serious in the Gynaecological treatment room, which had two couches but also much more frequent examinations and other procedures. Only one of the couches had stirrups, which staff said were rusty and had long been at risk of breaking. A senior nurse/midwife working in the Gynaecology ward recounted taking the couch back from the estate department (repair shop) before the repair was done because of an urgent need in the ward. This suggested an increased

possibility of a life-saving procedure being delayed or suspended when these couches finally broke.

Baby cots appeared to be an issue specific to the Labour and Obstetrics wards. The Labour ward had no baby cots. Staff kept new-borns on the only resuscitaire in the ward, with several observed instances of multiple unlabelled babies being placed together. This has serious patient safety implications because babies could have been accidentally mixed up and given to the wrong mothers. This risk was potentially increased given that babies of women who went for caesarean sections from Gynaecology emergency or Obstetrics wards were also kept on the same resuscitaire with those in the Labour ward. There also remained a risk of resuscitation delay for babies needing the procedure urgently if the only available machine stop working. Despite the potential hazards, some nurses/midwives in the Labour ward did not see the need to have cots in their ward, because the mothers and the new-borns only stayed for a short period (one hour) after delivery.

The Obstetrics ward had eight baby cots, which various staff members said was not a sufficient number for a 41 bedded ward. When the cots were unavailable, some babies were at risk of being pushed off the bed or lain on by their mothers because they had to share beds. A staff member told me of a recent case of a baby that had died following a head injury after falling from its mother's bed in the Obstetrics ward. A senior registrar recounted a similar event but claimed that it was due to the baby not being assigned a cot, despite one being available at the time of the incident:

A baby recently fell from the mother's bed even though there were a couple of cots available at the time, suggesting that a cot was not assigned to the mother by the nurse-midwives (Observation notes: Obstetrics ward-day 6).

While the suction machine numbers per ward were not apparent, it was noted that the Obstetrics ward had only two of these devices. This was potentially insufficient considering that multiple post-operative women and other serious cases were admitted at the same time in this ward and may have needed the devices at the same time. The situation could have been even worse if one of these devices had broken down.

Oxygen supply appeared not to be an issue in the Labour and the Obstetrics wards. That was because they had mounted oxygen pots and a spare oxygen cylinder each. However, a few doctors reported issues related to oxygen cylinders and supply in Gynaecology emergency. Given that provision was shared with the Gynaecology ward,

some staff members saw the two oxygen cylinders provided as grossly inadequate because both wards received women with severe conditions. One of the doctors stated that the large cylinders were not easily portable, and were sometimes found empty when oxygen was needed, due to delays in refilling. However, a senior nurse/midwife from Gynaecology ward said getting the cylinders refilled was not a problem, and they could borrow from other wards. There remained a possibility of delay in oxygen administration to women if staff had to wait for refilling or rely on borrowing, especially since requests made at night for such as oxygen refills had to go through the compound office.

Essential instruments for obstetrics and gynaecological procedures were also insufficient across all the O&G wards, with some in incredibly short supply. For example, the Labour ward had only four pairs of episiotomy scissors. These were observed to be most often in use, which increased their chance of being unsterile. Nurses/midwives working in the Obstetrics ward also reported that their ward was not provided with delivery packs because they were not expected to conduct deliveries. However, these staff members saw having such packs in their ward as critical because they had some instances of unanticipated deliveries. On many occasions, obtaining instruments required for specific procedures was observed to be challenging for nurses/midwives in the O&G wards. On such occasions, they would have to borrow instruments or specific procedure packs, mainly from the Labour ward. Some O&G staff, commented that the Labour ward staff disliked loaning their resources. One senior resident was observed to have moved a Gynaecology emergency patient to the Labour ward specifically to get the required instruments and consumables.

Supplies

Each O&G ward was provided with stationery by the hospital records department but these items were observed and reported to be frequently unavailable when needed. Although staff members did not regard stationery insufficiencies as something serious, it could result in delayed or missed laboratory investigations or procedures, or staff using different forms, which led to loss of women's records being observed in both the Obstetrics and Labour wards.

The O&G wards had "life-line boxes" intended to minimise delay in accessing essential life-saving emergency medicines and consumables. However, there were several observed and reported instances of insufficiencies of such supplies, especially in the Gynaecology emergency. To highlight the insufficiencies of the "life-line box in the Gynaecology emergency, one doctor referred to it as a "half-life" (Interview NO02-SR1).

Supply issues in the wards were mostly raised by doctors, whereas nurses/midwives, especially the seniors, seemed to be more reluctant to admit to having this problem or referred only to problems with individual items. For instance, when asked if there were times when they experienced medicine shortages, a senior nurse/midwife in Gynaecology ward said they only had an availability problem with oxytocin and MgSO₄ but not with IV fluid, and this occurred when service users did not replace them after use. However, several observations and reports from various staff, mostly doctors, showed that not only were IV fluid and essential medications insufficient but many components of the life-line box, including pads, syringes, catheters, gloves, IV giving sets and cannulas, were also frequently missing when needed.

Even the Labour ward, which was notably least affected by supply issues and described as the “first stop” for borrowing supplies by other wards, also had occasional supply challenges whereby their staff had to borrow from elsewhere. Obtaining consumables and medicines in the neighbouring wards appeared not to be as straightforward as acquiring stationery on most occasions. The pattern of such supply insufficiencies caused uncertainty regarding their availability in any of the O&G wards, with the hospital pharmacy also having occasional shortages. Therefore, staff members and/or women’s relatives had to search various sources, including pharmacies situated near the hospital gate, in town, or even in different states. The following Labour ward observation extract highlights an instance of this occurring, where a senior registrar requested a nurse/midwife to replace an ongoing dextrose water infusion because it was unsuitable for the patient’s condition (cardiac):

The midwife said they did not have 5% dextrose saline in the ward, and when they sent to the central pharmacy, they were told that they did not have it either. The SR told the midwife to give the prescription to the patient’s relative to go and buy it outside the hospital (Observation notes: labour ward day 2).

Expensive and less commonly used medicines or consumables were more at risk of being unavailable in the hospital and/or nearby pharmacies. For example, a booked Rhesus negative patient waited several days in admission for an anti-D medication. The medication had to be delivered from a different state because none of the pharmacies in the hospital or town had it. Similarly, observations and reports from staff working in the Gynaecology treatment room indicated that they had only two manual vacuum kits (Karma's syringe) at any given time. Despite these being designated for single use only, they were repeatedly used on many different women over a long period. Some staff members linked this practice to saving women the expense of having to pay for a new

one and the lack of availability of these devices in the local pharmacies. However, a senior registrar dismissed the claim that the devices were expensive and noted that this was an avoidable practice because women were not given a choice. A consultant highlighted how limited availability might have driven re-use of the syringes:

It is workable (offering a new Karma's syringe), but then it means that the hospital will need to have an initial stock of the syringes available so that if a patient decides that she wants a new one, it can be provided. As it is now, I doubt if we have more than five, and with the load of patients (women) we see, it will be challenging to say "okay a woman can choose whether a new syringe should be used or not" (Interview NO29-COG4).

In general, staff members seemed to be finding workarounds for some insufficiencies by borrowing or swapping some items at the hospital pharmacy, for example. However, I noted that some items in short supply were either irreplaceable or the measures taken to replace them raised patient safety concerns. For example, a senior registrar commented that only four regular surgical gloves (wrist-length) were usually provided for each labour patient. The staff, therefore, conserved the gloves by utilising a single hand at a time when conducting procedures such as artificial rupture of membranes and vaginal examinations. Staff also modified regular surgical gloves to make elbow-length gloves because the latter were not usually available at the hospital. They cut the bottoms off two regular surgical gloves to join them with two others. In an interview, a junior registrar described using these improvised elbow-length gloves to remove a retained placenta manually, but acknowledged that it was an unacceptable practice.

It appeared that leaving staff to evolve strategies to solve insufficiencies was unhelpful to the hospital's overall approach to risk management by contributing to the normalisation of the inadequacies and potentially lack of reporting. This was seemingly reflected in the mixed views of staff on whether they had inadequate, adequate or manageable provision of equipment, supplies and services. In an interview, an MPST member could not remember seeing any report of such issues from O&G, which might have led the hospital management to regard the O&G department's equipment, supplies and services provision as sufficient.

Well in the few months we have spent as MPST members, and in the few incident reports that we have received, I cannot remember them (O&G) reporting that they have a limited number (equipment, supplies and services), but it is a general

complaint in the hospital. (...) So, what I am trying to say is (that) we have not received a formal complaint from them (O&G) (Interview NO 12-MPST member).

Services

Services, in this study, refers to the blood bank and various laboratories which aid diagnosis and treatment. Blood and/or blood products were collected from the hospital blood bank by O&G support staff after women's relatives had undergone blood donation procedures. In an emergency, doctors could collect these for service users under their care by signing an undertaking at the blood bank, on behalf of the service users, even before the donation procedure was completed. Except for instances of problems with rare blood groups, the majority of O&G doctors seemed to be happy with the system in place for this life-saving intervention. However, they did not like physically going to the blood bank. A delay could result when the doctors were busy or unwilling to do this.

Obtaining laboratory investigations usually involved the support staff taking women's samples together with investigation request forms and payment receipts to the laboratory. These staff members would also bring the result in paper form back to the wards. Laboratory test delays resulted from instances of wards lacking sample bottles or investigation request forms, or where women lacked the funds for payment. Many O&G doctors reported having no problems obtaining basic laboratory investigations results for such as PCV, FBC and blood grouping and cross-matching; although, the doctors said a few types of investigation results, including clotting factor and urea and electrolyte (U&E), usually took longer to obtain, up to 24 hours. This was reported and observed to cause significant delays in timely lifesaving intervention for some women. However, a senior laboratory staff member refuted a claim regarding difficulty in obtaining urgent urea and creatinine results within the same day. They explained that emergency electrolytes tests could be completed within 5-10 minutes, and urea and creatinine including iodised calcium within two hours. The laboratory staff member also said they had adequate staff and a machine that could process over 300 samples simultaneously within minutes. The staff felt that the O&G staff members were misinformed about such laboratory investigations and said they would arrange for a visit to educate them.

The (senior staff member) said, to improve the relationship with clinical departments, they used to go to different departmental meetings to educate them about laboratory investigations. However, they could not remember when last they had been to the O&G department for such visits and felt that it was high time to arrange for them to visit the O&G (Observation notes: Meeting-Chem-path).

Maintenance schedules and inventories

Several observations and reports highlighted that a lack of consistent mechanisms to check the functionality and availability of equipment and supplies and to replace the existing ones contributed to the shortages.

Checking for equipment functionality appeared to be at the staff's discretion. Throughout the three months of the data collection period, there was only one observation of checks being carried out to ensure machine functionality. This observation was made in the Obstetrics ward when a senior nurse/midwife directed a porter to check if the two spare suctioning machines and oxygen cylinders were functioning. One of the suctioning machines was then found to be faulty and was repaired immediately. However, it appeared that this was not a regular routine in any of the wards, as the following interview response indicates:

I will blame the system because there are no set mechanisms (...) to ensure that these things (equipment, supplies and services) are always functioning and maintained, and when it is time to replace it, get it replaced. (...) For example, anytime people report in the morning, all these things should be checked. Alternatively (...) the department that provides the oxygen, for example, should (...) have people (staff) going around every day to check that these cylinders are in optimum condition, (...). (Interview, NO2-SR1).

Similarly, checks for availability and or readiness of essential instruments and supplies such as procedure packs, sample bottles, oxygen and stationery, including laboratory request forms and patient charts, were not routinely scheduled. For example, the O&G department's "pack system" strategy, which was supposed to ensure that instruments were arranged, packed and sterilised according to the intended procedures, such as delivery, episiotomy and artificial rupture of membrane, was inconsistent. This was because the wards had no specific guidance on when instruments should be taken to or returned from the CSSD. This contributed to the many observed and reported occasions of procedure pack shortages and subsequent use of unsterile instruments on women. In the Labour ward, for instance, staff collected required individual instruments from a trolley loaded with washed or disinfected instruments seemingly meant for sterilisation at the CSSD. The instruments were soaked in a diluted jik (hydrochloride solution), termed by many staff members as "jikking". This was observed even in the case of women that had been in the ward long enough for staff to make adequate provision for sterile instruments. This practice breached the departmental and general sterile

procedure protocol and could have increased the risk of hospital-acquired infections, including HIV and hepatitis. The following interview quote from a senior doctor highlights this practice as a common occurrence:

I do not think I would say we have enough (packs) because (...) we have times when the delivery packs are exhausted. Yes, several times and in fact it's almost every month. (...) So, you have to re-sterilise, in quotes, because that one is not full sterilisation. Use bleach, then quickly get (...) the few instruments that you can get to conduct the delivery. So, that too is not a good thing (Interview NO2-SR1).

Some nurses/midwives saw retaining some instruments in the ward as a backup rationale in case they needed them before the packs came back from the CSSD. However, concerns about delays in the CSSD should no longer have been an issue because the sterilisation service was available 24 hours a day and they had urgent sterilisation services on request as confirmed by a senior nurse/ midwife:

We (Labour ward) do not have that problem (sterilisation delays) because we always have light, even if NEPA (electricity) is not working, a standby generator is there. So even if we need a pack, within 30 minutes to 1hour we call them (CSSD) (...), and they will do it (sterilise packs) and bring it for us (Interview NO5-ACNO).

During the nurses/midwives' shift hand over, they routinely conducted inventory checks for medicines and consumables. These items usually had an attached monetary value and were generally paid for by service users. The inventory was used to ensure accountability of the revolving fund and to guide them on insufficient items so they could request supplies from their ward managers. However, on many occasions such requests were not made or made only at the time of need, which resulted in persistent shortages and delays. A specific instance of this was noted when a house officer had to wait for an additional suture to be collected from the ward's store before finishing an episiotomy repair they had started on a woman in the Labour ward.

There was no system in place to check equipment functionality in order to support an efficient hospital procurement process. A functionality checking system could have indicated to the hospital management what equipment needed replacing, early on before it broke, which would have triggered the start of the requesting process. For instance, a senior hospital manager appeared surprised and indicated a lack of knowledge about

the O&G's CTG issue, but acknowledged that this equipment was about 20 years old and its replacement was long overdue. The manager acknowledged the hospital management's lack of control regarding when a request for this would be granted. This was because the funding had to be approved by the government through the medium-term strategy, which might take three years.

Procurement related issues

Sufficiency of equipment, supplies and services was influenced by a lack of timely requests, administrative delays, delays in identification of appropriate suppliers, and departments' ability to proactively request and or persuade the management.

Various staff members linked shortages of some equipment and supplies to lack of timely requests by the responsible staff members as indicated in the following comment from a senior hospital manager:

Most times, some of these petty, petty purchases come in time except if (...) except if they did not reorder in time (Interview NO32-SM2).

A few staff members raised a concern that the hospital finance department's administrative procedures delayed payment of suppliers, which deterred the suppliers and resulted in frequent changes of suppliers and consequent disruption to supplies. A senior manager in the nursing/midwifery department involved in procurement acknowledged the occurrence of administrative issues but said that they had changed their procurement strategy to reduce supply delays:

All we did as a means of reducing the problem is once we have applied and supply is made, we will now send another request immediately, (...) so that the administrative procedure can be done on the request and a supplier can be identified. So that before this one is finished, you can now get your consumables (Interview NO31-SM3).

Some staff members saw the hospital's location as limiting the supplier choice to a few inefficient suppliers with little capital. They said this sometimes resulted in the supplies coming in batches or getting nothing from an unwilling supplier if the funding was insufficient. O&G ward managers stated that receiving incomplete supplies was most likely when they requested a preferred brand. They highlighted their concern about counterfeit medicines and consumables, as a reason for returning unfamiliar brands to

the supplier, and occasionally leaving them short of supplies. The senior manager from the nursing/midwifery department explained that this was because most of the supplies were obtained outside their locality due to the geographical location of the hospital.

When staff members were asked about what they would want to see changed in the hospital, many of them wanted essential medication and consumables to be made available all the time and they suggested collaboration with external pharmacies, so that supplies could be ordered with just a call, as a way forward. Collaboration with other suppliers could potentially help in the provision of needed supplies, including expensive and not commonly needed medicines.

Procurement decisions and allocation of equipment supplies and services across O&G and the wider hospital appeared to be driven by the perceived importance of different departments or wards. This possibly explains the observed and reported differences in provision of resources throughout the hospital. For example, electricity backup and oxygen piping were gradually being provided throughout in order of perceived priority as funds become available.

Money is not forthcoming, so we have to take the projects in phases. We started with the main theatre, ICU, paediatrics, the laboratories... So, we are coming down to "the critical areas". Yes, O&G is a critical area, but we are thinking of areas that serve the whole of the hospital. (...) Then of course, O&G is likely to be on top of the list. (...) We get our receipts monthly. So, every month we seek out one (...). (Interview, NO32-SM2).

The fact that the O&G theatre and Labour received oxygen piping and inverter services before other departments indicated that they were regarded by the management as "critical areas". Whereas in spite of being the entry point for all O&G cases, including time-critical emergencies, the Gynaecology emergency appeared to be perceived as less critical as they were still waiting for both services and had to share equipment and supplies with the Gynaecology ward.

It also appeared that departments with more influence at hospital management level were able to communicate the importance of having specific equipment, supplies or services and more likely to have requests approved. A senior registrar's response in an interview supported the view that those who shouted loudest got what they wanted. The doctor commented that they justified their department's need for additional junior

registrar staffing and a theatre suite during a management meeting, which led to their provision within one month.

However, some O&G doctors felt that their departmental leadership lacked sufficient engagement in the hospital's executive activities. According to the doctors, this resulted in their requests being ignored and according to a senior registrar was why their department had the most insufficiency issues:

Their (other department) resident doctors tell us to our faces (that) our consultants do not come to work; we do not do this, (...). Even the management do not even know what we are doing, and that is why, when we request things, they do not give them to us. Because when you see your colleagues from other departments getting extra hands (staffing) even though they have enough, while you are begging for more hands, you (then) ask them why is this. They will say "ah, but they say you guys are not serious", (...) That says it all (Interview, NO30-SR).

The O&G doctors' view about their departmental leadership was supported by a senior hospital manager who stated that O&G did not disturb the hospital management (Interview NO31-SM1).

Funding and payment challenges

Both local hospital payment processes and the way hospitals were funded nationally appeared to have influenced the provision of equipment, supplies and services.

Figure 10: Diagrammatic representation of the hospital payment process



The payment processes and options associated with the "fee for service" system summarised in Figure 10 was reported by many staff as time-consuming since it involved visits to multiple different places, and the queues were often long. The process involved providing women/relatives with prescriptions for supplies (medications and consumables) or investigation request forms at the point of care (e.g. Ward), which they

took to a specific service (e.g. the pharmacy or laboratory) for payment. Depending on the service needed, a receipt would be returned to the point of care as evidence of payment for specific services (e.g. surgery, medicines and consumables).

Apart from a few small payment units near the essential services, which only operated on weekdays and closed by 1:00 pm, service users from O&G and other departments generally made their payments at the hospital's only central payment point. This payment point operated on a 24-hour basis but was quite some distance from the O&G department. Various staff members expressed concerns regarding time spent in these queues and the lengthy payment process, which they linked to avoidable delays in getting supplies and services. The staff also said there was no provision for hastening the payment process for emergencies.

The central billing unit is also contributing to the delay of payment and then a delay of patient's (woman's) care. (...). There might be queues, and the staff in the billing unit might not know the gravity of what this particular patient's (woman's) relative is dealing with (Interview NO04-R).

The hospital only accepted cash payments, despite having few cash machines, which frequently ran out of cash and typically had very long queues, especially around the first and last weeks of the month. People sometimes had to go to cash machines outside the hospital grounds. This delayed the payment process and consequently access to supplies and services, particularly for those needing urgent intervention.

Payment was more difficult for those with little or no money at hand. Many staff members attributed some delays in laboratory investigations or admission procedures to women having no money at presentation. Some of the doctors recommended that the hospital should make some provision to help such women.

The 24-hour "national emergency policy" and "service rendered forms" designed to hasten access to necessary supplies and services appeared not to be readily available for many women. One of the reasons for this was that eligible women always outnumbered available hospital funds. The 24-hour emergency time-frame also prevented women from obtaining additional support beyond this time, making it difficult to get further assistance. Additionally, what support was available to women within the first 24-hours of their presentation seemed to be poorly understood by staff, resulting in inconsistencies and unnecessary delays. For instance, many of the staff believed that women could only have two emergency laboratory investigations (mainly packed cell

volume, blood grouping and cross matching). Thus, women needing more could face delays. It was also observed that women classed as emergency were asked to pay for their two investigations, including one instance where an emergency caesarean was delayed because of the relatives' inability to pay for laboratory tests:

According to a junior registrar, doctors intended to conduct a CS on her arrival, but deferred it because the relatives could not pay for the requested investigations. The woman's blood sample was not taken to the laboratory because, despite having paid for PCV and blood grouping and cross-matching, they had not paid for a clotting factor test, which the doctor said was necessary because of her condition. (...) I noted that the time from the woman's admission at 10 pm to the end of the observation, which lasted from 7:25-12:30, was still within the 24-hour national emergency time frame, but these investigations were not treated on such grounds (Observation notes: Labour ward day 6).

Intensive care (ICU) had only two critical care beds for the whole hospital and was not included in the emergency policy. This meant that women with critical health condition and insufficient financial means found it hard to obtain this type of care, and were at increased risk of experiencing severe AEs.

A senior hospital manager agreed that there were occasional issues with obtaining investigations for some service users despite the emergency policy and reported that there was a plan to talk to the staff about it. The manager also clarified that the ICU issue was complicated by the fact that it served the entire hospital. Given their previous experience of receiving service users with no money for investigations and treatments occupying beds, the hospital devised the admission deposit policy. This was designed to allow admission of service users who could afford to use the service and keep away those who could not. However, the manager said they could allow admission of such patients without the deposit if staff provide justification and permission from the CMAC or CMD.

In general, the senior hospital manager's response indicated that getting such support for service users with little or no available money depended on their care providers' willingness to act. It was noted, though, that some of these service users might not get such assistance because the care providers were not obliged to take this extra step.

Funding insufficiencies and policies (blockages) by the federal government were seen by various staff members and managers as the main reason for the lack of new and or

adequate equipment, supplies and services. For example, the following quote from a senior hospital manager highlights that getting funding to replace faulty equipment such as a CTG could take up to three years:

A CTG is not something we can purchase from our IGR (internally generating revenue). It has to come from the capital budget and, on average, it takes about three years for something (like this) to get pushed into the capital budget. (...) Imagine how long it is going to take! (Interview NO23-SM1).

Provision of patient care supplies in the hospital, including O&G, depended on each wards' ability to recover its allocated fund (revolving fund). The revolving fund was an initiative to ensure a steady supply of essential supplies as described in the response of a senior manager in the nursing and midwifery department. Various staff members identified difficulties with this fund, particularly in the case of Gynaecology emergency, where most of the women were emergencies and the supplies they used were hardly ever paid for. A senior manager in the nursing/midwifery department explained that the actual amount for the revolving fund was only sufficient for one month's supply and that was sometimes used up earlier if they had many women.

The measure problem is funding. We operate a revolving fund system, every unit or most of the units have their own revolving funds (...) and they have an account for that. Whenever you make a request, the payment of that money is going to be done from your own account. This is to ensure accountability. (...) Sometimes you will see one revolving fund collecting more than the other does (...) (because) it is the money that you've generated that (...) (is) Circulated (Interview NO31-SM-Nursing).

4.2.3 Staffing levels

The third potential contributory factor to be examined is how and why staffing levels contributed to AEs. This section will examine the role of organisational staffing systems and national staffing policies on staffing levels.

Organisational staffing system

Insufficient staff numbers were observed and reported in O&G and identified by some of the staff as a general issue across the hospital. Some O&G doctors felt that they had the

worst staffing shortage in the hospital and linked this to O&G having the highest cancellation rate for elective surgeries:

In one of the presentations, (...) O&G was the one that had the highest rate of cancellation of cases for theatre, and it is obvious when you have so many patients (women), but you have limited manpower (Interview NO2-SR).

The findings highlighted significant variation in the levels of O&G staffing, with seemingly more severe shortages amongst junior residents and nurses. As noted below in the comment from a consultant, there was a relatively higher number of senior doctors among the 23 specialist doctors in the department, which included seven consultants and 11 senior residents.

We now have more senior than junior doctors, and it should be the reverse (Interview NO29-COG).

Locum doctors were temporarily employed by the hospital to ease the junior residents' work pressure. However, they were generalists rather than O&G specialists and as reflected in the following interview quote, some doctors did not regard locum doctors as a solution for the lack of permanent junior registrars:

These are locum staff. They are medical officers; their primary interest was not Obstetrics and Gynaecology. So, I feel the problem (inadequate staffing) is still there, and I think the management has to do something to improve the standard of the services in that department (interview NO2-SR).

Before the locums were recruited, O&G had only three junior residents during a significant part of the fieldwork, which represented a general shortage of medical staffing as these doctors provided the frontline medical care. House officers were limited in terms of what they could do and sometimes unavailable. Some senior doctors said they were overwhelmed, and could not also do the jobs of junior residents. Observations and reports indicated that the junior residents had very high workloads, which appeared not to change significantly following the addition of locum staff. A junior resident commented on occasions where they were so tired that they had delayed care so that a procedure could be carried out by the next doctor on call:

The care you will give to the patients (women) if you are (...) not stressed, is better than when you are stressed. For example, you have a patient (woman)

that you feel needs surgery (...). Somebody might even want just to push the patient (woman) forward, maybe wait until call hours, so the doctor on call can take on the patient (woman) (Interview NO4-R).

The workload and lack of sleep during junior resident on-call duty hours (32hours) was reported to be causing them ill health. This was observed when one of them became ill for more than a week, resulting in the remaining two doctors having to share the on-call workload. The senior doctors appeared aware of the effect of long working hours on the junior doctors and many of them cited instances of doctors collapsing on the ward following the long on-call hours. A consultant acknowledged the risk to the health of these staff as well as the impact on their ability to provide safe patient care. Another consultant linked some of the AEs, including maternal and foetal deaths to staff burnout:

We have lost many patients (women) to issues that I will have no hesitation to label as mismanagement, and it is because of fatigue and burnout. Once you get burned out and fatigued, you will not pay attention to the patients (women) as you should. (...) We lost many babies because the staff got tired and did not adequately monitor the patients (women). Because you can imagine ... (...). A woman would come to the Labour room with the baby alive, and then at the end of the labour you are told she has a fresh still-birth (Interview NO9-COG).

Most of the consultants described dealing with large women numbers during clinics, with around three doctors seeing up to a hundred women. Consequently, it was challenging to give each woman adequate time, which resulted in many oversights, near misses, and complications. One consultant recounted a situation where a pre-eclamptic patient convulsed after attending the antenatal clinic on the same day, where they had overlooked her blood pressure:

When you try to see as many patients (women) as you can, you might overlook somethings. It happened to me. The patient (woman) was a pre-eclamptic, and she came back to the hospital the same day, having convulsed in the evening. So, when we were reviewing, (being) the consultant in charge, I was trying to complain, who was the person that saw this patient (woman)? (...) When the folder was brought to us, I saw (that) I was the one that saw her. I had completely overlooked her blood pressure (Interview NO8-COG).

The shortage of staff was similarly common among the nurses/midwives in all the O&G wards but sometimes appeared to be less severe in the Labour ward where the staffing

level was higher. For example, the Labour ward had 13 nurses/midwives for between one and nine women, while Obstetrics had 17 nurses/midwives for up to 41 women. Observations and interviews indicated that the imbalance in nurse/midwife-women/patient ratios made it difficult for these staff to keep up with the frequent observation required for critical women/patients. Staff leave (e.g. annual, maternity, study, examination, and sickness) further exacerbated shortages of nurses/midwives in all the wards. A senior nurse/midwife in the Labour ward reported having worked alone twice during the first six months of 2017. A higher-ranking nurse/midwife from the Gynaecology ward acknowledged that this was not uncommon in O&G. This staff member recounted a time when they had to stay back on the ward after their shift because it was left with no nursing/midwifery staff when the two on the afternoon shift took different women to theatre and x-ray.

Staff rotas and rotation were perceived to contribute to the inadequate staffing levels and potential for AEs including delays, poor monitoring, wrong diagnosis and treatment.

Lack of alignment between staff rota and staff availability

There appeared to be a lack of alignment between the staff rotas (numbers and grade) and actual staff on duty. The daytime working hours (8 am - 4 pm) appeared to be dominated by the more skilled, senior staff members, while outside this timeframe, there was a reliance on junior staff, who were sometimes insufficiently supervised.

Most senior nurses/midwives tended to work during the regular weekday hours, excluding weekends. Instead of being on-site when on-call, some senior staff such as consultants, anaesthetists, theatre nurses and radiologists were also allowed to remain at home but expected to return when needed. However, many observations and reports indicated that it was difficult for some of these staff members to attend quickly due to distance and personal safety. As a result, communications with senior staff out of regular hours were mostly conducted by telephone, but some staff were difficult to reach even on mobile phones. Some junior doctors saw this as problematic where they were unable to discuss the specific symptoms, resulting in inappropriate diagnosis or intervention.

There also seemed to be a lack of consideration of the impact of rotas on the staff mix, for example, the numbers of different staff available and where staff had reduced hours (e.g. breastfeeding mothers) or capacity (e.g. light duties only). For instance, having only one senior resident on-call was insufficient, given that there were more of them than junior doctors. It was perceived that their rotas were designed to give them infrequent on-call duties. During one of the Obstetrics ward observations, one of the two

nurses/midwives on duty was a breastfeeding mother, which meant she was allowed to finish two hours earlier, which left only one nurse/midwife. In this instance, records of two post-operative women indicated that their vital signs were not adequately monitored. The following Obstetrics ward observation notes recounts the experience of a nurse/midwife who described essentially working alone because their colleague was only able to undertake light duties:

The nurse/midwife said there was a time they “literally worked alone” on a weekend morning shift because (...) the staff member they worked with could not do any (physical) work because of their health condition (Observation notes: Obstetric ward day 8).

The lack of allocation of nurses/midwives in the Gynaecology emergency placed additional pressure on the Gynaecology ward. They attended to the Gynaecology emergency service users in exceptional situations, but this exacerbated the staff shortages in the Gynaecology ward as noted in the following observation:

The nurse/midwife said whenever a woman is going for a CS from the Gynaecology emergency, one of the nurses/midwives working in the Gynaecology ward must prepare and accompany her to the theatre. The nurse/midwife must remain in the theatre to receive, bathe and stay with the baby in the Labour ward, before returning. This means that the other nurse/midwife will be the only one providing care to all the women, some of which are also very sick (Observation notes: Gynaecology emergency day 3).

Doctors reported that the lack of nurse/midwife support in the Gynaecology emergency area meant having to do almost everything by themselves, which increased their workload. According to the doctors, having designated nurses/midwives allocated in this unit could help them with specific tasks, such as medication and infusion.

In all the wards, some experienced nurses/midwives were observed to be advising the junior doctors on what to do when senior doctors were not around. However, there were occasions when relatively inexperienced doctors such as the house officers had no access to both senior doctors and experienced nurses/midwives, and manage service users in the Gynaecology emergency alone.

While some staff attributed this working pattern to insufficient staffing, it was observed that this was not always the case. Instead, it seemed to be more linked to rostering that

favoured the top of the professional hierarchy, a common practice among the most senior staff. A consultant and a senior member of O&G described this working pattern as purposefully selfish and it was difficult to challenge because it had been normalised.

The senior people (nurses/midwives), for their own selfish things (interest), they make the roster to suit their purposes. So, it becomes (...) a big challenge to change (Interview NO8-COG).

Staff rotation

The practice of temporarily rotating staff across wards was intended to address general staffing issues by enabling staff to obtain varied skills and allowing the hospital to deploy staff flexibly to fill staffing gaps. According to a senior manager in the nursing/midwifery department, they generally rotated about 70-80% of nurses/midwives to a different ward, leaving about 20-30% of the experienced staff to provide senior support. The manager perceived rotation as also helping to mitigate poor staff behaviour, including late arrival or leaving for personal reasons, which they associated with staff being in a specific ward for a long time.

However, some senior doctors saw this type of rotation as unhelpful to the O&G department because many experienced nurses/midwives would be replaced by staff who were relatively inexperienced. According to the doctors, this increased the risk for women. An instance was observed in the obstetrics ward during a morning shift where the roster still listed three nurses/midwives on duty when one of them was deployed to work in the Gynaecology ward and two post-operative women were not adequately monitored

National staffing policy

The Nigerian Federal Government's national staffing employment restrictions, hospital upgrading system and training funding cuts appeared to influence staffing levels at the hospital.

Hospital managers and many other staff blamed the government's employment and replacement restrictions for the hospital's inability to improve the staffing situation. It was reported that the hospital had not employed any additional staff in the years leading up to it being upgraded to a teaching facility. This meant that staff numbers remained the same or lower due to non- replacement of the staff that left and despite being upgraded

to a teaching facility offering broader access to specialist services. The following interview quote from a senior manager highlights this point:

We have the problem of an embargo by the Federal Government on employment. We were not employing staff for more than five years, and now we cannot even replace those who have left (Interview, NO32-SM2).

Many of the staff were not blaming the management for the staffing shortage issue. However, some doctors felt that the management was not doing enough to obtain government approval to employ or replace staff. Hospital managers reported doing their best having reported the situation many times to the government and employed locum staff. One of the managers also believed that this issue cut across other teaching hospitals, giving examples of worse hospital settings. They appeared hopeful that the issue would be resolved in the following three months, while also being aware that it might take longer.

It (embargo) is all over the country. I know most of my colleagues all over were complaining. They have not been able to employ for 2 to 3 years because of the embargo. (...). It took (Hospital 1) almost one year to get permission to employ. (Hospital 2), it took them about six months. We are hoping that our own will not take more than 3 months (Interview, NO32-SM2).

The government hospital upgrading system appeared not to have considered the impact of hospital upgrades on staffing level requirements. Various staff members reported that the staffing level generally remained the same for two years after it was upgraded to a teaching facility. A consultant who had worked in the hospital for about 17 years identified almost all the various professional groups as having inadequate staffing. They commented that the situation had worsened after the hospital achieved teaching status, which resulted in higher numbers of women but with the same level of staffing and has impacted on the quality and safety of care:

Hospital attendance has increased, but staffing has not kept pace with the number of patients (women) (...). That is the major issue that has reduced the quality of care and safety patients (women) get (...). For instance, one nurse taking care of 40 patients (women). You would not expect these patients (women) to get the best. Initially, it was like a nurse to 5 patients (women), so you can imagine a nurse taking care of 40 patients (women) in an 8 hour shift (Interview NO9-COG).

To improve the O&G staffing situation, one of the ward managers said they needed about 20 nurses/midwives in their ward. This number was far more than the total of the nurses/midwives in any of the wards. A nurse/midwife working in the Labour ward suggested three to four nurses/midwives during shift hours, while a senior registrar also recommended not less than five residents during call hours:

If we can have a situation whereby even if two teams are in the theatre, there will be one on the ground. So, and in that respect, you will need nothing less than maybe five or six residents on call (Interview NO2-SR).

The government's lack of funding for continuing education and training restricted staff from updating their professional practice. Despite the number of consultants in the department being regarded by some staff members as adequate, some identified a lack of staff with highly specialised skills (e.g. choriocentesis and amniocentesis studies, and endoscopic and laparoscopic surgeries). The training for most of these skills was said to be obtainable outside the country but was restricted by funding limitations. Women who could afford these procedures had to be referred elsewhere, resulting in delays and worsening of their condition. Meanwhile, those that did not have the means to go elsewhere could miss out on the opportunity for life-saving intervention.

The limited funding available for training and continuing education also affected the lower medical ranks. Senior and junior residents reported having to fund their studies or professional examinations themselves. The lack of training opportunities for junior doctors also appeared to increase the pressure on those equipped with the skills required:

If there is an emergency in the Labour ward, he cannot divide (separate) him or herself to cover both the Gynaecology emergency and the Labour ward. (...) There was a time, a patient (woman) presented with ectopic pregnancy, and my SR on call had to enter the theatre with the patient (woman). Another patient (woman) was waiting for emergency CS, which I could take, but after catheterising the patient (woman), we noticed bleeding, and we suspected uterine rupture. Then I could not handle the uterine rupture. I had to wait for the senior registrar to come (Interview, NO17-R).

Nurses/midwives also reported difficulty in getting approval to undertake self-funded further study. This was notably harder for extended courses such as bachelor's degrees, which were in high demand among Nigerian nurses/midwives as most of them had only

diplomas. Many younger nurses/midwives, keen to undertake the degree course, said they were on a waiting list, with no idea when the opportunity would arise. Some of them seemed discouraged by the selection system and said they did not even apply:

Due to financial constraints, I cannot say when I will go on study leave. They (...) may not even approve for me to go for four years (Interview NO20-NO).

Some nurses/midwives said getting approval for short training courses was much easier. However, junior nurses/midwives felt that seniors were not giving them the opportunity to attend workshops as they always selected themselves or other favoured individuals. Additionally, those attending events did not cascade or share learning afterwards:

Some training would come up, which might require seniors to select who would go for it. Instead, they (seniors) would be the ones attending the seminar, workshop, or anything. (...) Like the issue of this HIV training that they were given. A particular group of people would be the ones going for the (training), and when they come back, they generally do not narrate to us what they have gained, at least to help us, who are attending to the patients (women), to improve our care (Interview, NO20-NO).

4.2.4 Organisational culture

This fourth and final contributory factor relates to the contribution of organisational culture to AEs. Several observations and reports noted poor staff behaviours, underpinned by negative and ineffective communication patterns and unclear professional boundaries. Potential AEs associated with such behaviours include care delays and poor adherence to care and infection protocols. Four underpinning factors identified as contributing to the organisational culture include; professional identities and power conflicts, insufficient accountability, insufficient standardisation of care or procedure and poor patient-centred communication.

Professional identities and power conflicts

There appeared to be a very strong sense of professional identity and hierarchy among the same and different professional groups, which seemed to fuel divisiveness and rivalry, despite observed efforts by many staff members to conceal it. The following quote from a senior nurse/midwife echoed this:

Like the doctors and the nurses, you know we are like "rivals." The doctors do not give the nurses a chance, while the nurses think the doctors cannot command them (Interview NO3- ACNO).

Efforts by somebody from a different professional group to improve practice were reported to be looked upon with suspicion and resistance. A senior doctor recounted experiencing this situation when they tried to stop the rotation of nurses/midwives, which they viewed as replacing more skilled with less skilled nurses:

The head of the O&G department has little or no say on the nurse/midwife distribution. The nursing/midwifery department decides who should go where and all this. I have tried, but the nursing/midwifery department always resisted (Interview NO8-COG).

Power relationships associated with hierarchies and professional groups appeared to influence care delivery. Observations and interviews indicated instances when the decisions of senior staff seemed to be more concerned with exerting authority than the women's best interests. Some doctors also reported that a few consultants would overrule the care management plan recommended by the registrar caring for the woman, even when it was considered the most appropriate plan:

Sometimes you think is it ego or what, we do not know. They (consultant) would say: No! We are not using that management. We will use another kind; we will do something else; let us do this". (...) Then maybe later they would realise or (...) would come to terms with the fact that somebody is actually telling them the right thing and then they would come back to your own line of management (Interview NO19-SR).

Power relationships appeared to discourage those of lower status from voicing their views regarding the standard of care being delivered. Some junior doctors said they were "told off" by specific seniors, including consultants, for calling them about issues they were unsure of, which made them feel incompetent. Consequently, the juniors were reluctant to call those seniors for support and supervision, which could result in wrong diagnosis or treatment.

Many nurses/midwives also claimed that some doctors behaved "as if they were their masters" and ignored patient safety concerns raised by the nurses/ midwives. An instance of this was observed in the Labour ward when a nurse/midwife verbally

expressed concern to a junior registrar regarding the possible lack of head descent and advised him to report this to a senior doctor. The doctor did not say anything and appeared not to have raised this issue with the senior. The woman's labour ended with shoulder dystocia and the baby being admitted for delivery complications. However, this behaviour was not displayed by all staff. For example, a senior nurse/midwife commented that many doctors respected and fully involved nurses/midwives in the women's care and decision-making. A senior registrar expressed the need for leaders at all levels to lead by example and involve subordinates in decisions.

Staff performance accountability system

The O&G and the hospital in general appeared to lack a system for staff performance accountability and enforcement, which resulted in observed and reported instances of unchecked staff behaviours. These behaviours ranged from staff absences, lack of adherence with general care and infection control protocols, to inappropriate hospital equipment handling.

While staff absences for a short or long period were typical in all staff categories, they appeared worse among senior medical staff. Doctors, including some consultants and a senior hospital manager, reported that some consultants were frequently unavailable at the hospital even when their team was on-call and needed by junior doctors for critical decisions or interventions. Although junior doctors were permitted to call any of the consultants when they could not reach the one on-call, experiences of being rebuffed by some of them deterred the juniors from calling. A senior registrar in the following quote described how some consultants' absences and their typical behaviour of giving directives over the phone resulted in instances of women's information being missed, which would have changed the decision and choice of intervention implemented, had the consultant seen the women earlier:

(Getting) the most senior colleague to review (a) patient (woman) to decide, sometimes is quite difficult. Sometimes if you tell somebody about a patient (woman) on the phone, it may be different from when he sees the patient (woman) in most cases, because later they will say, "but we did not know about this and that." (...) Therefore, that also affects the patient's (woman's) management (Interview, NO19-SR).

Although it was said that not all the consultants behaved in this way, there did not appear to be any action to address the issue, despite the reported impact on women as identified in the following comment from a consultant:

A resident will call a consultant on the phone. The (consultant) will tell him, "do this," but would not show up. If anything happens to the patient (woman), you go to the mortality meeting; the HOD who is perhaps junior to that consultant cannot say anything (...). They would not want to write to the management. Things would just be hushed up, and nobody will take the case any further (...). So, the issue is that things are not taken seriously. Nobody is made to take responsibility for their action and inactions, which is why they keep occurring (Interview NO9-COG).

A junior registrar recounted being lucky to have avoided a bad outcome, having conducted their first independent complicated caesarean section (CS) alone. According to the doctor, a senior registrar should have performed the procedure because the woman had undergone two previous CS. However, they had to call another senior registrar who was not in their on-call team because their senior registrar went on sick leave without notifying them. This senior registrar directed them to conduct the procedure but to keep their phone handy in case of any difficulty:

I had to enter (CS) alone and (...). I faced adhesions, but I was able to do it successfully. (...)The only confidence I had was: (Dr) told me to keep my phone with me. If I see or anticipate any difficulty, I should let somebody (...) (or) him know. (...) God so kind; I was able to overcome all the difficulties I faced (Interview NO17-R).

This quote highlights that the junior registrar lacked the skill to perform a complicated CS, which was known to the senior and potentially put the woman and her baby at risk.

Instances of short absences were also observed among the nurses/midwives and support staff, though were more common among the support staff. These were for personal errands such as school runs, visiting the bank or relatives/friends in different wards. The staff sometimes obtained permission from seniors, but on some occasions, they would disappear without informing those working with them. In such absences, their duties remained uncompleted. This was observed and reported as explaining why wards were sometimes left unclean and samples/results for laboratory investigations were not

taken or returned on time. The following observation notes describe how a Labour ward cleaner left the ward shortly after resuming work and left it uncleaned:

The most senior afternoon nurse/midwife went out to look for the cleaner to clean a bloodstain off the floor but returned to say that they could not find them or a mop. A house officer (...) walked in, stepping on the bloodstains unknowingly until one of the nurses/midwives alerted them. Later, the nurse/midwife complained that the cleaner was nowhere to be found; their colleague said that the cleaner went to one of the wards to visit a sick relative (Observation notes: Labour ward day 5).

A senior staff member in one of the laboratories also described an instance when a porter was sent to a laboratory with an urgent sample, but two hours later had still not shown up with the results. When a doctor followed it up, the porter then arrived at the laboratory with the sample. Due to such behaviours, senior doctors directed house officers to take urgent samples or consults themselves, which affected their availability. A senior doctor recommended the hospital to come up with an attendance register for all the staff.

How I wish I could see the CMAC and say, “establish a register for all of us”. As you come in, you sign, and if you are leaving, you have to sign. Then you will see changes (Interview NO30-SR).

However, it was also noted that there were times when it was difficult for some frontline staff members to take their rightful breaks due to work pressure, which could have given some staff the feeling of entitlement to take time in lieu when the wards were less busy. The following observation note highlights the frequent inability of nurses/midwives to take their breaks:

Because of the workload, pointing to a wall clock, it is now (12:10 pm) that some of us are going to eat our breakfast because we resume at 7 am. Sometimes you will bring the food and take it home because you did not have time to eat it (Observation notes: Obstetrics ward day 2).

Another area of concern was the common behaviour of throwing materials (such as gloves and swabs) contaminated with blood and body fluid on the floor, especially in the Labour and Gynaecology emergency wards. On many occasions, these would be left on the floor for some time before being cleaned up. One instance of samples and used gloves being left on a trolley next to the nurses' station was observed in the Gynaecology

ward. These appeared to have been left for many days as the following observation highlights:

A house officer was asked about what they thought of the samples. They said, "Obviously, the blood samples may have been there for days because they have turned almost black instead of red, but I am not sure about the urine sample" (Observation notes: Gynaecology emergency day 3).

Some machines and instruments were perceived not to be handled with sufficient care, which resulted in their breakdown. For instance, during one of the doctors' meetings when the lack of CTG was raised, a consultant observed that the existing one had broken as a result of poor handling and had previously been seen falling off a trolley. During one observation, the only sphygmomanometer in the Labour ward fell and broke when a nurse was about to monitor a woman's blood pressure. The apparent lack of concern shown by all the staff members present (making jokes out of the incident) indicated they were unaware that this was a serious issue. On a different occasion, a health assistant brought a thermometer into the Labour ward that they said they had found in the laundry bag along with dirty bedsheets. This was cleaned with methylated spirit and kept in the ward. Lack of care in handling equipment could have contributed to the depletion of the limited equipment and instruments.

Standardisation of care and procedures

There was a general lack of standardisation of care and procedures, and a lack of an enforcement mechanism, which increased the risk of shortages of medication and equipment on the ward and a shortfall in care quality.

Insufficient standardisation of women's care appeared to be widespread, resulting in care inconsistencies. For example, some women were given their routine post-operative antibiotics with no breaks. Others experienced a gap in medication continuity and had to wait a long time, which was common. A senior resident explained why this occurred:

The senior registrar said some doctors prescribe both parenteral and oral antibiotics at once to avert delay, but others give parenteral drugs within the first 24hrs. They then convert them to oral medications after 24hrs post-operative review. He said delays are likely with those who did not do a ward round within the 24hr period (Observation notes: Obstetrics ward day 5).

While most care activities should have been guided by infection control procedures, which are part of the basic training of all healthcare professionals, many of the staff appeared to have forgotten or not be using them. Observations identified many procedures being conducted with unwashed hands and unsterile gloves or surfaces, even when sterile packs were available. Failure to empty and disinfect oxygen supply pots/cylinder and suctioning machines after each woman had been raised as a concern by the infection control team. The team reported finding bacteria strains in samples taken from these devices in selected sections of the hospital, including the Obstetrics theatre. While the wards had a jikking procedure guide, several observations indicated that this was not followed correctly by many staff members. A nurse/midwife who provided a senior registrar with jikked instruments to examine a woman said the instruments were placed in a solution of 1:6 parts of jik for about five minutes, but that they usually soaked them in the jik for at least ten minutes. This was in contrast to the observation as it appeared that no jik measurement or waiting time was observed, and the doctor did not query this procedure but used the instruments straightaway on the woman. Many nurses/midwives (mostly the ones responsible for equipment) could not correctly recall how they were supposed to use jik to disinfect instruments. This is demonstrated by the following responses of two different senior nurses/midwives from the Labour and Gynaecology wards when asked about how they conducted the equipment disinfection:

I cannot really remember now, but I know how to do it (Interview NO03-ACNO).

I have forgotten the percentage (of jik to water) that we use. But we pour (jik) and a little water, and you allow it to stay for like five minutes, then (...) rinse it (and) take it to where you want to use it (Interview NO27-SNO).

The lack of disinfection knowledge among the senior nurses/midwives was a serious patient safety concern, given that some of them had attended infection control and disinfection workshops and claimed to be responsible for teaching their subordinates. This increased the potential for much wider compromising of infection control standards if staff learned the procedure incorrectly. The hospital infection control team recognised that an infection control manual would have helped guide most of the sterile practices and indicated that they were trying to develop one. However, observations and reports from staff members highlighted that the hospital lacked a sufficient mechanism for checking whether staff members adhered to the guidance already available. For example, a senior nurse/midwife outlined that she relied on trusting staff members to honestly report their actions rather than having a system for monitoring:

I cannot be there in the treatment room; I will have to assign somebody to be there (...) to take care of it (instruments). All I need to do is to ask, "did you do what is expected of you?" If that person says yes, it is between them and God (Interview, NO3-ACNO).

Women-centred communication

While good clinical practice should include providing obstetric women with adequate information about their condition and available care options, the systems and practices in place were not entirely consistent with this. For example, the hospital policy forbade service users from having access to their medical records. A senior nurse/midwife explained that this was because access to the records could result in service users finding out information about their condition, which their doctors might not have told them, and this could worsen their condition:

The senior nurse/midwife explained that (...) it is boldly written on the (women's) folder that this is confidential and should not be handled by the (women) (Observation reflection notes: Labour ward day 1).

Some staff members appeared to have prejudices about service users, particularly those with no western education, as they regarded them as uninformed, which one of the participants described as *"not knowing their rights from lefts"* (Interview NO6-NO1-Lab). As a result, the staff tended not to see the need to provide women with sufficient information. The nature of communication between staff and women in this setting appeared to be mostly one-way. Many staff members appeared to make decisions for women without taking time to explain the rationale, ignoring their preferences and personal circumstances. This was observed in staff giving women prescriptions, arranging for investigations, or requesting them to make payment into hospital account without any explanation. Other examples included situations where doctors told women that a caesarean section had been decided as the option for them, without giving much detail and expecting them to consent.

The observations indicated that staff were not always giving adequate attention to the women's physical and emotional needs, resulting in early warning signs of problems being missed. For instance, during an Obstetrics ward round, a doctor asked a woman's relative why they had not reported that the woman had been suffering from fever and insomnia for four days. The woman's relative described being sent away by the nurses/midwives each time they went to the nurses' station to report it.

Observations also highlighted poor pain management for women in labour or undergoing procedures such as episiotomy repair. Expressions of pain sometimes appeared to attract negative responses and comments from some of the staff. On one occasion, multiple pleas by the only woman in the Labour ward, who seemed to be in severe pain and asked for her husband to be allowed in so that she could speak to him, were refused. She was told by a house officer, "*men are not allowed here.*" (Observation notes: Labour ward day 8).

These behaviours could have contributed to a lack of trust between women or relatives and hospital staff, being a factor in the multiple observed and reported instances of women or relatives refusing admission or treatment. For example, it was noted that some women with previous caesarean sections, who staff said had been informed that future deliveries would require caesarean sections, came to the hospital in active labour saying they had never been told this. One specific instance where poor communication may have been a factor involved the death of a premature baby following a father's refusal for it to be admitted into the SCBU. The father reportedly called the staff members "cheats," suggesting he believed the admission was aiming to extract money unnecessarily. During one of the doctors' meetings, the presentation discussed an incident in which a woman had a partial uterine rupture following a caesarean section because of her husband's initial refusal to consent to the operation. The following quote highlights my reflection on the incident:

I felt that something might be wrong with the post-operative counselling in this department. Because this is the second case discussed in today's meeting with a previous CS in this facility, but somehow did not abide by the advice against vaginal delivery. For this woman, had she been booked in for ANC in this hospital it would have helped prepare her for the CS and possibly prevented the consent refusal issue from the husband. She would have been saved from the partial uterine rupture (Observation reflection notes: Doctors' meeting 2).

However, various staff members reported that some women had misconceptions about what a hospital birth entailed, which influenced their willingness to accept specific interventions:

Maybe they have some notions, maybe some people telling them if you come to the hospital so many things would happen so that that fear may be there, and so they do not accept management (Interview NO19-SR).

4.3 Adverse events (AEs) reporting and management

The main aim of an AE reporting system is to underpin comprehensive organisational learning. Reporting potential patient safety threats will contribute to a more proactive systems approach rather than just reactive learning from AEs. This final section of the results chapter presents the findings regarding the processes and context surrounding the AE reporting system in the case study hospital. Two key aspects of the AEs reporting system that will be addressed include, processes for reporting and managing AEs and factors influencing these processes.

4.3.1 Processes for reporting and managing AEs

The hospital's reporting and learning process discussed earlier in section one (4.1.3) detailed various practices used by the hospital to identify and manage AEs. These included long established patient safety practices such as raising concerns with either staff involved or reporting to specific professional superiors, departmental and professional forums (doctors' meetings, nurses' meetings, Labour ward statistics and mortalities) and nurses' reports. Newer processes included voluntary incident reports, clinical governance, theatre processes, patient safety teams, and a systems approach in response to patient safety concerns. While most of these practices could result in AEs being identified, reported and investigated, their ability to underpin organisational learning seemingly depends on the type of response they generate. The occurrence of AEs, appeared to produce three types of response from staff members: informal, formal, and no action. However, it should be noted that there was significant overlap between these three sets of actions.

The informal response generally involved verbal action. For instance, staff or sometimes women/relatives verbally identified and reported issues to senior staff members that could result in or had resulted in AEs. The senior staff could be either within a specific professional group, a team-managing consultant, the head of the department, a ward manager, or one of the hospital managers (e.g. the Chair medical advisory committee). Solutions were then discussed, communicated and implemented verbally. This approach notably occurred during ward rounds, handovers, staff meetings or confidentially. This informal response was much more common at professional, departmental or ward level, but infrequent at the senior hospital management level. The majority of the staff in this study appeared to prefer the informal approach when reporting and managing AEs, mainly because many of the staff saw informal action as helpful in resolving their concerns more quickly, as indicated in the following house officer's interview quote:

There are instances whereby you report verbally because that will not take time (before) something will be done. Instantly, the patient (woman) will be safe. But, the incident (report) that you have to write through the management will take time before something is done (Interview, NO11-HO).

Although the informal actions resulted in quick resolution of most AEs at the time of their occurrence, this approach appeared less effective in preventing subsequent occurrences. This was because the solutions implemented were noted to be rarely communicated outside the immediate team. Even staff within the immediate team could be unaware of the issue if they happened to be away when the discussions were taking place. A senior registrar pointed out that one of the main reasons why other staff might not be aware of the issues dealt with through informal action was that the hospital was a training institution where staff such as house officers passed through various rotations. This meant the senior doctors had to repeat this information for new staff. However, long-established patterns of behaviour could explain the preferential staff attitude towards informal AEs reporting and management. This is highlighted in the following comment from a senior doctor who linked it to staff being used to finding a way of working around things, which resonates with earlier identification of the workarounds staff use for dealing with shortages of equipment, supplies and services:

We are used to the system of not reporting, just trying to work your way around things and then help the patient (woman). So many people even forget to report these kinds of things (Interview NO19 SR).

The lack of organisational learning associated with the informal approach may have led to reoccurrence of previously identified incidents. One of the consultants highlighted this and further explained that the reason why issues discussed were not completely resolved was that the measures identified were frequently not implemented:

Perhaps, that is another thing we need to look at as a department. I think it is always a Nigerian way of doing things, you sit down, you talk, and you leave without taking concrete measures to affect outcomes (Interview NO9-COG).

Whilst the reactive nature of informal action appears to have helped in preventing or minimising harm for some *patients* (women), the consultant's quote indicated the need for a more formal approach in dealing with AEs.

Formal action on patient safety issues entailed completing documentation. The reported issues were generally dealt with by the most senior person in the department, including the HOD and ward manager or a senior managerial staff member at the hospital level such as the CMAC or CMAD. On most occasions, actions taken on the reported issues were communicated to the broader hospital community. Reporting of issues in nurses' reports, voluntary incident reports, clinical governance, theatre processes (WHO surgical checklist, debriefing and surgery cancellation register) and patient safety teams (multidisciplinary patient safety team, infection control and patient safety champions) mostly resulted in a formal response to a patient safety concern.

The no-action approach to AEs entailed a failure to either informally or formally report events, which in turn prevented management. There were many observed and reported instances where staff members had identified issues that could result or had resulted in AEs but had not formally/informally acted on them. While this approach was not part of the recommended patient safety practices of the hospital and could have resulted in the persistence of potential and actual AEs, it seemed to be a widespread response among staff, particularly among juniors. However, a lack of action could also occur at hospital management level where they are aware of an issue but need a formal report before they could act on verbal reports. For example, a senior hospital manager identified a lack of action on verbal reports about a consultant who was potentially medically unfit and whose care was linked to AEs affecting many women:

Several reports have been coming in, but nobody was willing to commit to writing a formal report. There have been incidents of patients (women) suffering under him, but nobody is willing to come out and say it. If nobody is willing to say it, and you go to challenge him, he could sue you (Interview NO23-SM1).

4.3.2 Factors influencing AEs reporting and management processes

A number of factors were found to influence staff members' choice of action in response to AEs. These will be examined under organisational processes/systems and patient safety culture.

Organisational processes/systems

Two main issues affecting AEs reporting and management include insufficient guidelines on the hospital's risk management procedures and the availability of incident report forms.

Insufficient guidelines on the hospital's risk management procedures

The hospital appeared to lack clear guidelines and training regarding what patient safety concerns should be reported and through which hospital reporting and learning system. This resulted in a lack of clarity on reportable incidents among the staff members and flexible reporting options, with important patient safety issues potentially being unreported. Observations and discussions with staff suggested a lack of understanding of reportable events, with many appearing to have limited insight into what they should report. Nurses/midwives seemed to have a more limited understanding of reportable incidents compared to doctors. The following comment outlines how one of the nurses/midwives claimed to have never had an incident on their ward, which was surprising given the range of observed and reported patient safety concerns in various O&G wards, including the Labour ward.

I have never seen an incident happen in the Labour room, but I know, I do hear that it has happened in other wards. But I cannot really say anything about it (Interview NO5-ACNO).

A difference in understanding of reportable events between doctors and nurses/midwives was apparent in the completed incident reports obtained during the data collection period. Nurses/midwives appeared to report more general patient safety issues, such as theft, fire safety, equipment mishandling, but not equipment or staffing shortages. In contrast, doctors' reports related to more clinical issues, including delays, staffing imbalance, medication incidents, lack of equipment and supplies. The following quote illustrates that the hospital management were aware of the knowledge gap regarding reportable incidents:

I had a meeting with a department late last week. I was surprised to find out that many of the staff that attended the meeting (...) have heard about the incident report forms, (but) a lot of them still were not aware of the things that should go into the incident report form. So, do we have informed people? Yes. Can we do better? Yes, but I think we have made a lot of progress (Interview NO23-SM1).

The observations indicated that staff were left to make their own risk management decisions on the basis of limited information or support, which resulted in them applying the most convenient action (generally not the formal approach). Consequently, the application of the formal process was inconsistent across the staff. As the following interview quote indicates, staff took the formal approach only when they envisaged that

the issue could not be managed informally or if it repeatedly occurred, especially if it would generate a problem for their colleague or the individual staff themselves:

It is not everything that you are supposed to report. At least, there are some things that you can tackle for yourself. So, there is no need for you to write a report. But if the situation is beyond your power and can create problems thereafter, then you need to clear yourself of the incident, it is better for you to write the incident report and send (interview NO3-ACNO).

Both observations and interviews indicated that the hospital's reporting and learning system was structured in such a way that it prioritised formal reporting for AEs that resulted in severe consequences such as deaths for service users. The regular O&G doctors' meetings also appeared to be focused around serious incidents, including morbidity and mortality. However, some staff members felt that formal reports should be made on all incidents irrespective of their severity. A consultant identified the need for staff to have an understanding of the principles behind formal incident reporting to improve its uptake:

However small it is, we can't ignore it because the smallest one could become severe. It is important to identify the root cause of that incident. (...) I think unless there is a proper re-orientation of staff to understand the principle behind incident reporting forms, it will never be put into use (Interview NO8-COG).

Availability of incident report forms

Staff and senior hospital managers were, on various occasions, quick to mention that the hospital/ward had incident report forms available for raising patient safety concerns. However, my discussions with staff highlighted that many had not actually seen the forms. For example, one of the senior registrars reported having only seen parts of the form, while an assistant chief nursing officer disclosed not knowing what the forms looked like because she had not seen them.

Many staff reported difficulty in obtaining the forms when they required them. I also experienced this difficulty when I requested to have a look at the form. None of the three O&G ward managers could provide a copy of the form, despite previously telling me that they had them in their wards. Throughout the data collection period, the forms were not visible or easily located in the O&G wards, which may have hindered formal incident reporting. This observation is supported in the following quote from a senior registrar:

If you could say they were available at every station, maybe it would be easier. But the availability of the forms too, I think, is also affecting the number of incidents being reported (Interview NO19-SR).

When asked about access to the forms on the wards, one of the senior hospital managers, an MPST member, appeared shocked. They claimed that the forms had been made available in all strategic places, including the wards. They attributed non-use of the forms to staff laziness:

The issue is attitudinal; people are too lazy sometimes (...) to even look for the form and fill it in. So we have also tried to solve this issue by having the incident report forms now printed just the way you print all other request forms and have also made efforts to be sure that they are available in all nursing stations, clinics, wards (Interview NO12-MPST member).

The hospital management may have provided adequate numbers of the incident report forms, but they were not easily available to staff. A few staff linked the persistent unavailability to the ward managers being the custodians of the forms. A doctor among the staff members with this view claimed that all the O&G ward managers refused to hand over the forms without being informed of the issue to be reported, which the doctor did not wish to disclose. Eventually, the doctor had to obtain the form from a different ward. However, the doctor said they were prevented from using the form because an O&G ward manager took it when it was left on a table. Although the doctor viewed not handing over the incident report form as another incident, it was not reported because of the possible consequences of reporting colleagues:

If you want to be managing patients (women) adequately, you want to be getting what you need in time, you have to be pallying (pally) with the nurses/midwives (Interview NO30-SR).

Organisational patient safety culture

Adverse events reporting and management processes appeared to be influenced by a number of factors relating to patient safety culture. These include, professional hierarchies and allegiances, blame culture and punitive measures, lack of trust in the system, personal relationships and lack of patient safety ownership.

Professional hierarchies and allegiances

Many of the staff saw following through and ensuring that reported issues were completely dealt with as the responsibility of the senior departmental members, including the chief resident, ward managers, unit managers, consultants and the head of the department. However, actions did not always seem to fulfil this expectation. Junior staff and others from different professions seemed to rely on senior staff for advice and intervention concerning patient safety issues. Reports were often verbally directed to the seniors in the first instance for further reporting and/or appropriate resolution. Several reports from various doctors, including some O&G consultants and a senior hospital manager, claimed that some consultants were known for not engaging well with patient safety activities, such as doctor's meetings (morning reviews, mortality presentation and monthly Labour ward statistics), where concerns were identified, discussed and resolved. This was also identified during observation of meetings. For example, it was noted that there was no consultant in attendance in two of the six doctors' meetings observed.

A few doctors also raised concerns over their department's lack of representation during most of the senior executive meetings, in which each department had an opportunity to present their needs or concerns. The doctors linked this behaviour to their departmental leadership, which they said had portrayed their department as uncommitted to patient safety in the eyes of the hospital management and other departments, thereby preventing them from securing an adequate resource allocation. A senior hospital manager also raised the issue of lack of O&G engagement as the main reason preventing them from knowing about problems affecting the department. The manager described the department as one that did not report and did not want to be asked about issues concerning it. This behaviour could have prevented identification and resolution of patient safety issues affecting O&G and potentially promoted their reoccurrence. The manager tagged this behaviour as "the O&G issue".

They (O&G department) generally do not want to be troubled, when they have problems, they would rather keep it to themselves. They do not want to be troubled and they do not want to trouble you. But if you do not trouble the management then things are not likely to work well. That is my major problem with the O&G department (...) and many things are left literally under the carpet (Interview NO23-SM1).

Senior staff also appeared reluctant for incidents involving their subordinates to be actioned within the formal reporting and learning system. A reason for this reluctance

appeared to be a perception that healthcare mistakes are inevitable. Therefore, they preferred talking to the individual involved directly or solving the issue within their immediate team or professional circle informally rather than formally. The seniors were uncomfortable with taking formal action because they perceived it as directly reporting the staff member involved, especially if the events were perceived to implicate a group of staff. Observations and staff reports suggested that this practice was common across the various professional groups and the whole hospital. One of the O&G consultants saw it as a “cover up”

At the moment, it is an issue of “cover-up.” A person belonging to the nursing/midwifery department does something wrong, then the next thing you will see, all the nurses/midwives would want to gang up to protect that particular staff. A doctor does something wrong, then the doctors would go out of their way to ensure the doctor is covered, and that is how the cycle goes on. And that is why we do not have the issues properly sorted out (Interview NO8-COG).

The following senior registrar's quote also highlights the potential for incidents to be repeated. As the quote indicates, one of the circumstances where many staff members expressed a willingness to report formally was a situation where "the person had been corrected "over and over". This view indicated the potential for incidents to be repeated further without formal action, and this was also observed.

Somebody makes a mistake that you can actually correct, I think I will call them to order and correct them. Except if they have been corrected over and over or are proving to be quite difficult, then maybe I will report it (Interview NO19-SR).

A senior registrar acknowledged in an interview that reporting reluctance had possibly influenced the number of formal reports they had made. The majority of the interviewees seemed unwilling to discuss the reporting reluctance further, but this could be linked to feeling obliged to protect the subordinate from unwanted consequences. A senior registrar also suggested that it was because the senior staff wanted to protect themselves from blame, being the head or supervisor of the individual involved.

A reluctance to report was also observed and reported among junior staff, particularly doctors, as reporting was regarded as a significant thing to do. Junior registrars and house officers seemed unwilling to input on issues under discussion during doctors' meetings unless specifically asked. A house officer explained that only a few courageous ones would talk, because of the fear that the seniors might use what they said against

them later. This potentially prevented junior staff in particular from speaking up for patient safety:

Only very few people have that bold nature to... you might sometimes feel maybe if you say something, they (seniors) would use it against you or something (NO13-HO).

Discussions with junior doctors identified a belief that a negative consequence would befall anyone who reported a senior doctor. One of the house officers believed that it would be impossible for a person who reported a senior doctor to finish their posting.

Assuming you saw a senior registrar doing something that was not right, and you wanted to report. (If) you put your name there, it means you do not want to finish the posting. That is for sure; you cannot report your boss (Interview No11-HO).

Since the established process was that staff generally reported issues to their immediate seniors, junior doctors appeared reluctant to contact senior hospital managers (e.g., CMAC), despite a senior registrar stating that the CMAC continually told staff that they were welcome to report issues directly. A house officer perceived no potential consequences of reporting seniors from the non-medical profession, presumably because they had little or no influence on a doctors' training. However, some nurses/midwives, who also described keeping issues within their professional group, said they would be more likely to report issues where non-medical professionals were implicated.

In contrast, nearly all the incident reports collected during the research period came from senior staff members, especially doctors. This could have been because they were more confident in identifying and reporting incidents, both informally and formally. They may also have been less likely to worry about potential negative consequences than the juniors were.

Blame culture and punitive measures

The "no-blame culture", described as being introduced since the safety initiative, seemed to be inconsistently adopted within the hospital. My observations suggested that a punitive culture and focus on individuals was still prevalent, which generated a fear of consequences amongst staff. This potentially undermined important patient safety activities within the hospital's reporting and learning system, with people covering up their mistakes or being discouraged from reporting.

The hospital leadership generally appeared enthusiastic about promoting a "no-blame culture", open discussions of areas that went wrong in women's care, and the way forward. On many occasions, I observed senior hospital managers discouraging staff from making comments that could be perceived as blaming individuals. One specific example occurred during one of the clinical governance meetings when an anaesthetist was being criticised by a surgeon who was commenting about a surgery cancellation. The moderator (a senior hospital manager) reminded those present that the process was meant to improve the system but not assign blame to individuals:

The senior manager then reminded them to learn to control their emotions, warning that people will start covering up or stop coming to the meeting (Observation notes: Clinical governance meeting 1).

The hospital management's no-blame approach appeared not to have permeated down to the departmental level. The blame culture was very much evident at the departmental level because perceived staff wrongdoings were observed and reported to result in punitive measures. These punitive measures sometimes appeared to be imposed even when there was a clear indication of systemic failure (such as insufficient staffing). However, the application of punitive action sometimes seemed to be selective and was observed to be more readily applied to junior rather than senior staff members. A particular instance of this was a punitive reaction to a house officer for not documenting care given to a woman (no harm occurred), despite the doctor describing how they were very busy, and the woman's folder was not available. The punitive response involved an unpaid extra on-call shift:

Then I try to reach a senior to tell him about the case; I could not get him. So, I did what I felt was important for that patient (woman) at that time, but then I forgot to document what I did because of the overwhelming nature of the call (...). Besides, the record people were not at their duty post, so there was no folder to record what had been done to the patient (woman). The drastic action that was taken against me... I feel it is unfair. (...). Documentation is very important, but everybody just capitalised on that, and they (senior doctors) punished me. (...)
(Interview NO13-HO).

Using extra shifts as punitive measures imposed additional demands on doctors who were potentially exhausted (physically, emotionally and psychologically) might have increased the risk to women. Following this punishment, the house officer reported that

they would always clerk (taking medical history) women next time and wait for a senior to review them, which could introduce unnecessary delays.

Two other more serious incidents of intervention and documentation failure noted, involved senior doctors and did not result in punitive action despite resulting in a woman's harm. One of the incidents involved a woman who had visited the Gynaecology emergency on two consecutive days with reduced foetal movement complaints. On both occasions, the woman was sent home with no intervention or documentation of her previous visits, and returned on the third day with IUFD. The attending doctor (senior registrar) attributed the error to being busy with a more serious case and the nurse/midwife (senior) accompanying the woman telling the woman to go home. This incident went unreported, and no one seemed willing to raise it even for learning purposes until I did so. This is outlined in the following doctors' meeting observation note:

The moderator (consultant chairing the meeting) indicated a lack of awareness of the case and asked for details from anyone who knew about it. The SR who saw the woman during the initial visit described scanning the woman and telling her and the nurse/midwife accompanying her that she should be admitted, saying, "of course, I do not have to be the one to admit her." Besides, he was busy with two critical women, one of whom died later. The doctor said they later found that the nurse/midwife who accompanied the woman had told her to go home. The consultant said to me, "you see?" This kind of case was a "daily happening" (Shrugged). In this environment, we have a problem with health workers telling patients (women) things contrary to what the doctors tell them, and most of the time, they (women) prefer to take their advice to that of the doctors because they know them (health workers) personally. (...) The consultant said this was a general problem, not just peculiar to this environment (observation notes- Doctors' meeting-4).

The Chair of the meeting appeared to have accepted the reasons attributed to the incident (being busy with other service users) by the senior registrar, possibly because this was regarded as an ongoing problem. However, my interpretation of this was that the incident was dismissed because senior doctors were involved. This perception was supported by the following house officer's concern over a failure to acknowledge that everyone makes mistakes and that the juniors were particularly targeted, while mistakes committed by the seniors were simply ignored:

The relationship between different cadres of health care personnel (...) should be (...) a cordial one, not to just be looking for the simple loophole of the juniors, because even the seniors (...) do make mistakes. But sometimes, some people will just keep quiet, but once a junior does one small thing, everybody will now descend on them. We are in the process of learning, and if they show you this is what you (should) do politely, you will be able to accept the correction more (Interview NO13-HO).

The house officer's response also indicated the need for staff not to be punished in the first instance but to be allowed time to improve. This view was in line with that of many staff members who also wanted some guarantee that formal reporting would not result in negative consequences unless the staff involved in the incidents refused to change.

Trust in the system

Observations and staff responses suggested a lack of trust that their formal incident reports would get to the MPST or be treated with confidentiality.

The majority of the staff expressed concern that someone with access to the report forms might reveal the name of the person who reported the incident. Many of these staff indicated that they were willing to report incidents formally but that they feared being linked to any consequences that might create tension with their colleagues. The following comment from a consultant, reveals why they did not report any incidents, despite disclosing they had seen many on the ward:

I have not reported for the same thing (lack of trust in the confidentiality of the reporting system). People do not want to be responsible for someone else's misfortune. That is the attitude I see, and most often, the responses are they are not going to get involved, and they hands-up. They do not report. (NO9-COG).

A few staff members also did not trust that their written incident reports would reach the MPST. These staff claimed that people who received the incident report forms on behalf of the hospital might keep them away from the MPST investigation if they knew those involved in the report. This following view was shared by a junior registrar:

The person receiving the incident report might be a brother (...) or a sister or a friend of the person you are reporting and then he collects it and says ah! This is about my friend! He might pocket it (Interview NO4-R).

Although staff with this view could not give specific instances of someone removing a completed incident report form, one senior registrar commented in an interview that an O&G ward manager had taken away a blank incident report form they had planned to fill in. Instead of sharing incident reports with the MPST, one of the ward managers also reported retaining them to be used in the event of a repeat of an incident by the same person, to warrant punitive action. While this could have limited the wider organisational learning scope of the incident reports, it had also created mistrust in the reporting and learning system among the nurses/midwives in particular and could have prevented staff from taking formal action, as indicated in the following quote:

The irony of that incident report form is that (...) they (seniors) are not using it for incident reporting per se, but [it is] always used to find fault or maybe query something and most times among the nurses (Interview NO6-NO).

However, those involved in patient safety activities in the hospital (MPST, including hospital managers) said that they had explained to the staff that disclosing identity was optional, but acknowledged that there was still a lack of understanding.

Personal Relationships

Relatedly, personal relationships with a staff member or woman could motivate staff to either raise a patient safety alarm or not.

There seemed to be divisions among staff members along friendship, ethnicity and religious lines. These divisions seemingly influenced a belief among the majority of the staff that reporting incidents involving one of their group members would affect their relationship, while reporting an incident involving a member of a different group member would be regarded as malicious. These divisions appeared to have significantly influenced how staff members reported and or managed incidents and their interpretation of the reports and actions they generated. As highlighted in the following quote from a junior registrar, such a relationship could prevent some members from reporting and/or appropriately managing patient safety events, to protect the group member, especially if there were potential consequences.

The majority of people (staff) are a bit reserved. I do not want to do this (report), and this person loses his job. He is a father to this, she is a wife to this, he is an elder brother to this, he is the breadwinner of his family, and all sorts of stuff (reasons) (Interview NO4).

On the other hand, a personal relationship with women might have been a factor in the reporting of patient safety concerns. A consultant observed that some staff felt more obligated to raise patient safety concerns if the woman affected was related to them:

There is this attitude of I do not care, on the part of most (staff) (...) but getting calls from doctors or from nurses/midwives or ward attendants that "I have a patient (woman) in the Labour room and she is having issues. I have talked to this person, but they are not doing anything about it." You'll get it (call), if a person (woman) is directly related to them (staff). Perhaps this is something that needs to be institutionalised. It does not have to be a relative or someone you know for you to report further up the chain of command (No9-COG).

On a few occasions, this consultant's claim was verified when O&G staff or those in other parts of the hospital were observed to step in to provide care for a woman to whom they were related, or even go with them to see a doctor. One house officer with a similar view claimed that such women were more likely to receive better and safer care. However, not all staff saw friendship as a factor in reporting. As the following response of a nurse/midwife highlights, some staff felt that patient safety should come first, and friendships should not be a barrier to reporting or managing patient safety issues.

If you are considering patient safety, you are not thinking of your friendship or your relationship with the person. The priority should be the patient's (woman's) safety, not any other thing (Interview NO6 NO1).

Patient safety ownership

Throughout the data collection period, strategic places within the hospital had many posters informing all stakeholders that reporting patient safety was everyone's responsibility. This message was also observed to be given to the participants of clinical governance meetings by the MPST members and senior hospital managers. Additionally, the managers reported carrying out multiple visits to various hospital departments to talk to staff about this. The majority of the participants in this study further reported seeing patient safety as paramount to what they did. However, the responses and actions of some staff members seemed to reflect that they did not see reporting patient safety as their responsibility. Therefore, they tended to do nothing about identifying patient safety concerns. This behaviour appeared to be a notable barrier to patient safety and was reported by many staff as a hospital-wide problem.

One specific example of a lack of patient safety ownership was shown in an unreported incident that resulted in a woman's death following a delay in an intravenous cannula insertion. The following comment from a house officer, who acknowledged not reporting the incident despite observing it, suggests that they did not report it because there were other staff who they thought should have taken on the reporting responsibility:

Even without a consult, it was obvious that this patient (woman) was in shock (...) but they (...) felt since there was no documentation, (...) they left. I feel it should not have been that way. Who will you tell? The SRs (senior registrars) were already there. All the care managing team (members) were there (Interview NO13-HO).

Such behaviour appears to have contributed to a lack of action in response to patient safety issues within the O&G department, potentially resulting in reoccurrences.

CHAPTER 5: DISCUSSION

This chapter summarises and discusses the main findings of the study with reference to the wider literature. The strengths and limitations of the study are then discussed, including consideration of the researcher's role and potential influence. The chapter concludes by considering the implications of the findings for patient safety practice and policy, and further research.

The aim of this study was to provide a deeper understanding of the contributory factors to adverse events (AEs) in maternity care. Understanding the nature of AEs, and how and why they occur is crucial to managing risks for women. The literature review presented in chapter two indicated that much of the existing research on maternity care adverse events (AEs) from the SSA region focus on incidences of severe patient outcomes (maternal and neonatal mortality) and their contributory factors but provide little detail on how and why the contributory factors might occur. Other authors have reported that interventions implemented to date in SSA hospitals have had some impact in reducing severe incidents [75, 91, 105, 121]. However, the majority of these interventions rely on approaches that are reactive, in responding to significant AEs (such as mortality audits) rather than being more proactive in identifying risk factors (system weaknesses) before they cause AEs. This means that the opportunity to address system failures underpinning patient safety concerns, including AEs and near-misses, may not be fully recognised, particularly where a system for reporting is lacking or not working effectively.

While the immediate occurrence of AEs is often linked to staff who provide direct care to women, viewing patient safety via a systems approach recognises that there are inherent weaknesses within the processes and organisational mechanisms in which these staff operate. These weaknesses arise from, for example, decisions, policies, protocols or guidelines, educational provision, staffing, organisation of care, provision of equipment and supplies, and could manifest in the local working environment to trigger the occurrences of AEs [223]. A holistic examination of systems to identify and address specific latent causes of AEs is essential to managing AEs in a healthcare organisation [223]. Knowing the contextual factors that promote and/or inhibit the implementation of different interventions is key to understanding the likely success of improvements. This understanding is also key to informing decision-making regarding which of these conditions could be modified for more effective implementation [224, 225].

The systems approach is recognised as a suitable framework for gaining insight into how various organisational components influence one another [223]. This study thus employed the principles of the systems approach to explore complex care delivery processes within a single case study site. Using multiple qualitative methods, the study explored the contextual and organisational factors underpinning patient safety and AEs in a maternity unit within a Northern Nigerian teaching hospital. The study aimed to answer the following questions:

- What organisational and/or management related factors potentially contribute to AE in the maternity unit?
- How are the potential and/or actual contributory factors of AEs identified, reported and managed?

Findings from this research have shown that women receiving care within this setting were at risk of various forms of AEs. The study identified the influence of insufficient and inappropriate building structures, limited resources (material and human), and organisational culture challenges. This fits with a systems approach, which views weaknesses across the system as allowing AEs to occur. A key factor for change identified in the current study relates to the hospital's reporting system, which was in its infancy and not robust enough to generate adequate proactive management of AEs.

The discussion of findings will be structured according to three key levels of context: micro, meso and macro [226]. This three-level model for structuring the discussion section has been selected as it permits examination of various level of context and the dynamic interaction between them, which is a prerequisite of change management [224, 225].

The first two levels are related to factors internal to the organisation. According to Fulop and Robert [226], the micro-level includes aspects around the clinical team/department, such as knowledge and training, teamwork, climate and cultures and team experience of quality improvement. The meso-level is related to higher-level organisational/management and comprises leadership, knowledge and training, financial and clinical performance, cultures and climate, data and information system and organisational experience of quality improvement. The macro-level factors are outside the research setting and relate to the wider context of the health system, including location (urban-rural demography), regulatory mechanisms (e.g. national targets with sanctions), professional regulation, resource allocation, technology and financial incentives. While these levels of context are distinct, there is a close relationship between

them. Authors of other studies examining healthcare errors have reported that interactions between different levels of the system allow failures to “trickle-down” from one level to another, resulting in AEs [227].

5.1 Micro/clinical team/department level

Many staff providing direct care to service users in the O&G department seemed to be doing their best to ensure patient safety. However, this study identified gaps in the systems and practices exhibited by individual staff members and teams, contributing to resource shortages and poor local working conditions, which potentially undermined patient safety. These included staff not following the ward resource management system or available healthcare policies, protocols and guidelines. Others include a lack of teamwork and valuing the contribution of others, appropriate level of leadership and patient safety culture. These will now be discussed in detail.

5.1.1 Resource management

This study identified weakness around material and human resource management systems, which seemed to have created grounds for some of the resource constraints identified in the O&G.

The findings described how O&G lacked consistent maintenance and continuity schedules (inventory), i.e. mechanisms for checking the functionality and availability of equipment and replacing the existing ones. This meant that while equipment and supplies may have been allocated to this department and/or their wards, this did not guarantee their availability at the time of need. This finding was similar even for the supplies with an inventory system, such as consumables and medicines, because the system lacked an enforcement mechanism to ensure that staff members followed through with necessary action. Observations revealed that it was typical for nurses/midwives to fail to request replacements for depleting supplies from their ward managers after completing an inventory.

While many studies in the SSA literature reported material resource insufficiencies, none relate these to maintenance and continuity schedules (inventory) issues. This could be because most of these studies focused on finding AEs and/or their contributory factors, rather than what underpinned the contributory factors, as in this study. Although three previous SSA studies add some insight into sources of the material resource

insufficiencies, their findings linked this to issues around meso and macro levels, but not the micro-level [54, 98, 114].

It is worth noting that the current study did not examine the O&G material resource management system and its overall effectiveness. Material resource management is an aspect of operational management and not part of healthcare professional training. Thus, staff involved in resource management activities might not have the necessary knowledge if this is not communicated via local training. Therefore, training in resource management is a potential area for attention. Determining whether staff who manage these essential resources in the department had received the necessary training or not could help to clarify what action is needed. The views of staff members regarding the current resource management system could further clarify what may help to make this activity more effective.

The findings also appeared to indicate a lack of commitment by the senior leadership in the O&G to proactively present the department's needs to senior hospital management or engage other departments to improve access to resources and services, which contribute to some of the department's insufficient resources. For example, despite some O&G staff raising the issue of delays in some diagnostic investigations and the need for a side laboratory to run some of these investigations, like other departments do, no action appeared to have been taken by the department to communicate this or pursue this further. This meant a missed opportunity to prompt discussion and action on how to improve the situation.

This study found that the O&G had a generally inadequate staffing level, which was worst among the junior residents and nurses/midwives working in the Obstetrics and Gynaecology wards. However, the findings highlighted human resource management issues as a wider hospital issue beyond the O&G. This will be discussed within the meso level section below.

5.1.2 Use of clinical policies, protocols and guidelines

Findings from this study highlight that while O&G had some policies, protocols and guidelines, it appeared to need many others. The study also identified an inconsistent application of the ones available, which seemed to be due to the lack of a mechanism to ensure that these healthcare policies, protocols and guidelines were appropriately applied.

The findings highlight the increased risk associated with variations in care and procedures, suggesting the need for O&G to design consistent local care pathways and protocols, such as post-operative antibiotic prescription and sterile procedures. The O&G department in particular had no observable system in place to ensure that patient safety concerns were raised and discussed and that there was action to prevent reoccurrence. A lack of healthcare policies, protocols and guidelines was also identified in many other SSA hospitals [38, 61, 72, 73, 75, 91, 97, 228].

The findings from both this study and others in SSA highlight instances of staff failing to use available policies, protocols and guidelines and suggests the need to consider ways to ensure their consistent application [61, 72, 229-231]. The lack of application of care policies, protocols and guidelines is not solely an issue in developing countries but is also known to be a problem in more developed healthcare systems such as the UK NHS [232] and others in the Netherlands, USA, Australia and Germany [233]. In the SSA literature, the lack of adherence to available care policies, protocols and guidelines is typically related to lack of training [229] and health workers' perception of them as being irrelevant to their context, as "something one would do in an ideal world" [61]. This is similar to the current study's findings, where many staff lacked sufficient understanding of incident reporting, and some of them described it as something new from the UK. The study also observed that staff sometimes simply ignored the care policies, protocols and guidelines. This appeared to be due to a lack of communication and insufficient drivers to ensure adherence within the department.

A review of barriers to staff implementing guidelines identified three factors; personal, guideline-related and external [233]. The first two are most relevant to this study. Personal barriers to implementation are related to knowledge (lack of awareness and lack of familiarity with the guideline and its recommendations) and attitudes (lack of agreement, self-efficacy, skills, outcome expectancy and motivation). Lack of knowledge was identified as an issue in the current research and in one other SSA study [229]. Attitudes, particularly lack of motivation, may also explain why staff in this study did not follow the available care policies, protocols and guidelines.

The guideline-related barriers to implementation include the plausibility of the evidence within the guidelines and their complexity, layout, accessibility and applicability [233]. These barriers appear consistent with some of the findings on factors influencing AEs reporting and management in this study. AE reporting and management guidelines and the 24-hour national emergency policy were not clear to many staff, which may again fall within the knowledge aspect of the personal factors. There was also the issue of the

incident report forms being in paper form and not easily obtainable by all staff. Most of these policies, protocols and guidelines were adopted from other settings, and not sufficiently engaging with staff, which could be why they perceived them as irrelevant in their context [61]. Some of the proposed strategies for the guideline-related barriers include making them short, user friendly and in various formats [233]. The current study suggested that the uptake of incident report forms in the research setting may improve if they were more easily available and in sharable formats, such as google forms. Recommendations for dealing with knowledge and attitudinal barriers reported by other authors include learning from experts as opinion leaders and continuing medical education and in-service-coaching [233-235].

5.1.3 Teamwork and professional hierarchies

Teamwork can be defined as professionals working together to achieve a common goal [236]. Interdisciplinary teamwork and valuing of the contribution of other team members is known to be essential for ensuring the safety of healthcare delivery [237], especially in high-risk areas such as O&G. An obstetric team in teaching hospitals, as in this study's context, commonly comprises the most senior doctors and midwives to the most junior, support staff and other staff from different departments in addition to the women [238]. All of them working and acting in a co-ordinated way is important for patient safety. However, this study's findings highlighted a strong sense of professional identity and power conflicts in the O&G setting, resulting in poor multidisciplinary team coordination among the staff. The associated behaviour was observed to affect teamwork between staff of the same and different professions. Professional affiliations appeared to explain why many meetings excluded other professionals. Doctors had a higher power ranking and appeared to have the final say about women's care. Nurses/midwives reported experiences of not being listened to by some doctors. However, junior doctors also experienced power issues, which seemingly inhibited them from having the confidence to call their seniors or participate in women's care or safety discussions for fear of rebuff. Hierarchy and power potentially influenced women's care decisions, which sometimes seemed to be about exerting authority rather than the women's best interests.

Other SSA studies have also reported teamwork and communication problems between staff of the same or different professions [38, 47, 69, 73, 80, 85, 107, 109], mostly between doctors and nurses/midwives [69, 85, 107, 109]. This has been reported as inhibiting open discussions, adequate transmission of information and appropriate resolution of safety concerns [81].

Teamwork is difficult in healthcare due to team membership instability, inter-professional differences in knowledge, skills, culture and expectations, perceived and actual power hierarchies and power differentials, and teamwork's episodic nature [238, 239]. As seen in this study and others from SSA, healthcare hierarchies and power dynamics are common barriers to teamwork [238, 240]. Other authors have described how hierarchy is typical in healthcare teams, especially in teaching hospitals, with multiple power gradients within and between different professionals. While hierarchy in healthcare organisations can have benefits, including underpinning teaching skills, practice monitoring to ensure policies/procedures are followed, decisions, and enabling conflict resolution [241], there is a boundary where this becomes unhelpful to healthcare provision [238]. A steep hierarchical gradient and power imbalance can occur when too much power is in the hands of a few [242], with an adverse effect on working relationships and a tendency for staff to avoid challenging actions [243]. The steep hierarchical gradient seen in this study, especially among the doctors, seemed to be affecting AE reporting and management behaviours and merits further attention within the systems operating at this site.

This finding on barriers to teamwork may be attributed to a lack of coverage of teamwork in the curriculum of healthcare professionals in Nigeria. Teamwork skills can be learned [244, 245]. There are several teambuilding models available to help staff with reflective analysis of their team functioning and team effectiveness [238, 240, 246]. For example, Nancarrow and colleagues developed a teamwork competency framework for interdisciplinary teamwork, identifying ten competencies that a multidisciplinary team should demonstrate [245]. Training staff on teamwork and communication to remove the barriers associated with professional and hierarchy powers could be beneficial. Rather than concentrating power at the top (top-down), some experts advocate for shared and distributed leadership, whereby staff are supported to inform decision making in their organisation [247]. However, experts also note that developing such a leadership style may be challenging, especially in contexts with long-established rigid hierarchies like this study setting [247].

Findings from the study suggest that inconsistent team leadership and a lack of accountability permitted unchecked staff behaviours that increased the risk of AEs. The leadership of senior staff in the departmental team included both excellent and poor examples. For instance, some consultants diligently attended to women and junior doctors even when they were not on-call. They also attended all the doctors' meetings observed. Their juniors confidently sought their help or advice even when they were not their official supervisors. However, the study identified instances of behaviours that

suggest a lack of accountability and commitment among many senior staff, particularly the consultants. Some of this staff category would not come to work even when on-call and their juniors needed them, and they rarely attended the doctors' meetings to provide the necessary oversight during patient safety-related discussions.

These findings are consistent with existing SSA literature on the role of leadership in patient safety activities where the presence of senior doctors and departmental managers contributes to the successful implementation of, for example, audit and feedback [60, 81, 107]. However, unlike this study, the existing literature does not comment on the role of other less constructive leadership behaviours discussed above, such as within team relationships between senior and junior colleagues, horizontal relationships between departments, and vertical relationships between departments and their hospital management, and referring hospitals. Weaknesses in these relationships have been found in this study to inhibit adequate access to resources and positive patient safety practices. Therefore, interventions to improve patient safety should take into account how to balance these relationships in order to improve.

The departmental and team leaders' behaviour in O&G was linked to hierarchies, power issues and a lack of an accountability system to check staff behaviours and practices. However, these may also have been influenced by the senior departmental leadership style. The style of leadership at this level appeared to be consistent with a *laissez-faire* approach, which assumes that individuals are motivated by internal drives and impulses and that they need to be left alone to make decisions about how to complete specific tasks; thus, the leader provided little direction or facilitation [248]. This may also explain the staff perception of a lack of proactivity by the department's senior leadership compared to other departments, which the staff felt were more proactive in putting their department's needs forward within the organisation. It could also be why poor staff behaviours went unchecked. However, this study did not obtain O&G staff experiences of previous leadership to compare if something has changed or not. It also did not explore these issues in any other departments within the hospital to support comparison. The study did not also get to obtain first-hand information from the department's senior leadership, but views of other senior team leaders with previous experience of such level of leadership informed this finding. Moreover, this study did not explore the leadership and management training that the team and department leaders in the study setting had or the criteria used to appoint them. The findings may prompt O&G staff in these roles to consider the importance of effective leadership and management practices and how to ensure the necessary leadership and management competencies and training. There are many examples of knowledge and skills needed for such roles. For example, Smith

and colleagues' systematic literature review identifies characteristics to lead interprofessional healthcare teams effectively [249]. Other authors have developed models for effective healthcare leadership [250, 251] and a team leader coaching programme [252, 253].

5.1.4 Patient safety culture

The findings suggested that O&G staff had a varied commitment to patient safety. Blame, punishment and fear of speaking up were common in the department and at the team level. There appeared to be a lack of sufficient involvement of women and/or their relatives in decisions about their care. These seemed to have prevented openness in raising patient safety concerns and learning from them.

The findings are consistent with other SSA studies where blame, punishment and fear of speaking up hindered open discussion about care quality and patient safety [81, 93, 117, 254]. Human error theory is a useful model to consider these findings as it presents two approaches to errors in healthcare, focusing on either the person or the system [255]. The person approach focuses on individuals, blaming them for the errors. In contrast, the systems approach concentrates on the individual's working condition and building defences that avert errors or mitigate their effect. Findings from this study indicated that the senior hospital managers' efforts to get departments and teams to shift from a person approach to the systems approach had not well permeated the hospital's micro-level. Other authors have suggested that this is because the person approach to errors is a more convenient strategy to apply than the system as it is much easier to blame an individual than to blame or change the system [255]. It is important to note that the systems approach and patient safety focus in general, are relatively new in the Nigerian health care context and not embedded in the healthcare practitioners' training, and therefore likely to be poorly understood or applied [256].

The pursuit of patient safety improvement has been described as being restricted by an approach that does not seek out and remove the system's error provoking properties [255]. As identified in this study, the O&G department focussed on individuals, blaming and punishing staff for being the source of error, and data from the observations and interviews indicated a failure to address contextual factors. This appears to have created room for continued AEs reoccurrences as the same set of circumstances remained unchanged, provoking a cycle of similar errors. The data indicated that the reoccurrence of errors was typical in this department and that staff were aware of this. An example of this was in consultant's interview excerpts (Interview NO9-COG), where they indicated

that O&G lost many women, including babies, because of ongoing staff burnout, which had not been addressed.

Blaming and punishing staff for errors in the O&G department appeared to have been unsuccessful in preventing errors occurrences, with the data indicating that limited learning from incidents had taken place [238]. Indeed the findings suggested that the response to incident reporting worsened the departments' patient safety culture by creating divisions, lack of trust in the system, and silence among staff. Establishing a reporting culture is known to be critical for effective risk management [257] but despite the hospital having a reporting system, the department's culture of individual blame and fear of speaking up hindered this from operating as a means of learning from incidents. The findings identify instances of unwillingness to report patient safety concerns among staff from all professions and hierarchies. This signifies the need for the blame and silence culture in this department to be addressed [258]. The department and team level leadership could redirect their focus on assigning blame to individual staff towards identifying and addressing broader systemic issues. Evidence suggests that examining failures at a micro-level offers a better learning environment for incidents than organisational level [77, 259]. It is important to note that this does not require additional funding but a shared understanding and commitment to patient safety [260].

Focusing on the system also includes examining the role of the women in their care. The findings in this study identified poor women-centred communication in the O&G. This included instances of not giving sufficient information to the women and/or their relatives, not involving them in the care and/or management plan, and not paying adequate attention to their physical and emotional needs. This issue sometimes appeared to have resulted in the women missing or refusing lifesaving treatment.

Similar findings have been reported in other literature from SSA hospitals [58, 59, 61, 62, 80]. However, some of these other studies reported even more serious behaviours, including unkindness, threats and slapping of women [59, 61, 62]. A disregard or disrespect of women in maternity care has been identified in many studies in SSA hospitals and is still the subject of concern, as recent studies show that the problem persists [261-263]. Some authors have suggested reasons for this behaviour, including poor working conditions, a training gap, and a desire for a good obstetrics outcome [62, 262, 264]. While these behaviours are reported to exist, a United State Agency for International Development report and Nigerian Patients' Bill of Right published by the Consumer Protection Council (CPC) emphasised that such behaviour breaches service users' human rights and should not be tolerated in healthcare [265, 266].

It appeared that the occurrences of poor women-centred communication observed in this study might be related to a power imbalance between the staff and women, similar to that occurring between staff. This finding is echoed by another study from Nigeria, which reported service users experiencing a power imbalance in their relationship with doctors [267]. Evidence from the UK also suggests that women experience not being offered all the care choices available by their midwives [268]. This could be due to a desire to achieve the most optimal obstetrics outcomes, as reported in other studies [264]. For instance, some staff in the current study appeared to consider women without western education as uninformed and may have believed that they could not understand the health information needed to make the best choice. Therefore, they may not see the need to explain and/or involve the women, so they instruct such women to do what they assume is best. It could also be due to a lack of sufficient time [268].

Women-centred care approach ensures that women's views, experiences and rights drive the way care is delivered, making it an essential characteristic of care quality [269, 270]. Denying women the opportunity to participate in their care decision-making infringes their rights and adversely affects their views of the quality of care and trust in care decisions [271, 272]. While this may explain why women and/or relatives refused admission or treatment as described by many participants in this study, it is not certain, as the findings did not include women's views. Therefore, the department must identify low-cost solutions that promote the quality and safety of maternity care [273], informed by women's experiences [274]. The department could draw upon a prominent Cochrane review conducted by Sandall and colleagues [275]. This found that the Midwife continuity model based on compassionate, high-quality but low intervention had fewer adverse outcomes for women and babies than Medical-led or Shared models. Although the review illuminates the value of the Midwife continuity model in low-risk women, it acknowledges that other models are more applicable in caring for those with complications.

5.2 Meso/organisational level

The discussion around the macro-level will be mainly focused on the senior hospital management in the setting studied. While action at this level seemed to have taken the hospital beyond what they were previously doing in terms of patient safety, findings from this study identified some areas for improvement. These include general leadership and management capacity for patient safety, resource management structures, organisational policies, engagement with frontline staff, promoting and supporting

organisational patient safety culture and inter-organisational partnerships and collaborations. These topics will now be discussed.

5.2.1 Organisational leadership

The study findings highlight that hospital-wide patient safety improvements depend on senior hospital management and therefore may cease with staff changes at this level. The study setting appeared to have appropriate representation/involvement of different leadership elements at their senior hospital management level, including the Chief Medical Director and Chair Medical Advisory Committee positions. These leaders' openness to collaboration and improvements had brought about changes in the hospital that were not there before. These include adopting a systems approach to managing patient safety incidents, introducing incident reporting processes, enhancing clinical governance and welcoming research activities such as this study.

Existing SSA literature provides little detail on senior leadership's influence on patient safety. Authors of two studies mentioned that the presence of managers and policymakers during audits helped in the implementation of recommendations made [60, 107]. Another study indicated that having the right senior leadership is vital in driving improvements in health care quality, patient safety, and organizational and system transformation [276]. This is most necessary in healthcare settings with no strong national patient safety policies, such as in Nigeria.

Other authors have noted that candidates for senior leadership positions in Nigeria may not have the essential knowledge, skills, and interest to lead and sustain service transformation, including patient safety [277]. This is because leadership and management is not part of medical doctors' training, who usually hold these positions [278-280]. Leadership and management training did not appear to be an essential requirement for heading a Nigerian teaching hospital. Two different online adverts for CMD positions in ABU and Edo teaching hospitals identified during this study did not list leadership training or qualification as an essential requirement. In addition, the lack of inclusion of patient safety in healthcare professionals' training in Nigeria could result in potential senior hospital leaders not having skills or knowledge in safety improvement. The appointment of a hospital CMD is controlled at the Macro-level by the Minister of Health. Potentially a hospital could therefore be at risk of having any existing patient safety improvements terminated if those appointed choose not to support them. If the improvements are well established and supported by the remaining senior management, it is more likely that new appointees will support them. Therefore, it is important to

develop a shared commitment to patient safety improvement action within organisations at a senior management level.

The findings suggest that the hospital executives were taking steps in the right direction towards improving patient safety, as they seemed to promote and support a patient safety culture openly, towards increasing staff trust in the system and mitigating poor behaviours. For instance, staff exhibiting individual blaming behaviour during hospital-wide patient safety discussions such as clinical governance were openly discouraged from such behaviour by the senior hospital leaders. The senior hospital managers' seemed enthusiastic about a no-blame approach and enabling a safe environment for speaking about patient safety. During these meetings, the senior managers repeatedly emphasised and reminded staff that the purpose of the meeting was "to improve the system but not assign blame to individuals".

During interviews and informal discussions with staff, some of them had reservations about completing incident report forms. The reservations appeared to be related to lack of awareness of how the information collected is used. Therefore, addressing this through feedback may help, especially highlighting actions taken and lessons learned from these reports. In addition, the findings of the study emphasise the importance of hospital managers' having a message that the systems approach is about a "just culture". The just culture needs to balance the "no blame" approach with individual accountability, applying rules and laws in instances of deliberate breaches of hospital procedures by any staff member [281-283]. Other researchers have acknowledged the difficulty of the just culture approach when applying accountability to some staff categories [284]. The hospital in the current study seemed to have a similar problem given the steep hierarchical and power imbalance associated with senior staff. The findings indicate lack of action regarding poor patient safety practices associated with these staff members. Therefore, the hospital could aim to address the imbalance in hierarchical structure and power, as part of wider organisational improvements by taking measures such as to flatten the structure.

The findings suggest a low-level of engagement between the senior hospital managers and the O&G department, especially the junior staff and the departmental leadership. This potentially contributed to why these staff did not understand and/or engage well with the hospital policies, protocols and guidelines, including the patient safety initiatives. This may also have resulted in the hospital managers not being aware of issues affecting the O&G department.

Existing SSA literature around senior hospital managers and micro-level staff engagement is very limited. A few studies echo the finding that poor staff engagement is a contributory factor to AEs, and their findings indicated staff feeling that the hospital managers did not value their opinions [53, 56, 58, 81]. Staff in one of the studies reported that this reduced their motivation to collect required information on maternal deaths or implement audit committee' recommendations [81]. These findings reinforce the importance of senior hospital managers improving their engagement with all staff.

In terms of how managers engage staff, two approaches have been identified in this study, top-down and bottom-up. A top-down approach is characterised by a prescriptive hierarchical directive, inadequate engagement and lack of ownership by the frontline staff, availability of resources, and results are faster but short-lived [285]. Alternatively, the bottom-up approach is less directive, involved encouraging and empowering micro-level staff to lead the change, but outcomes may be slow or variable [285]. The current study's findings suggested that hospital management used a top-down approach to engage with frontline staff regarding patient safety improvements. The management discussed these changes directly with the O&G senior staff, such as the consultants and ward managers, expecting them to communicate the information to the junior staff, which hardly occurred. This approach potentially contributed to why many junior staff members lacked sufficient understanding of and engagement with the hospital patient safety improvements, such as the clinical governance and incident report forms. Thus, the senior hospital managers should also consider the bottom-up approach to staff engagement. The bottom-up approach is also recognised among the six building blocks for harnessing NHS staff's creativity and enthusiasm and promoting quality of care [286]. This approach would have allowed the junior staff to see the incident report forms and ask questions directly to the hospital executives themselves. Such engagement allows this staff cadre to talk about hospital policies to support frontline staff activities and/or ease women access, in addition to making them feel valued by their senior managers.

The senior hospital managers' top-down approach appeared to have not gained sufficient ground in the O&G to promote staff engagement with the hospital patient safety improvements. This could be related to the poor working relationships between the hospital management and the O&G department resulting in the department not openly promoting these initiatives. Therefore, senior hospital managers need to find a way to gain the co-operation of the O&G departmental leadership in supporting the hospital improvements. Open dialogue and communication may help resolve relational problems as these invariably shape the extent to which people engage with tasks [287]. The current study recognises the importance of staff engagement at all levels in an

organisation in patient safety, and suggests that senior hospital managers combine top-down and bottom-up approaches in their engagement with staff. The benefits of using both approaches have been shown to be effective in other studies [285, 288]. Throughout the three month data collection period, there was no time that the senior hospital managers visited the O&G to motivate or encourage staff to use any of the hospital policies, protocol or guidelines. Though the managers said, they had done this in the past and were planning for more such visits.

Engaging staff also includes empowering them to lead the changes themselves [289]. Rather than calling in external experts to redesign services, supporting and empowering the frontline staff to reform how they do their work is a proven strategy for unleashing employees' enthusiasm and creativity, creating leaders of change rather than opponents [73, 290]. Low levels of staff engagement are more likely to result in a poor quality of care and AEs [289], as shown in the high profile report of the Mid Staffordshire hospital [8]. Therefore, this reinforces the need for the senior hospital managers to explore how best to engage with staff in developing policies, protocols and guidelines, which could improve their commitment to using them. The staff engagement toolkit provides an example of resources that have shown potential benefits [291].

5.2.2 Resource management

The findings indicate that inadequate material and human resource management structures to support proactive requests or respond to unexpected shortages contributed to some chronic scarcities of these resources in the study setting. The findings also suggest that the hospital was not adequately collaborating with external organisations to ensure access to the necessary resources.

Two main problems related to material resource management identified were an absence of a robust maintenance and continuity plan, and administrative delays for supplier payments and insufficient partnership with other pharmacies for quick supplies.

The findings are consistent with the literature from other SSA countries, which also identifies shortages of material resources as a broader problem across the hospitals [38, 46, 47, 55, 60-62, 65, 69, 72, 73, 85, 87, 96, 100, 102, 106, 107, 110]. The literature is generally focused on highlighting material resources unavailability and the contribution of this to AEs, but provides little insight into what underpins the shortages identified. The few studies that consider the contribution of meso-level factors to inadequacies of material resources cite organisational purchase bureaucracy [54, 114] and/or limited

pharmacy opening [98]. In one study [114], the authors described how the hospital in their study faced difficulties obtaining MgSO₄ because it was not among Mozambique's essential drugs' list. Thus, the hospital managers had to lobby the Ministry of Health's Pharmaceutical Centre to include it in their shipment. The study of Santos et al [114] highlighted that the source of the MgSO₄ problem was at the macro rather than meso level. However, it showed that meso (hospital-level) management could partner with the macro level to prompt changes.

The current study adds to the existing evidence that poor resource management contribute to material resources' inadequacies. The lack of a robust maintenance and continuity plan for wider hospital material resources prevented the senior managers from knowing ahead of time what items were serviceable or needed to be replaced. This contributed to some vital machines, such as the CTGs in the O&G being broken and not replaced for use. Having the right maintenance and continuity plan would have indicated to the hospital managers what equipment needed replacing before they broke, to begin the request process. A senior manager involved in hospital supply administration reported sending a new request shortly after receiving a supply rather than waiting for the supplies to be used up in order to overcome administrative delays. While this solution could help improve the situation, it may not completely resolve the administrative delays. Staff also blamed administrative delays in paying suppliers as a reason why they were sometimes put off from supplying the hospital, contributing to shortages of consumables and essential medicines.

The findings of the current study highlight the need for the hospital to consider improvements to their material resource management. The UK NHS Department of Health procurement development programme provides a valuable source to consider when improving material resource management [292]. The programme aimed to increase resource availability and reduce costs for the NHS. Other resource management strategies adopted in the UK, for example, include attracting the best talents to manage the NHS Supply Chain Co-ordination Ltd, which have reportedly resulted in "unlocking millions of pounds" for the organisation [293]. While these examples resulted from decisions taken at the higher-level of the UK health system and not an individual hospital, they could still provide valuable lessons for resource management improvement in this study's setting.

The study also found that the O&G had a generally inadequate staffing level, which was worst among the junior residents and nurses/midwives working in the Obstetrics and Gynaecology wards. This had created conditions for high workloads, longer work hours,

insufficient breaks and recovery time from shifts/on-calls for some staff. Insufficient staffing was identified as a general problem in the hospital studied, which affected all professional categories. Deficiencies around the hospital's human resource management included staff rotation and rostering, and the lack of hospital-wide system for staffing projection and a staff performance management system. The SSA hospitals' literature similarly reported staffing insufficiencies. However, the majority of the literature focused on identifying staffing insufficiencies, what staff category/cadre was short or their contribution to AEs but not the underpinning factors [46, 47, 51, 55, 60, 62, 69, 79, 83, 87, 90, 98, 105-110].

Other SSA studies identify the issue of staff rotation as a detrimental factor [62, 109, 294]. As discussed earlier, staff rotation in the hospital studied involved the nurses/midwives only but not the doctors. The rotation annually resulted in 70-80% of nurses/midwives' deployment to different wards, leaving about 20-30% experienced staff to support the newer staff. In the current study and the literature, participants' responses indicate that wards are often left with staff that have limited ability to manage labour and delivery processes due to the rotation of experienced staff to other units. The findings from both this study and the literature also suggested that staff rotation added pressure to an already insufficient staffing level, further risking patient safety [62, 109]. While routine staff rotation is a widely practised activity in SSA countries, it primarily benefits the hospital system. It is perceived to enable staff to work in any part of their organisation, filling a short-term staffing gap. However, the effect of staff rotation on patient safety appeared to be less well considered, possibly because patient safety is still relatively new in the SSA care system. This means the need for future consideration of how the rotation could be best conducted without impacting patient safety.

The focus of rotas in most healthcare organisations is to ensure the availability of suitably qualified staff to cover women's demands [295]. However, rotas in the current study setting favoured the top of the professional hierarchy, allowing more senior and skilled staff to work during the regular hours of weekdays and rarely out of hours. The findings detailed that the rotas did not sufficiently consider the effect on staffing levels where a particular profession had fewer numbers, which resulted in reduced working hours or capacity. For instance, the rigid hierarchical structure in O&G typically meant that the junior doctors were the first to see all women before their seniors, even though senior staff seemed to have a more manageable workload. This rigid hierarchical structure and top-heavy staffing meant that the few junior doctors in the setting were overworked.

Studies from other SSA countries including Ghana, Malawi and Tanzania also reported staff working patterns similar to this study's findings [83, 93, 109]. However, these studies did not clarify why such a working pattern existed, which in this study appeared to be linked to hierarchy. In my data, a senior O&G consultant described the staff rota as "purposefully selfish and difficult to challenge" (Interview NO8-COG1). This description reveals the existence of an 'unethical culture' that required the co-operation of several actors in higher positions (with authority) to be able to adapt hospital processes to their purpose [296]. Fear of speaking up, especially among the junior staff who experienced the greatest work demand, seemingly allowed this behaviour to proliferate and can only be changed with open and non-judgemental communication amongst team members. Crucial to improving the staffing level in O&G entails looking at their staffing allocation strategy, ensuring adequate skill mix, and that all staff work for certain minimum hours per week.

The findings suggest that some of the inadequate staffing issues could be related to a lack of planning. For example, the top-heavy/inverse distribution of doctors, i.e. more seniors than juniors noted during the fieldwork. The lack of staffing of nurses/midwives in the Gynaecology emergency had been an ongoing issue for nearly a decade, long before the staff recruitment embargos, which were in place at the time of the study. It was the embargo however, which was typically identified as the cause of staffing problems by the study participants. A lack of systems to inform staff planning as a contributory factor to AEs was highlighted in this study, but has not been identified in other SSA literature. The findings of the current research therefore indicate a new area for attention - the need for improvement in human resource management (HRM). The concept of HRM increasingly recognises employees as the most valuable assets of an organisation, and who contribute to its success [297]. The HRM of an organisation comprises establishing integrated personnel policies to support organisational strategy, including recruitment, training, retaining and managing them to achieve optimum performance in line with their organisational activities [298]. In health and social care, HRM entails ensuring that appropriate individuals are employed with the right skills, in the right numbers and at the right time [297].

The top-heavy distribution of doctors and chronic lack of nurses/midwives in the Gynaecology emergency suggested the need for an effective HRM system as described [297]. This could be related to the O&G department's seeming lack of a significant role in the staffing system, which appeared to be run at the meso-level. This potentially resulted in ineffective staffing in the department, contributing to the inadequate and chronic staffing numbers observed, with potential adverse consequences for women and

staff. The website of the case study hospital indicated that it had an approximately 500-bed capacity. The senior managers did not appear to have used this information to project their broader staffing need and make requests ahead of time. This lack of advance planning appeared to have resulted in the ongoing staffing shortage across the hospital such that it was difficult to fill unexpected staff absence.

These findings also suggest that the hospital human resource management procedures lacked a system for staff performance management. This seemed to have allowed absenteeism, especially by the senior doctors to persist. A senior hospital manager acknowledged this shortcoming and indicated that they planned to roll out a checklist for performance management of specific job responsibilities. The checklist, which the manager reported had been adapted from the UK NHS, will begin with the hospital consultants. Senior doctors' absenteeism and the lack of accountability has been identified as a broader problem across all Nigerian teaching hospitals [299]. The study context might have some control if the department-level staff decided to apply the performance management checks. However, there is a risk that they may not be accepted by the staff since this approach is not recognised practice across all the Nigerian teaching hospitals and not mandated by their employer (the Federal Ministry of Health). The Professional hierarchies and allegiances could prevent staff from responding honestly, as with the incident report forms.

Managing organisational resource, including material and human, is part of the hospital managerial role. Hospital funding limitations and a responsibility upon hospital managers to work within their provisions increasingly makes it essential for them to be knowledgeable about managing these resources effectively [297]. This is especially important for this hospital as findings indicated a general inadequacy of material and human resources. However, resource management is an aspect of operational management and not part of healthcare professional training, which means staff involved in such activities might not have the necessary knowledge, and need to be trained. While the current study did not examine what informed the hospital's resource management systems and its overall effectiveness, it established the need for the senior management to reconsider how they do this to make necessary improvements.

5.2.3 Relationships with other organisations

Having successful inter-organisational partnerships has become an essential function of public sector agencies as it is associated with enabling resource access, lowering costs, and identifying solutions unachievable by one agency alone [300]. This study's findings

highlight how the hospital did have visible, collaborative relations with external patient safety improvement partners and researchers, including taking part in this study. However, the findings also identify a lack of strategic partnerships between the hospital and other vital organisations, including facilities referring service users to the hospital, private pharmacies and government organisations. This may have contributed to a lack of information sharing and limited the hospital's access to human and material resources.

Other SSA literature also raises the need for collaboration between hospitals and the facilities that refer women to them [38, 47, 65, 83, 231]. One study described the benefit of collaboration with a government organisation to facilitate access to supplies [114]. The need for partnership with private pharmacies raised by many O&G staff in the current study appeared to have not been addressed in the literature. The prospect of the hospital collaborating with private pharmacy seemed to be a potential means of increasing their access to medicines and consumables. However, time limitations for data collection did not allow this issue to be explored with the senior hospital managers. Speaking with the managers would have provided insight into their experience and knowledge relating to such partnerships' feasibility. It is possible that the hospital managers were aware of this idea but did not take it further because they would have to introduce a different resource management structure than what they have, which means an additional task or role.

The findings of this study support other research in SSA that reports how referred women are generally at risk of coming late to the hospital and are therefore at greater risk for AEs [38, 47, 65, 83, 231]. Evidence suggests that some of the problems that increase the risk for late referred women include insufficient referral notes, lack of accompanying staff from the referring facility and lack of prior notification about the referral [65, 83]. The hospital could approach the late referral issue as a wider organisational problem by identifying problem areas and collaborating with referring facilities to address the problem. Future studies could explore the implications of late referrals in terms of contributing to AE risk and help identify in-depth context-specific areas of the referrals needing improvement.

5.3 Macro/country level

The discussion of the macro-level of the context considers factors external to the organisation studied. While recognising the importance of the context is beyond an individual organisation, the main focus of this study was on factors within the organisational system that they have control over. However, the findings highlighted the influence of external factors in contributing to and exacerbating issues, especially

organisational resources, culture and access to service, posing an additional barrier to managing patient safety. The findings indicate that the hospital studied is limited in its capacity to improve patient safety without macro-level support. The government/national health system has a significant role in safeguarding care provision in Nigerian hospitals. Therefore, the government/national health system need to consider adopting a more comprehensive approach in line with the six Health System Building blocks [301]. Crucial to this is ensuring appropriate funding and policies that will address barriers to accessing healthcare services, improving hospital resources, creating and supporting patient safety structures and practices, including leadership and management capacity, appropriate training, reflective practice, systematic data collection, audit and improvement science implementation, cultural shift through academic education (university and in-hospital training), inter-agency collaborations; and wider media exposure to engage the public. Other healthcare researchers have also observed this need [277, 302]. These will be briefly outlined:

5.3.1 Improving access to healthcare services

The findings noted many access barriers, with a potential bearing on what hospital organisations could do. Previous SSA studies also reported these barriers, which include poverty [28, 38, 45, 47, 53, 54, 61, 72, 80, 85, 91, 96], cultural practices [28, 85, 98, 100], distance [55, 67, 72], transport [65, 72, 85, 96], ambulance services [55, 61, 69, 72], and travelling conditions [72, 106]. Therefore there is a need to consider the wider context when considering what steps should be taken to address these issues. Creating job opportunities to alleviate poverty [26] and sustainable and effective health insurance coverage [303, 304] will address the financial barriers, especially for those with financial constraints. Wider infrastructural improvement, including good roads, transport systems and security, will positively support access to health care services [305, 306]. Others include wider media targetted community engagement to dispel some harmful cultural practices, especially those inhibiting women from timely access to healthcare [307].

5.3.2 Appropriate funding and policies to support hospital resources

The hospital's initial conception and design was for a lesser facility before it was upgraded to a Federal Medical Centre and subsequently a teaching hospital. While it might be expected that hospitals that were upgraded to teaching hospital status would be given more funding for this enhanced role, staff indicated that this facility did not get any building improvement, new equipment or additional staffing following its upgrade and communicated their disappointment about this. Upgrading facilities to provide higher or better services is not a new phenomenon in Nigeria or other countries [49, 77, 114].

Other researchers have highlighted that the physical environment is an aspect that often receives little attention in patient safety research [308]. The current study appears to be the first to note the role of the physical environment as a contributory factor to AEs in Nigeria, especially in relation to facility upgrading. While it is unclear how decisions and processes to upgrade hospitals in Nigeria consider the need for enhancement of these facilities, this study shows that there are lessons for future upgrades and the need to consider the potential impact on patient safety.

The findings highlighted that inadequate national healthcare funding had contributed significantly to deficiencies in the building, material and human resources in the study setting. This was exacerbated by the lack of alignment between funding and the needs of the facilities. For instance, why O&G could not get a new CTG or had a restrictive revolving fund for supplies. Insufficient healthcare funding is a common problem in nearly all African countries, including low and middle-income countries [277, 309]. However, global health financing information showed that even within the African countries, Nigeria is still at the bottom in relation to health budgeting. For instance, its spending was 3.4% of GDP in 2013 compared to Sierra Leone with 11.8% [309]. Although the document showed a slight increase in the Nigerian health budget [309], the country's 2020 healthcare budget is yet to meet the committed target of the Abuja declaration of 15% of the national budget. Thus, there appears to be a need for increased government funding for healthcare and consequently hospitals that could improve care, particularly for the hospital in the current study, which is one of the lowest funded among the teaching hospitals.

The findings from this study indicated a lack of consideration of some government policies on patient safety. For instance, the findings highlighted that the Federal Government's staffing employment embargo further worsened the staffing situation. Other SSA studies from Ghana and Malawi have raised concerns regarding inadequate consideration of government policies on hospitals [83, 109]. These studies showed that government policy to encourage women to attend hospital births resulted more women without increasing resources. While the current study did not explore the extent of the government policies implications on healthcare delivery or patient safety, it does raise the need for sufficient consideration of the effect of any policy. For instance, while the staffing embargo policy was to control unnecessary government spending, they could make this policy flexible, considering exceptional situations such as the healthcare staffing needs. The staffing issue is known to be worse in hospitals located in Northern Nigeria compared to other parts of the country, and this has been worsened by the

current insurgency problem affecting the region. There is an indication that the government was aware of this gap [27]; which may prompt action to address this inequity.

It has been identified in the literature that the level of remuneration in Nigerian healthcare resulted in staff taking an additional source of employment alongside their primary roles, resulting in some absenteeism behaviours among some hospital staff [310]. While the government allows some professional categories to take additional part-time roles (visiting jobs) in other public facilities to fill staffing gaps, this could result in staff working in multiple places, including private hospitals, leaving the hospital of their primary employment short-staffed. A national policy to clarify how many hours staff should work in their hospital of primary employment and others may help, in addition to improving the general healthcare staff remuneration.

5.3.3 Creating and supporting national patient safety structures and practices

Patient safety appeared to be an area of the health system that receives little commitment at the Federal Government level in Nigeria. Therefore, the findings support more comprehensive patient safety structures and practices, including leadership and management capacity development in line with patient safety, appropriate training, reflective practice, systematic data collection, audit and improvement science implementation, cultural shift through academic education (university and in-hospital training).

The findings indicate the need for the government/national health system to support leadership and management capacity development in line with patient safety. In the case study context, the initiation and sustaining of hospital-wide patient safety improvements depend on the most senior hospital management staff's interests and decisions, especially the CMD, whose appointment is made mainly by the Federal government. This highlights the need for the Federal Government to ensure that appointments to such positions are given to individuals with appropriate interest and capacity to lead patient safety. This study and others in SSA note the varied leadership capabilities among hospital management staff [277, 311]. This may be due to the absence of leadership and management in the healthcare professionals' curriculum [280] or tailored postgraduate training in Nigeria. Typically, individuals learn leadership as they grow in their profession, and this type of experiential learning is likely to lead to inconsistent practices. To improve healthcare leadership and management capacity in Nigeria, the government could support leadership development, ensuring its inclusion in healthcare professionals'

academic and in-hospital training programmes. There are resources widely available that could support this learning [312].

Patient safety appears to be an area of the health system that receives little commitment at the Nigerian Federal Government level. This limits hospitals regarding what patient safety improvement they could do or the support they could get. This was observed in the efforts of the hospital studied to improve and strengthen its patient safety structures through several activities discussed in chapter four. For instance, the lack of a risk management role in the Nigerian civil service and hospitals resulted in the risk manager in the hospital studied undertaking this task out of goodwill. This increased their workload and could result in the risk management task not being sufficiently executed because they had to meet their regular role expectations first. Such staff were also using their free time for patient safety activities. Some SSA studies also reported this issue, highlighting the need to provide such staff with incentives, such as cash and refreshments, to encourage them [78, 117].

It has been highlighted that patient safety is not well-understood among Nigerian health care practitioners. This is because patient safety is not part of the professionals' training curriculum and a lack of national patient safety training programs that could fill this training gap [313]. Staff could also regard the patient safety activities introduced in the study setting as optional or additional work because they were not mandated by their employer (the Federal Government). A study from Ethiopia attributed frontline staff adherence to the maternal death surveillance and response (MDSR) to a clear message from the Federal Ministry of Health communicating a sense of urgency and prioritization for this activity [314]. According to the authors, MDSR received considerable political commitment and alignment with existing national strategic health policy guidelines because of the government commitment to meet Millennium Development Goals (MDG) 4 and 5. Therefore, the national health system needs to be more committed to patient safety and support appropriate training through academic courses and in hospitals. Such courses should promote reflective practice [315], routine data collection [316], audit, improvement science and cultural shift to adopt evidence based practices [317].

Crucial to a commitment to national patient is creating a recognised patient safety body in charge of developing, implementing and monitoring patient safety structures and governance appropriate for Nigeria, which was lacking at the time of this research [302, 313]. This type of body could help define Nigerian patient safety standards and criteria for improving hospital performance. Nigeria also has no recognised patient safety surveillance system for capturing and patient safety incidents [302, 318]. This potentially

discourages error reporting and prevents opportunities for learning and improving the healthcare services both locally and nationally. The lack of patient safety structures and governance appears to be a potential problem in other sub-Saharan African countries as well but some are taking actions to address the issue. For example, Ethiopia is among the first SSA countries to establish a data capturing system for facility-based and community maternal deaths in 2013 [314]. This highlights the potential of inter-agency collaboration as ensuring national patient safety has to be a collective effort of different parts of the health system. For example, in an effort to share learning and take measurable action to prevent preventable deaths, in 2017, the UK NHS Quality Account Regulations legally requires all Secondary Care Trusts to report quantitative and qualitative information relating to patients deaths [317]. However, for such transformative improvements to yield benefit, the process needs collaborative involvement of various stakeholders, including frontline staff, improvement experts [319, 320].

5.4 Strengths and limitations of the study

Throughout this research process, the need to ensure the quality and trustworthiness of the study was fully considered. Reflections on the strengths and limitations of this study will be discussed in relation to established criteria for assessing the quality of qualitative studies [217]. These include worth or relevance of the research, appropriateness of the design to the question, context, sampling, data collection and analysis, and reflexivity of the account.

A systematic review of the literature provided a comprehensive narrative synthesis of existing evidence and identified factors contributing to AEs, including organisational and/or management-related factors. The review was used to examine where there were gaps in existing knowledge. It was found that existing SSA studies lacked sufficient information on how and why contributory factors for AEs occurred. This study, therefore, was based on a systematic examination of the existing evidence and appears to be the only study to provide an in-depth exploration of the contributory factors for AEs, examining how and why they occur within the Nigerian obstetrics context. In addition, this study provides an insight into how the contributory factors for AEs are identified, reported and managed in the hospital studied. Unlike the SSA literature, which seemed to focus on AEs with severe consequences, such as maternal mortality, this study focused on factors contributing to all forms of AEs.

This study examined the contributory factors for AEs through the systems lens, which allowed the organisational weaknesses to be identified proactively before they result in

AEs. This makes it different to the more reactive approaches found in most SSA studies, which identify contributory factors following the occurrence of AEs.

This research was based on a single case study design involving multiple qualitative data collection methods. The research questions necessitated an in-depth exploration of contributory factors for AEs, including how they are identified, reported and managed in the O&G department of the hospital studied. Therefore, a qualitative case study design seemed the most suitable approach because it allowed an in-depth exploration of the phenomenon of interest within its natural context [173].

The flexibility of the case study design allowed the use of multiple methods to gain a deeper understanding of the phenomenon [166, 171, 173, 176]. Combining both observations and in-depth interviews in this study allowed a more in-depth exploration of the contributory factors for AEs and AEs reporting and management processes of the hospital than interviews or focus groups alone offered. The multiple data sources also permitted triangulation, i.e. comparing findings from the various methods, and this in some instances revealed differences between observed staff practices and views, thus highlighting the value of observing staff at work in 'real time' rather than relying on retrospective accounts [211, 217].

Both convenience and purposive sampling strategies were used in this study. The convenience sampling approach was applied in selecting the study setting because it is considered an appropriate strategy when studying complex and sensitive issues such as patient safety as not all hospitals would provide access. However, a different strategy, i.e. purposeful sampling, was adopted in selecting the participants of this study. This was also suitable as it allowed targeting staff with the relevant information that would highlight the factors underpinning the AE contributory factors and their reporting process [158]. Views of front-line staff, such as nurses/midwives and doctors, are regarded as a valuable source of information that can inform patient safety improvement [183]. The data collected in this study mainly focused on front-line staff working in O&G but included different health professionals and staff categories with varied seniority and experience levels, which provided a range of insights. While this study provided in-depth findings regarding O&G, exclusion of staff from other departments could mean that the issues identified may be different in other areas of the hospital studied. This is acknowledged as a limitation of the study design and PhD time, which did not permit findings to be explored in other departments of the hospital. However, observations of hospital-wide activities such as the clinical governance, interview responses of senior hospital

managers and some O&G staff indicated that the findings in other departments would not have been too different.

Lack of inclusion of women/relatives experiences of care and/or AEs may be regarded as a limitation of this study. However, the focus of this study was on staff experience and the care they delivered. Women's views are very relevant here but time and resource constraints restricted this research to staff only. However, the findings did raise the need to improve women-centred care.

This study's findings would be relevant to other hospitals in Nigeria and SSA and can be used to inform future patient safety improvement and research within the county and in similar contexts. Undertaking the study in a single site may be regarded as a limitation and can be argued that the findings may not be transferable to other contexts [321]. However, this is not unusual for a case study as it seeks an understanding of a phenomenon in depth. An adequate description of the context studied has been provided, which will help the reader decide about the findings' transferability to other settings.

My background as a native of Northern Nigeria with previous experience of working in a similar context to the hospital studied was a strength in conducting the research. This made me, to some extent, an "insider", which helped to settle and begin the fieldwork within a short period more easily than someone different could. This background also facilitated my engagement with the research setting and participants. For example, my understanding of more than one language local to the research setting helped me understand all the activities and discussions taking place without the need for anyone to interpret, which may have been necessary for other researchers [61, 79]. Knowing the local language also helped to some extent in recruiting one key participant whose initial behaviours and body language indicated that they would not have participated had I not been able to talk to them in their preferred language. More details of my role as a researcher will be discussed in the researcher reflexivity section below.

One researcher collected the data for this study as it was an independent PhD activity. This may be regarded as a limitation because of a potential limited field of vision associated with a single researcher. An additional researcher may have brought a slightly different lens/focus and may have observed different things or recorded observations differently. However, the data were frequently discussed with the supervisors throughout the data collection and analysis processes. This resulted in the findings being thoroughly reflected upon, including focus and assumptions, and ensuring a depth of insight. The

time spent in the field, the number of observations and interviews give a degree of confidence that the data reflect the setting's reality.

The data collection and analysis processes were appropriate for the research questions, and conducted systematically. A detailed description of the processes has been provided in the methods chapter. Two potential limitations of the data collection process relate to the time of observation and the observer effect. While it is expected that observation should be carried out during a range of times throughout the day, only two night observations were carried out. This may limit the representativeness of the observational data, as the data collected may have missed an aspect of AE occurrence or risk management that did not occur during the day. The decision to predominantly observe daytime activities was primarily for the researcher's safety. Efforts were made to ensure that fieldwork took place during a range in hours of the day, mainly between 7 am to 8 pm, and interviews with staff could have complemented the data potentially missed.

The observer effect (Hawthorne effect) is related to staff changing or adjusting their practices when observed by a researcher [189, 190]. The observer effect appeared to have not affected this study because the observations were conducted over a long period (3 months) that would make the staff used to the researcher's presence, and the busy nature of their work would not allow them to maintain any unusual behaviour or practice [180, 191]. Moreover, the staff were aware that the research was focused on the whole system and not individuals, which may have helped to make them feel relaxed about my presence. My background as someone local to the setting also may have helped avert the observer effect and this will be discussed more in the researcher reflexivity section.

An additional potential limitation is related to the researcher's own bias, which could affect the data collection and analysis processes [322]. Therefore, the researcher's reflexivity is appropriate to enhance readers' judgement on whether the study has been affected by the researcher's bias or not.

Researcher reflexivity

Qualitative research tradition does not seek to restrict the researcher's role to an unobtrusive neutral position. It instead recognises the co-construction of findings in the interaction between participants and the researcher. Thus, it is good practice for the researcher to acknowledge their relationship to the setting and how their previous experiences, knowledge, and attitudes influence the data collection and analysis of the findings [164, 210, 323]. Researcher reflexivity is important in this study, having taken a critical realist stance, which supports the researcher's active role in co-constructing

meaning during the data collection and interpretation of the findings [324]. Therefore, I describe the issues relating to my positionality as a researcher while conducting this study, my experience working in a Nigerian hospital, and the research participants and setting.

My interest in patient safety research was stimulated by my experiences as a trainee nurse-midwife and later as staff in two different hospitals. Then, I observed what I believed to be a gap between theory and care practices in the hospitals I worked in, which compromised patient safety, and this has always been an area of concern for me. This interest became stronger following my sister's experience of AEs, which resulted in a ruptured uterus and the loss of her baby and nearly her. Therefore, I acknowledge that this study began with some preconceptions about AEs and/or the contributory factors for AEs [322]. For example, up to the time I registered for this study, my views of AEs and their contributory factors had been associated with the individual staff involved in direct care. However, these views significantly changed after conducting the systematic review of the literature, which shifted my thinking to look beyond individuals and examine the context of care. This view then shaped the data collection and the analyses of the data for this research.

The research participants and the research setting were not familiar to me, which means I met them for the first time during the fieldwork. However, I would consider myself an insider compared to someone from a different country and/or non-healthcare related profession. Being a Nigerian national from the Northern part of the country, with previous experience of working in a similar context as the research setting, had given me insight into the dynamics of a typical Nigerian hospital. This helped me navigate the study hospital and engage well with the participants, faster than may have been the case for a total outsider. For instance, it was easy for me to understand and adjust my initial plan of how, when and where I conducted interviews.

My fluency in the two local languages helped me access a participant whose body language initially indicated they would not participate. I felt that this particular staff member had extensive experience and could provide useful information because of the leadership position they held previously in the hospital. However, their unwelcoming behaviour discouraged me from approaching them. This concern was discussed in confidence with the gatekeeper and they advised talking to the particular individual in their native language before requesting their participation. To my surprise, they accepted, and their behaviour towards me completely changed afterwards. Having a gatekeeper benefited this study in numerous ways, including access to the research

setting and participants. However, on one occasion, I felt this served as a barrier to accessing one of the participants that may have been helpful. A possible internal conflict between the gatekeeper and this individual may have prevented them from participating in this study because I may have been regarded as being on the gatekeeper's side. However, not including them in this study did not affect the data because others with similar experience and rank had participated.

The non-participant observer role I adopted gave me the freedom to shadow various staff members (with their consent) without having to partake in any aspect of women care. Staff understood and appeared accepting that this was my role and did not impose any expectation despite knowing my nursing-midwifery background. I kept considering how my presence affected their behaviour and practices because I was aware that the staff might adjust these when I was there (Hawthorne effect) [189, 190]. For much of the data collection period, I did not feel that this had occurred because the staff seemed to regard me as one of them (being healthcare personnel) and appeared unaffected by my presence. Although a few staff members displayed signs that they were conscious of my presence, I did not feel that this significantly influenced their behaviour. For instance, during one of my observations in the Labour ward, a house officer commented that a woman was being pampered as staff kept trying to make them understand the need to consent to an emergency caesarean section. The house officer stated that they would not hesitate to grant the woman's request for discharge if they were the one in-charge as it would reduce their workload. Another house officer sitting nearby laughed and reminded them that I was observing them, but the house officer shrugged and indicated that they were not concerned by my presence. The majority of the staff seemed generally relaxed about my presence, which could be expected with someone local and with a clinical background [325].

Knowing that my assumptions and familiarity with the typical Nigerian healthcare system may risk me missing relevant information [325], I made a conscious effort to document every observation while in the field, which I then converted into detailed notes. I recorded personal reflections for each specific observation, which helped me question any underlying assumptions that may affect the findings, this differentiated my views from what was observed or discussed with the research participants [164]. The most challenging theme in my analysis was professional hierarchies and power conflict, especially around consultants' poor behaviours. This behaviour is a practice area that did not sit well with my idea of how senior professionals should act. At first, I tried to ignore it for fear of imposing my views and was conscious that the findings might be associated with me being a nurse-midwife, especially knowing of the poor working

relationships between nurses/midwives and doctors in Nigeria. However, having reflected so much on the data relating to this finding, which mostly came from multiple interview responses, including consultants, and the constant supervisory feedback to check the interpretation of the data and possible researcher's assumptions, I felt confident about my interpretation. This finding highlights the importance of professional hierarchies and power conflict on various aspects of care provision and patient safety. It is a sensitive issue that staff in the research setting and Nigeria are generally silent about, but I feel it cannot be addressed if we do not talk about it.

Throughout the research period, I have reflected continuously through to presentation of the findings, which made me go back to the data, reconsider and re-analyse until I was confident about my interpretations. Supervisory sessions also helped me reflect more on the findings, ensuring that my interpretations were grounded in the data. These sessions also helped me to look at the data through a different lens, especially when my interpretation seemed judgemental, being a novice researcher.

I found that considering what I would do when I see something that will harm the service users before the fieldwork had helped my decisions. I felt that the planning around my own risks underestimated dealing with the emotional aspect. This had been one of the most challenging parts of the fieldwork for me. Speaking with my husband, who understands the Nigerian hospital settings, provided the necessary support without disclosing any personal identifying information. Although authors of sensitive studies such as this research highlighted that one might never be well prepared for how they would emotionally react to data, this is definitely something I would give significant consideration to the future [326].

5.5 Implications of the findings for micro, meso and macro contexts.

While the findings were based on one case study, their implications for patient safety practice and policy are discussed in broader terms as having relevance for other settings, especially in sub-Saharan Africa. The discussion of the implications is organised according to the three-levels of micro, meso and macro contexts.

The main implications at departmental level include improving the resource management system, addressing care/procedure variations and patient safety culture.

- Both the material and human resources of departments could increase by improving their resource management system. This may include having a maintenance and scheduling system for all material resources and supporting them with proactive

actions. Similarly, departments should consider their staffing needs well ahead of time, placing staffing requests and following up with the senior hospital managers. In addition to this, ensuring equitable staff allocation with the right skill mix and ensuring that all staff work for specified minimum hours per week could help improve the staffing numbers and availability.

- To reduce the risk associated with variations in care, hospital departments should have standard operation procedures (SOP's) for common conditions, such as antibiotic prescription and sterile procedures and ensure adherence. Senior staff should increase juniors' supervision and check those SOP's had been applied. Staff should feel accountable for positive patient safety practices and support shared responsibility by reminding others when they fail to adhere.
- Strengthening multidisciplinary team coordination among all staff could improve patient safety culture at the department level. All meetings associated with departmental work or patient care should include different professionals and not be restricted within one professional category. The departments should also provide an enabling environment for speaking up about patient safety by removing the barriers associated with professional hierarchies and powers. Everyone's views should be respected. Junior staff should be encouraged to speak up, and their responses should be considered and not be used against them. Individual staff blaming and punitive measures should not be the first line of action in response to staff mistakes unless there is clear evidence of intentional negligence/patient harm. This should then be dealt with using appropriate hospital guidelines and procedures. In line with improving patient safety culture in departments, the patients should be involved more in their care plan and decisions.

At a meso (hospital management level), key improvement areas around hospital management include organisational resource management system, wider hospital patient safety culture and staff engagement, in addition to collaborative relationships.

- The hospitals should look into having a robust organisational resource management system. This may include employing staff experienced in resource management, providing training in resource management practices for staff involved in this activity at various levels in the hospital and frequently reviewing their long-standing staffing practices, such as staff rotation and rotas, and their effect on patient safety.
- Staff should be supported to develop capacity and practices in leadership, patient safety, teamwork, and multidisciplinary collaboration. The findings suggest the need

for improving the wider organisational patient safety culture and staff engagement. Therefore, the hospital managers need to understand the fundamental role of the organisational culture on care delivery in their facility and should continue to identify what inhibits or promotes appropriate behaviour and manage staff behaviour accordingly. Hospital managers' approach to organisational patient safety culture needs to be consistent. For example, it should be clear to staff that the systems approach also means a "just culture" and that rules and regulations would be applied to all staff equally in instances of a deliberate breach of hospital regulations.

- Hospital management staff should value communicating with staff across the various departments and levels (using top-down and bottom-up approaches) about the hospital patient safety improvements. They should also strive to provide feedback on staff comments or incident reports received and show their visible impact on service provision and patient safety where possible. Patient safety training should be provided to all staff to better understand the systems approach and their responsibility in patient safety. This will potentially motivate and encourage them to participate in their hospital improvements activities.
- Service providers are likely to be aware of latent organisational contributory factors that could result in adverse patient outcomes. Therefore, hospital managers should enhance all staff participation in raising patient safety concerns by promoting the culture of speaking up about patient safety among the hospital community. The managers should also encourage and support departments to adopt this approach. In addition, they should employ measures to address the fear of speaking up about poor patient safety behaviours, such as flattening the steep hierarchical structure and power imbalance issues.
- Collaboration with other organisations is also an area where improvement is needed. Hospitals should open up engagement opportunities between their staff and referring facilities to discuss how to mitigate late referral issues, which staff linked to increasing the risk of AEs. However, improving the recording system in hospitals would help collate data to show the outcome of late referral on patients. The current study noted that this information was not collected in O&G during the fieldwork, though there was a seeming problem with the late referrals and AEs.
- Senior hospital managers could also explore the potential of partnering with other pharmacies for quick and not commonly kept supplies as suggested by staff in the current study. Other areas of collaboration that need strengthening include links with

government agencies in charge of hospital funding and provisions and other organisation and services that can support service improvement in the hospital.

Implications around the macro-level of the context noted the need for sub-Saharan African governments to adopt a more comprehensive approach to strengthening their health systems. This is mainly by being more committed to infrastructural funding and strategies that improve national well-being and developing and supporting appropriate policies to help hospitals provide quality and safe care to everyone.

- Governments should consider increased funding and strategic policies that support more job opportunities, better remuneration, and broader infrastructure, such as good roads, transportation, and security for citizens' wellbeing.
- They should also should strive to meet their committed target of the Abuja declaration of 15% of the national budget for healthcare funding to enable better healthcare resources provision in hospitals.
- The governments should appropriately consider their policies on healthcare provision and patient safety. For example, their policies on resources, including staff employment and replacement, free care, and facility upgrading, should be flexible, considering contextual variation and matching them with appropriate funding. There should also be a clear national job description and criteria for each role and a system to help hospitals manage staff performance.
- Sub-Saharan African countries should have national policies to improve and support leadership and management competence among healthcare professionals. Therefore, leadership development should be part of the undergraduate curriculum of all healthcare professions. The government should also support in-hospital leadership training programmes for healthcare providers to support leaders in their roles. It should also ensure that individuals with appropriate leadership and management competency and capacity to lead patient safety improvements are employed in senior hospital management positions.
- All countries should have a unit in charge of national patient safety, which could help create their patient safety standard and surveillance system for capturing and measuring patient safety incidents. This unit could consider designing context-specific criteria for improving and measuring hospital patient safety performance, which would raise standards across all hospitals. The government should also consider mandating patient safety in all healthcare professionals' curriculum to cover

reflective practice, systematic data collection, audit, improvement science implementation, organisational patient safety culture, and other training programmes in this field.

- Exploring networking opportunities with countries that have successfully implemented patient safety improvements to learn from their success stories could help the sub-Saharan healthcare systems. They could also take advantage of various international organisations' offers, such as the World Health Organisation, which provide patient safety-related support to countries [327].

5.6 Implications for future research

The findings of this study have a number of implications for future research. These will be discussed in relation to AE contributory factors, AE reporting and methodological considerations.

This study identified many reasons behind the occurrence of contributory factors for AEs, but there are remaining knowledge gaps that could be addressed in further research.

- Further research is needed in multiple contexts regarding resource management systems at both team and hospital levels to identify additional improvement areas. Such studies should also obtain views of staff involved in resource management to understand their role in resource management and what needs to be changed. Future studies could also examine the implications of certain traditional staffing practices, such as staff rotation and work patterns, and how to minimize the risk to patient safety.
- This study identified a lack of sufficient multidisciplinary engagement across all professionals involved in key patient safety activities. Thus, more research is needed on the process of staff engagement in patient safety in Nigeria and Africa. Further studies could also determine what works well or not in promoting staff engagement, followed by tailored interventions in different hospitals.
- This study has recognised the importance of having appropriate individuals with leadership and management competencies and the capacity to lead patient safety improvements. The criteria used to select individuals in leadership roles such as HOD or team heads remain unclear in this study. Future research could help us determine

these criteria and their effectiveness in the selection of appropriate leaders across different departments and hospitals.

- Future research should examine the role of other leadership behaviours on patient safety and care provision in Nigeria and other settings. These include team relationships between senior and junior colleagues, horizontal relationships between departments, vertical relationships between departments and top management of hospitals, and referring hospitals.
- Future studies should help us understand the sort of collaborative relationships undertaken by hospitals in Nigeria and other contexts, and identify how this would benefit hospitals. For example, exploring the viability of hospital partnerships with private pharmacies to fill shortages of supplies, as suggested by the research participants.
- This study did not explore in-depth staff assumptions that referred women suffer more AEs than those who were registered. Further research could examine this issue, understand the referral aspect that contributes to this, and design an intervention to mitigate the problem.
- Other studies should clarify what informs decision to upgrading hospitals in Nigeria and how the government consider the improvement needs of these facilities. Some of these studies should also seek to examine how government policies affect healthcare provision and patient safety and what needs to change.

Many researchers raise the issue of a general dearth of studies on patient safety in Nigeria. This is, even more, the case for studies relating to AE reporting processes.

- While systematic AEs reporting is not standard in Nigerian hospitals, healthcare providers have an inherent way of identifying, raising and managing patient safety concerns but these are not sufficiently studied. Future research should determine the robustness of the AEs reporting system in different Nigerian hospitals and explore the factors influencing the reporting and design interventions to improve them.

This research's findings are based on one researcher's observation and staff accounts in the O&G department of one hospital only.

- Other studies could involve multiple data collectors in various settings to test the findings of this study on the AEs contributory factors and AEs reporting and management processes. This would enable comparisons of researchers'

perspectives and between different departments of one hospital and various contexts.

- This study focused on the contributory factors to AEs on maternity patients and did not explore the extent and consequences of AEs. Further studies on AEs should also help us determine the extent and consequences to maternity and other patients.
- This study explored how staff report AEs within themselves and to the hospital management but did not cover how AEs is communicated/reported to the patients/relatives. Future research could include how staff and hospital communicate with patient/relatives regarding incident of AEs.
- While service users could recognise contextual factors resulting in AEs and/or their contributory factors, this study did not include women's views/experiences. However, the findings highlight the relevance of women's opinions as they raised the need to improve women-centred care. Future research should explore women's views and how best they can be involved in their care, including how they might have a role in identifying potential unsafe working practices.

5.7 CONCLUSIONS

Previous studies from the sub-Saharan African countries identified several factors contributing to adverse events but generally lacked sufficient detail regarding how and why they occur. This case study explored organisational factors contributing to AEs in maternity care using a combination of observation of staff and interviews. The multiple data collection methods and different staff included in the study, provide depth and insight to the findings.

This study adds to existing knowledge in two ways. Firstly, it affirms the findings of the body of literature on SSA hospitals that insufficiencies in building structures; material resources (equipment, supplies and services); staff numbers; and organisational culture impede safe care for maternity patients, contributing to potential and actual AEs. The findings then enhances our understanding of the system weaknesses that underpin these contributory factors to AEs within the hospital's O&G department. The insufficient availability of resources was reinforced by an inefficient resource management system. The poor patient safety culture within the case study context was influenced by an inadequate standardisation in care processes and enforcement mechanisms, a lack of a

performance management system, professional hierarchies and power conflicts, and poor women-centred communication.

Secondly, the findings provided an in-depth insight into AE reporting and management processes, including the factors that influence them in this setting. The reporting system should ideally proactively help to illuminate the contributory factors for AEs before they occur. An occurrence of AEs and/or contributory factors produced three types of response from staff, including informal, formal, or no action. This means not all the responses will identify contributory factors that could be addressed to prevent future AEs in the O&G department. This finding relating to AEs reporting and management represents a clear contribution to the existing literature because there is a dearth of evidence relating to reporting AEs and/or their contributory factors in the Nigerian context.

Overall, this study supports a more proactive approach to managing risks in the setting studied. The study established that the hospital organisation studied could contribute to AEs occurrences and that this could be prevented or minimised by identifying and managing weaknesses within the organisation before they result in patient harm, thus ensuring patient safety. However, this study also illuminated that the hospital is limited in terms of what it could do to manage the deficiencies within its system without the Nigerian national health system' support. These include more commitment to patient safety by employing appropriate individuals leadership roles, creating patient safety and governance systems, along with greater consideration of the implications of organisational policies on patient safety.

The findings are potentially transferable to other Nigerian teaching hospitals and are likely to apply to other SSA hospitals given the similarity with the current study's context as identified by the literature review. The relative merit of the research findings could be substantiated further by testing them in other Nigerian teaching hospitals and designing interventions based on the new understanding of the factors contributing to AEs and AE reporting and management processes.

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APPENDICES

Appendix 1: Search strategy (Embase)

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Support & Training Help Feedback Logged in as scharrib Lo

Search Journals Books Multimedia My Workspace

▼ Search History (12) View Saved

<input type="checkbox"/>	# ▲	Searches	Results	Type	Actions	Annotations
<input type="checkbox"/>	1	"patient safety".mp. or exp patient safety/	159310	Advanced	Display Results More ▼	
<input type="checkbox"/>	2	exp medical error/	141456	Advanced	Display Results More ▼	
<input type="checkbox"/>	3	exp risk management/	41029	Advanced	Display Results More ▼	
<input type="checkbox"/>	4	exp health care quality/	3402214	Advanced	Display Results More ▼	
<input type="checkbox"/>	5	"Adverse event*".mp.	356984	Advanced	Display Results More ▼	
<input type="checkbox"/>	6	exp incident report/ or "incident".mp.	114828	Advanced	Display Results More ▼	
<input type="checkbox"/>	7	"maternity ward".mp. or exp maternity ward/	4089	Advanced	Display Results More ▼	
<input type="checkbox"/>	8	"maternity unit".mp.	1625	Advanced	Display Results More ▼	
<input type="checkbox"/>	9	1 or 2 or 3 or 4 or 5	3735523	Advanced	Display Results More ▼	
<input type="checkbox"/>	10	7 or 8	5487	Advanced	Display Results More ▼	
<input type="checkbox"/>	11	9 and 10	1738	Advanced	Display Results More ▼	
<input type="checkbox"/>	12	limit 11 to (english language and yr="2005 - 2019")	1152	Advanced	Display Results More ▼	

Contract

Appendix 2: Quality appraisal of the studies

Case notes review				Quality checklists						Score
S/N	Study	Country	Data collection methods	Study objective clear?	Methods adequately described?	Research methods appropriate to the study question?	How well is data collection conducted? (Was there extraction form and reviewer training?)	How well is data analysis conducted? (Was there a reviewer consensus?)	How well was the data presentation?	
1	Chigbu, Okezie et al. (2005)	Nigeria	CNR	**	*	**	*	*	**	8
2	Ozumba and Nwogu-Ikojo (2008)	Nigeria	CNR	**	*	**	*	*	**	8
3	Sayinzoga, Bijlmakers et al. (2016)	Rwanda	CNR	**	**	**	*	*	*	8
4	Madzimbamuto, Ray et al.(2014)	Botswana	CNR	**	**	**	*	*	**	10
5	Oladapo, Ariba et al. (2007)	Nigeria	CNR	**	*	**	*	*	**	8
6	Pembe, Paulo et al. (2014)	Tanzania	CNR	**	*	**	**	*	**	10
7	Benimana and Small (2018)	Rwanda	CNR	**	**	**	*	*	**	10
8	Nelissen, Mduma et al. (2013)	Tanza	CNR	**	**	**	**	*	**	11
9	Kalisa, Rulisa et al. (2016)	Rwanda	CNR	**	**	**	*	*	**	9
10	Tuncalp, Hindin et al. (2013)	Ghana	CNR	**	**	**	*	*	**	9
11	Sharan, Ahmed et al. (2011)	Eritrea	CNR	**	*	**	*	0	**	7
12	Oladapo, Adetoro et al. (2015)	Nigeria	CNR	**	**	**	**	*	**	11
13	Cham, Vangel et al.(2007)	Gambia	CNR, interviews with community nurses and TBAs	**	*	*	*	*	*	6
14	Hailu, Enquenelassie et al. (2009)	Ethiopia	CNR, interviews with health workers.	**	*	**	*	0	**	7
15	Thorsen Meguid et al. (2011)	Malawi	CNR, Interviews with health workers.	**	**	**	*	**	**	10
16	Adusi-Paku, Antwi et al.(2015)	Ghana	CNR, physical inspections, key informant & staff interviews.	**	**	*	*	**	**	9
17	Okong, Byamugisha et al. (2006)	Uganda	CNR, Interviews with staff, patients & relatives.	**	*	**	**	0	**	8
18	Omo-Aghoja, Aisien et al. (2010)	Nigeria	CNR, observation & staff interviews.	**	*	**	*	*	**	8
19	David, Machungo et al. (2014)	Mozambique	CNR, Interviews with staff, patient and relatives.	**	**	**	*	*	*	9
20	Onah, Okaro et al. (2005)	Nigeria	CNR & staff interviews.	**		**	*	*	**	7
21	Sorensen, Elsass et al. (2010)	Tanzania	CNR, hospital registration books, maternal death audit forms, participant observation & staff interviews.	**	**	**	*	*	**	10
Less than 6- low quality			** Appropriate/clear/reliable/rigorous/rich answer							
6- 8= fair quality			* Inappropriate/unclear/unreliable/not rigorous/poor.							
9- 10=good quality			0 Unsure/unable to judge/not given.							
11- 12= strong quality										

Qualitative studies

S/N	Study	Country	Data collection methods	Study objective clear?	Is qualitative methodology appropriate?	How defensible is the research design?	How well is data collection conducted?	Is the role of the researcher clearly described?	Is the context clearly described?	Were the methods reliable?	Is data analysis sufficiently rigorous?	Is the analysis reliable	Are data rich?	Are findings credible?	Are the findings relevant?	Are the conclusions adequate?	How clear and coherent is the reporting of ethics?	Score
1	Bradley, Kamwendo et al. (2015)	Malawi	critical incident interviews	**	*	**	**	*	*	**	*	*	**	**	**	**	**	26
2	Beltman, van den Akker et al. (2013)	Malawi	FGD's	**	**	0	**	*	**	**	*	*	*	**	**	**	*	21
3	Chodzaza and Bultemeier (2010)	Malawi	In-depth interviews	**	**	0	*	*	**	**	*	*	*	*	**	**	**	20
4	Hutchinson, Lange et al. (2010)	Benin	Semi-structured interviews	**	**	0	*	*	**	**	*	*	*	*	**	*	**	19
5	Jones, Michael et al. (2015)	Tanzania	FGD's	**	**	**	*	**	**	**	*	*	**	**	**	**	**	25
6	Melberg, Diallo et al. (2016)	Burkina Faso	Participant observations and interviews.	**	**	0	*	*	**	**	*	*	*	*	**	**	**	20
7	Miltenburg, Kiritta et al. (2018)	Tanzania	Observations and informal conversations.	**	**	0	**	**	**	**	*	*	**	**	**	**	**	24
8	Mselle, Moland et al. (2013)	Tanzania	Semistructured interviews and FGD's.	**	**	0	*	*	**	**	**	*	*	*	**	**	**	22
9	O'Donnell, Utz et al. (2014)	Malawi	Indepth-interviews and FGD's	**	**	0	*	*	**	**	*	*	*	*	**	**	**	20
10	van Hamersveld, den Bakker et al.(2012)	Tanzania	Participant observation and interviews	**	**	0	*	*	*	**	**	*	*	*	**	**	**	22
	less than 14=low quality		** Appropriate/clear/reliable/rigorous/rich answer															
	14-18= fair quality		* Inappropriate/unclear/unreliable/not rigorous/poor.															
	19- 23=good quality		0 Unsure/unable to judge/not given.															
	24- 28= strong quality																	

Cross-sectiona studies			Quality checklists										
S/N	Study	Country	Study objective clear?	Study design appropriate to questions?	Any selection bias in sampling?	Is the sample representing the population to which it's referred?	Was sample size based on statistical power?	Outcome clearly defined?	Are the measurement valid?	How well did the data collection conducted?	How well did the data analysis conducted?	Is data adequately presented to support findings	Score
1	Leigh, Mwale et al. 2008	Malawi	**	**	**	**	**	**	*	**	**	**	19
2	Ziraba, Mills et al. 2009	Kenya	**	**	**	**	**	**	*	**	**	**	19
3	Tobi-west, Mezie-Okoye et al. 2012	Nigeria	**	**	**	**	0	**	**	**	**	**	18
4	Duysburgh, Zhang et al. 2013	Burkina Faso, Ghana & Tanzania	**	**	**	**	0	*	**	**	**	**	17
5	Echoka, Kombe et al. 2013	Kenya	**	**	**	**	0	**	*	**	**	**	17
6	Huchon, Arsenault et al. 2014	Mali	**	**	**	**	0	**	**	**	**	**	18
7	Ueno, Adegoke et al. 2014	Tanzania	**	**	**	**	0	**	**	**	**	**	18
8	Abegunde, Kabo et al. 2015	Nigeria	**	**	**	**	0	**	**	**	**	**	18
9	Wilunda, Oyerinde et al. 2015	Uganda	**	**	**	**	**	**	**	**	**	**	20
10	Chavane, Dgedge et al. 2017	Mozambique	**	**	**	**	**	**	**	**	**	**	20
11	Ntambue, Malonga et al. 2017	Democratic Republic of Congo	**	**	**	**	**	**	**	**	**	**	20
12	Thwala, Blaauw et al. 2018)	South Africa	**	**	0	**	0	**	**	**	**	**	16
	Less than 10- low quality	** Appropriate/clear/reliable/rigorous/rich answer											
	10-13= fair quality	* Inappropriate/unclear/unreliable/not rigorous/poor.											
	14-17=good quality	0 Unsure/unable to judge/not given.											
	18 and above= strong quality												

Intervention studies				Quality checklist						
S/N	Study	Country	Design	Focus?	Cohort recruitment?	Exposure measurement?	Outcome measurement?	Confounding factors	Outcome?	Score
1	Ansong-Tomui et al. (2007)	Ghana	Before and after	**	*	*	*	*	χ	9
2	Dumont, Fournier et al. (2013)	Senegal and Mali	Pragmatic cluster randomised controlled trial	**	**	**	**	*	✓	9
3	Dumont, Gaye et al. (2006)	Senegal	Before and after	**	*	**	**	*	✓	8
4	Galadanci et al. (2011)	Nigeria	Before and after	**	*	**	**	*	✓	8
5	Kongnyuy, Leigh et al. (2008)	Malawi	Before and after	**	*	*	*	*	✓	6
6	Kongnyuy, Mlava et al. (2009)	Malawi	Before and after	**	*	*	*	*	✓	6
7	Marzolf et al. (2015)	Eritrea	Before and after	**	*	**	**	*	χ	8
8	Nyamtema et al. (2011)	Tanzania	After	**	**	**	*	*	✓	8
9	Rawlins et al. (2013)	Malawi	Post- only quasi-experimental (comparative)	**	**	**	**	*	✓	9
10	Santos et al. (2006)	Mozambiques	Before and after	**	*	**	**	*	✓	8
11	Spitzer et al. (2014)	Kenya	Before and after	**	**	**	**	*	✓	8
12	Van den Akker et al. (2009)	Malawi	Before and after	**	*	*	**	*	✓	8
13	Van den Akker et al. (2011)	Malawi	Before and after	**	*	**	**	*	✓	8
14	Pirkle et al. (2013)	Mali and Senegal	Before and after with control group	**	**	**	**	*	✓	9
15	Duysburgh et al. (2015)	Burkina Faso, Ghana and Tanzania	Before and after with control group	**	**	**	**	*	χ	9
16	Crofts et al. (2015)	Zimbabwe	Before and after	**	*	**	**	*	✓	8
17	Lindjom et al. (2017)	Ethiopia	After	**	*	**	**	*	✓	8
18	Kabo et al. (2016)	Nigeria	Before and after	**	*	**	**	*	✓	8
19	Kabo et al. (2019)	Nigeria	Before and after	**	*	**	**	*	✓	8
20	Srofenyoh et al. (2016)	Ghana	Before and after (quasi-experimental)	**	**	**	**	*	✓	9
21	Borchart et al. (2012)	Benin	After	**	**	**	**	*	✓	8
22	Bishanga et al. (2018)	Tanzania	Before and after	**	**	**	**	*	✓	8
23	Forshaw, Raybould et al. 2016	Uganda	After	**	0	**	*	*	χ	7
24	Dumont, Tourigny et al. (2009)	Senegal	After	**	0	*	*	**	n	6
25	Nyamtema, Urassa et al. (2010)	Tanzania	After	**	0	*	**	**	χ	7
26	Richard et al. (2009)	Burkina Faso	After	**	0	*	*	**	n	7
<p>Less than 6- low quality</p> <p>6- 8= fair quality</p> <p>9- 10=good quality</p> <p>11- 12= strong quality</p> <p>** Appropriate/clear/reliable/rigorous/rich answer</p> <p>* Inappropriate/unclear/unreliable/not rigorous/poor.</p> <p>0 Unsure/unable to judge/not given.</p> <p>✓ Improved</p> <p>χ The same.</p> <p>n Outcome not reported</p>										

Tool to measure the quality of labour and delivery care processes		Quality checklists					
Study	Country	Production based on evidence?	Piloting	Validity and reliability issue?	Acceptability issue?	Any interrater reliability?	Score
Tripathi, Stanton et al. 2015)	Multicountry (Kenya, Madagascar & Tanzania	**	**	**	**	**	10
Less than 5 = low quality		** Appropriate/clear/reliable/rigorous/rich answer					
5- 6 = fair quality		* Inappropriate/unclear/unreliable/not rigorous/poor.					
7-8 =good quality		0 Unsure/unable to judge/not given.					
9 and above = strong quality							

Appendix 3: Studies per research design

S/N	Studies per research design					
	Interventions	Case notes reviews	Cross-sectional	Qualitative	Mixed	Others
1	Ansong-Tomui et al. (2007)	Chigbu et al. (2005)	Leigh et al. 2008	Bradley et al. (2015)	Austin et al. 2015	Tripathi et al. 2015
2	Dumont et al. (2013)	Ozumba and Nwogu-Ikojo (2008)	Ziraba et al. 2009	Beltman et al. (2013)	Ng'ang'a et al. 2016	
3	Dumont et al. (2006)	Sayinzoga et al. (2016)	Tobi-west et al. 2012	Chodzaza and Bultemeier (2010)	Spangler 2012	
4	Galadanci et al. (2011)	Madzimbamuto et al.(2014)	Duysburgh et al. 2013	Hutchinson et al. (2010)	Lobis et al. 2011	
5	Kongnyuy et al. (2008)	Oladapo et al. (2007)	Echoka et al. 2013	Jones et al. (2015)		
6	Kongnyuy et al. (2009)	Pembe et al. (2014)	Huchon et al. 2014	Melberg et al. (2016)		
7	Marzolf et al. (2015)	Benimana and Small (2018)	Ueno et al. 2014	Miltenburg et al. (2018)		
8	Nyamtema et al. (2011)	Nelissen et al. (2013)	Abegunde et al. 2015	Mselle et al. (2013)		
9	Rawlins et al. (2013)	Kalisa et al. (2016)	Wilunda et al. 2015	O'Donnell et al. (2014)		
10	Santos et al. (2006)	Tuncalp et al. (2013)	Chavane et al. 2017	van Hamersveld et al. (2012)		
11	Spitzer et al. (2014)	Sharan et al. (2011)	Ntambue et al. 2017			
12	Van den Akker et al. (2009)	Oladapo et al. (2015)	Thwala et al. 2018)			
13	Van den Akker et al. (2011)	Cham et al.(2007)				
14	Pirkle et al. (2013)	Hailu et al. (2009)				
15	Duysburgh et al. (2015)	Thorsen et al. (2011)				
16	Crofts et al. (2015)	Adusi-Paku et al.(2015)				
17	Lindjom et al. (2017)	Okong et al. (2006)				
18	Kabo et al. (2016)	Omo-Aghoja et al. (2010)				
19	Kabo et al. (2019)	David et al. (2014)				
20	Srofenyoh et al. (2016)	Onah et al. (2005)				
21	Borchart et al. (2012)	Sorensen et al. (2010)				
22	Bishanga et al. (2018)					
23	Forshaw et al. 2016					
24	Dumont et al. (2009)					
25	Nyamtema et al. (2010)					
26	Richard et al. (2009)					

Appendix 4: Types of AEs

S/N	Study	Country	Setting	Data collection duration	Data source	Type of adverse event	Number of AEs	Maternal mortality ratio
1	Adusi-Paku, Antwi et al.(2015)	Ghana	1 regional hospital	January-December 2012	CNR, physical inspections, key informant and staff interviews	Maternal mortality	33 MM	Not given
2	Cham, Vangel et al.(2007)	Gambia	1 tertiary	January-September, 2002	CNR, interviews with community nurses and TBAs	Maternal mortality	42 MM	MMR 279/100,000 live births
3	Chigbu, Okezie et al. (2005)	Nigeria	1 teaching hospital	January 1999-December 2007	CNR	Intrapartum stillbirths	316 NM	Intrapartum stillbirths: 52.1/1000 births. Overall stillbirths 89/1000 births.
4	Hailu, Enquenelassie et al. (2009)	Ethiopia	5 Public	December 2005-May 2006	CNR, interviews with health workers	Maternal mortality	34 MM	Not given
5	Madzimbamuto, Ray et al.(2014)	Botswana	Nationwide (all levels of care)	2010	CNR	Maternal mortality	82 MM with 52 records available for review.	Not given
6	Nelissen, Mduma et al. (2013)	Tanzania	1 rural referral hospital	November 2009-November 2011	CNR	Maternal near miss and mortality	316 MNM 32 MM	Not given
7	Ozumba and Nwogu-Ikojo (2008)	Nigeria	1 teaching hospital	January 2003-December 2005	CNR	Maternal mortality	49 MM with 47 records available	MMR 2397.3/100,000 live births
8	Sayinzoga, Bijlmakers et al. (2016)	Rwanda	Nationwide facility based	January 2009-December 2013	CNR	Maternal mortality	978 MM	MMR 69.1/100,000 live births
9	Thorsen Meguid et al. (2011)	Malawi	1 district referral hospital	1st January 2011- 30th June 2011	CNR, Interviews with health workers	Maternal mortality	14 MM	Not given
10	Oladapo, Adetoro et al. (2015)	Nigeria	42 tertiary	1st June 2012-14August 2013	CNR	Maternal near misses and mortality	1451 MNM 998 MM.	MNMR 158/100 live births. MMR 1088/100,000 live births.
11	Dumont, Tourigny et al. (2009)	Senegal	5 reference hospitals	May 2004- July 2005	CNR, focus group discussion, interviews with staff, questionnaires and participant observations	Maternal mortality	105 MM (69 audited)	Not given
12	Sorensen, Elsass et al. (2010)	Tanzania	1 regional hospital	July-November 2007 and July - November 2008	CNR, hospital registration books, maternal death audit forms, participant observation and interviews with staff.	Maternal mortality	37 of the 68 MM reviewed	Not given
13	Onah, Okaro et al. (2005)	Nigeria	1 teaching, 1 specialist and 4 other hospitals	1st December 2003-30th April 2004	CNR and interviews with staff	Maternal mortality	141 MM	MMR 772/100,000 live births
14	Kongnyuy, Mlava et al (2009)	Malawi	9 hospitals	January-December 2007	CNR	Maternal mortality	43 MM	

15	Nyamtema, De Jong et al.(2011)	Tanzania	1 tertiary	6th October 2008-8th July 2010	CNR	Maternal NM and mortality	363 MNM 36 MM	Not clear
16	van den Akker Rhenen et al.(2011)	Malawi	1 district hospital	September 2007- September 2009	CNR	Maternal near miss and mortality	340 NM 46 MM	MMR 11.9%
17	Dumont, Gaye et al.(2006)	Senegal	1 district hospital	1st January-31st December 1997- December-2000	CNR	Maternal mortality	153 MM	Not given
18	Ansong-Tornui, Armar-Klemesu et al. (2007)	Ghana	8 hospitals	January- July 2006	CNR	Maternal mortality	20 MM	Not given
19	van den Akker, Mwangomba et al. (2009)	Malawi	1 district hospital	20th August 2007- 20th August 2008	CNR	Uterine rupture	35 uterine rupture	Not clear
20	Okong, Byamugisha et al. (2006)	Uganda	4 referral hospitals	January, 1999- September, 2000	CNR, Interviews with staff, patients and relatives	Maternal near miss and mortality	229 MNM 269 MM	MMR 482/100,000 live births.
21	Oladapo, Ariba et al. (2007)	Nigeria	1 teaching hospital	1st January 1999-31st December 2001 and 1st January 2002-31st December 2004	CNR	Maternal near miss and mortality.	175-211 MNM 27-44 MM	MMR 2509-2931/100,000 live births
22	Omo-Aghoja, Aisien et al. (2010)	Nigeria	1 teaching hospital	1st January 2005- 31st December 2007	CNR, observation and interviews with staff	Maternal mortality	84 MM	MMR 2282/100,000 deliveries
23	Tuncalp, Hindin et al. (2013)	Ghana	1 teaching hospital	18th October,2010-14th March, 2011	CNR	Neonatal mortality. Maternal near miss and mortality.	94 MNM and 37 MM	NMR 40.8%/1000 births and MMR 1154/100,00 live births
24	David, Machungo et al. (2014)	Mozambique	1 central, 2 general, 1 district and 1 rural hospitals	August to December, 2008	CNR, Interviews with staff, patient and relatives	Maternal near miss and mortality.	564 MNM 71 MM	NMR 20.2/1000 live births and MMR 254/100,000 live births
25	Sharan, Ahmed et al. (2011)	Eritrea	118 facilities (18 hospitals, 47 health centres and 53 health stations)	1st January - 31st December 2008	CNR	Maternal near miss and mortality, and neonatal death.	6315 MNM 41 MM 91 NM	Not given
26	Kalisa, Rulisa et al. (2016)	Rwanda	1 District rural hospital	June 2013- December 2014	CNR	Maternal near miss mortality and stillbirth/neonatal death	86 MNM 13 MM 137 NM	NMR 24.8/1000 live births, MMR 325/100,000 live births.
27	Benimana and Small (2018)	Rwanda	1 teaching hospital	1st January 2015- 31st December 2015	CNR	Maternal near miss and mortality	121 MNM and MM (combined)	Not given
28	Chavane, Dgedge et al. (2017)	Mozambique	427 out of 1277 health facilities	November 2007- December 2008	Questionnaire	Maternal mortality	2198 MM	703/100,000 live births
29	Pembe, Paulo et al. (2014)	Tanzania	1 national hospital	1st January- 31st December 2011	CNR	Maternal mortality	155 MM	MMR 1541/100,000 live births

Abbreviations: Maternal mortality = MM, Maternal mortality ratio=MMR, Maternal near-miss = MNM, Maternal near-miss ratio = MNMR, Neonatal Mortality = NM, Neonatal mortality ratio = NMR

Appendix 5: Observation activities

OBSERVATION ACTIVITIES AND TIME								
WEEK	DATE	DAY	TIME	Hours	PLACE	WHAT OBSERVED	WHO OBSERVED	
1	04/04/2017	Tues	8:30-12pm	4.5	Labour, Obstetrics & Gynaecology wards	Location of the wards & met with key people.	O&G ward managers and unit heads	
			2-4pm	2	Gynaecology Seminar room	Doctors' meeting	Doctors	
	05/04/2017	Wed	2-4pm	2	Paediatric ward seminar room	Nurses' meeting	Nurses/midwives	
	06/04/2017	Thurs	9am-2pm	5	Labour ward	Orientation to ward, patient care, nurse/midwives's handing over.	Doctors & nurses/midwives	
	07/04/2017	Fri	8am-10am	2	Gynaecology seminar room	Doctors meeting	Doctors	
			1-3pm	2	Obstetrics ward	Orientation to ward, patient care and nurse/midwives handing over	Doctors & nurses/midwives	
2	17/04/2017	Mon(Easter)	Public holiday	9:30am-1pm	3.5	Gynaecology emergency	Orientation and patient care	Doctors
	20/04/2017	Thurs		2pm-2:30pm	0.5	O&G departmental office	Discuss how patient safety issues are handled	Senior departmental staff
	21/04/2017	Fri		2-4pm	2	Personal office	Analysis of patient safety incident	Incident report forms
3	25/04/2017	Tue		8:30am-11:30am	3	Gynaecology emergency	Patient care	Doctors
	26/04/2017	Wed		2pm-3:15pm	1.25	Hospital conference Hall	Presentation	Multidisciplinary patient safety team
	28/04/2017	Fri		4pm-7pm	3	Gynaecology emergency	Patient care	Doctors
4	03/05/2017	Wed		11am-12:40pm	1.67	Gynaecology emergency and Labour ward	Patient care	Doctors & nurses/midwives
	06/05/2017	Sat		12:00-3pm	3	Gynaecology emergency	Patient care	Doctors
	07/05/2017	Sun		9pm-6am	9	Gynaecology emergency	Patient care	Doctors and nurses.
5	12/05/2017	Fri		10:25-3:30pm	5.08	Labour ward	Patient care	Doctors & nurses/midwives
6	17/05/2017	Wed		7:20am-12:30	5.17	Labour ward	Patient care	Doctors and nurses
	18/05/2017	Thur		8:00pm-5:30am	9.5	Labour ward	Patient care	Doctors and nurses/midwives
7	26/05/2017	Fri		2-4pm	2	Hospital conference Hall	Clinical governance	Hospital staff
	27/05/2017	Sat		1pm-5pm	4	Labour ward	Patient care	Doctors & nurses/midwives
	28/05/2017	Sun		7:25am-1:30pm	6.08	Labour ward	Patient care	Doctors & nurses/midwives
8	30/05/2017	Tue		1pm-4:30pm	3.5	Labour ward	Patient care	Doctors & nurses/midwives
	31/05/2017	Wed		2-3pm	1	Gynaecology seminar room	Nurses' presentation	Nurses/midwives
	01/06/2017	Thur		7:25am-1:30pm	6.08	Labour ward	Patient care	Doctors & nurses/midwives
9	06/06/2017	Tue		2pm-4pm	2	Gynaecology seminar room	Departmental mortality meeting	Doctors
				7:30am-12:30pm	5	Obstetrics ward	Patient care	Doctors and nurses/midwives
	09/06/2017	Fri		1:30pm-5pm	3.5	Obstetric ward	Nurse's handing over and patient care	Nurses & doctors
	10/06/2017	Sat		1pm-5pm	4	Obstetric ward	Patient care	Doctors & nurses/midwives
	11/06/2017	Sun		7:30am-11am	3.5	Obstetric ward	Patient care	Doctors & nurses/midwives
10	12/06/2017	Mon		11:10am-11:20am	0.17	CSSD	Enquire about Labour ward's packs bringing and collection	CSSD staff
				10am-11am	1	Haematology department	Discuss why result of clotting factors takes longer time.	Senior staff member
	15/06/2017	Thurs		2pm-4pm	2	Hospital board room	Meeting of multidisciplinary patient safety team.	Members of MPTST
11	21/06/2017	Wed		12-3pm	2	Labour ward and Gynaecology emergency	Staff activities	Doctors & nurses/midwives
	23/06/2017	Fri		1pm-3pm	2	Obstetrics ward	Patient care	Nurses' handing over and activities
	25/06/2017	Sun (Eid)	Public holiday	10am-2pm	4	Gynaecology emergency, Labour ward & Obstetrics wa	Patient care	Doctors & nurses/midwives
12	27/06/2017	Tue	Public holiday	9am- 11am	2	Gynaecology emergency, Labour ward.	Patient care	Doctors & nurses/midwives
	28/06/2017	Wed		10am-11am	1	Chemical pathology department	Discuss about why urea and creatinine results take long time.	Senior staff member
	29/06/2017	Thu		1pm-2pm & 3:30 4pm	1.5	Obstetrics ward	Patient care	Nurses/midwives
	30/06/2017	Fri		2pm-3:30pm	1.5	Gynaecology seminar room	Doctors' meeting	Doctors
				8am-10am	2	Gynaecology seminar room	Doctors' meeting	Doctors
				2pm-4pm	2	Hospital conference Hall	Clinical governance	Hospital staff
Total hour observation				126				

SUMMARY OF OBSERVATION							
WEEK	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
1		✓	✓	✓	✓		
2	✓			✓	✓		
3		✓	✓		✓		
4			✓			✓	✓
5					✓		
6			✓	✓			
7					✓	✓	✓
8		✓	✓	✓			
9		✓			✓	✓	✓
10	✓			✓			
11			✓		✓		✓
12		✓	✓	✓	✓		
✓ Indicates occurrence of observation activity							

Appendix 6: Interview Topic Guide

Before each interview, the following will be done:

- Thank the participant for their willingness to participate.
- Mention the research purpose.
- Revise all the points on the consent form
- Inform the need to switch off all mobile phones.
- Ask them if they understand the information given.
- Ask if whether they have any question.
- Ask if they are happy to be interviewed.

Background information:

- Date and time.
- Professional category of the interviewee
- Rank

Work environment (organisational factors contributing to adverse events).

- Nature of the job.
- Care policies, protocols and guidelines.
- Staffing adequacy.
- Workload.
- Equipment and supplies.
- Support provision.
- Training.

Example of questions asked:

- I understand that this hospital has been upgraded to a teaching hospital a few years ago. In what way does this upgrade improves the care and services provided to women coming here for delivery?

Probe:

- Can you list the things you have in the O&G that help in the provision of safe care?
- What are the challenges you are facing in providing safe care here?
- More probe as the discussion evolved.

Potentiality of adverse events

- Opinion on the safety of the care provided.
- Things in place to ensure safe care.

Example of question asked:

- Could you think of a situation when you felt that the care given to a patient has been really well and safe?

Probe:

- What do you think helped?

How about when you think things have gone wrong?

Probe

- What are the things that worsened the situation?
- What would have helped?
- What was done to prevent this situation from happening again?
- More probe as the discussion evolved.

Reporting of AEs

- Procedure for identification, documentation, reporting and managing AEs.

Example of question asked:

If you notice, a situation that you think could compromise patient safety, what are you expected to do in this setting.

Probe:

- Facilitators of incident reporting: Could you give me an example of how well this is helping to safeguard patient safety and managing reoccurrence of the event?
- Barriers of incident reporting: What are the things that enable the reoccurrence of patient safety incidents?
- Systems in place for managing occurrence of unsafe care.
- Whether the systems are working to their satisfaction or not?

Other questions

Other questions from observations and previous interviews.

Example of question asked to a hospital manager:

- Are you aware that there is no CTG in the Labour room?
- What are you doing to get new one?
- What were the challenges you faced regarding the CTG because this would have been provided as indicated in one of the doctors' meetings in early April?
- How about the handheld doppler?

Closing

- Thank the participant.
- Ask if they have any question or comment they want to add.

02/04/2017

Appendix 7: Interview activities

INTERVIEW PARTICIPANTS				
S/N	WEEK	DATE	PARTICIPANT	ROLE
1	4	01/05/2017	Doctor	House officer
2		03/05/2017	Doctor	Senior registrar
3		03/05/2017	Nurse/midwife	Assistant Chief Nursing Officer
4	5	13/05/2017	Doctor	Registrar
5	6	15/05/2017	Nurse/midwife	Assistant Chief Nursing Officer
6		18/05/2017	Nurse/midwife	Nursing officer I
7	7	23/05/2017	Doctor	Senior registrar
8		25/05/2017	Doctor	Consultant
9		25/05/2017	Doctor	Consultant
10		26/05/2017	Doctor	Consultant
11		27/05/2017	Doctor	House officer
12		28/05/2017	Other	Multidisciplinary patient safety team member
13	8	29/05/2017	Doctor	House officer
14		31/5/207	Doctor	Senior registrar
15		31/05/2017	Nurse/midwife	Chief Nursing Officer
16		02/06/2017	Nurse/midwife	Chief Nursing Officer
17		02/06/2017	Doctor	Registrar
18	9	11/06/2017	Doctor	Registrar
19		12/06/2017	Doctor	Senior registrar Female
20	10	18/06/2017	Nurse/midwife	Nursing Officer I
21		18/06/2017	Nurse/midwife	Nursing Officer II
22	11	20/06/2017	Nurse/midwife	Principal Nursing Officer I
23		20/06/2017	Doctor	Senior Hospital manager
24		21/06/2017	Other	Sevicom
25		22/06/2017	Nurse/midwife	Chief Nursing Officer
26		22/06/2017	Nurse/midwife	Nursing Officer II
27	12	27/06/2017	Nurse/midwife	Senior Nursing Officer
28		27/06/2017	Nurse/midwife	Assistant Chief Nursing Officer
29		27/06/2017	Doctor	Consultant
30		28/06/2017	Doctor	Senior Registrar
31		30/06/2017	Nurse/midwife	Senior Hospital manager - nursing
32		30/06/2017	Doctor	Senior Hospital Manager

SUMMARY OF STAFF INTERVIEWED		
S/N	Participant category	Total
1	Doctors	15
2	Nurses	12
3	Senior Hospital Managers	3
4	Others	2
	Total	32

Appendix 8: Participant Information Sheet

Understanding the role of organisational factors in maternity care: A case study of a Nigerian tertiary hospital.



You are being invited to take part in a research study. Before you decide it is important for you to understand, why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask the researcher if anything is not clear or if you would like more information. Take time to decide whether or not, you wish to take part.

What is the purpose of the study?

Habiba Aminu Saddiq, a PhD student at the University of Sheffield, is conducting the research. She is a registered nurse/ midwife with a considerable work experience in patients' care and teaching of nursing and midwifery students in Nigeria.

The purpose of this research is to explore the nature of your working environment with a view of understanding how the current systems, processes, actions and decisions work or not in providing safe care to women coming to the hospital for childbirth. The presence of the researcher in your hospital is not to judge your activities or that of other staff.

Why have I been chosen?

You have been chosen to participate in an interview study because, you are considered to have the knowledge and experiences that could be beneficial to the study.

Do I have to take part?

It is up to you to decide whether or not to take part in the interview study. If you decide to take part, you will be also asked to sign a consent form before participating. The consent form can be returned into a box that will be kept at the nurses' station in both obstetric and labour wards. You will be then contacted by the researcher to arrange for interview date and time. Alternatively, you can contact the researcher directly to discuss how you can collect or return a consent form as well as fix interview date and time.

You are free to withdraw from the interview study after you have consented to participate without giving a reason by notifying the researcher. If you have been interviewed, information collected from you can still be removed within two weeks of collection but not after. As this must have been anonymised, analysed and included in the study (your name will not be identifiable).

What would be taking part involve?

If you agree to take part in the study, you will be interviewed on your experience of providing care to women in the obstetric and or labour ward of this hospital. The interview will further explore issues identified by the researcher during the study period.

The interview will take place in a private room within the hospital lasting about 40- 60 minutes. This will be during working hours and at a time most convenient to you. The interviews will be in English but, you are free speaking in Hausa if that makes you feel more comfortable.

The researcher may likely ask you to be interviewed again for the second time if more information is needed from you. In this case, you will be asked to sign a second consent form

the same as the first one if you agree to participate again. Note that all interviews will be audio-recorded with your permission.

What will happen to the information collected?

The audio recording will be transferred to an encrypted laptop (to ensure that no one can have access to it). This will then be transcribed (converted to notes), analysed and included in a final PhD student report book by the researcher. The findings may include quotations but information, which could identify individuals, will be removed. Your name and that of your hospital will not be linked with the information you provide, and you will not be identifiable in the research report or other publications.

Interview transcripts in which all information linking you to the materials has been removed, will be kept with your permission for appropriate future use in research and training purposes by the researcher. However, these will be destroyed appropriately using the University of Sheffield's data protection guideline as soon as possible if deemed no longer useful for the above stated purposes by the researcher.

What about confidentiality?

All information collected from you during the course of the research will be kept strictly confidential by the researcher and will NOT be shared with anyone within and outside the hospital apart from the PhD supervisors. However, in the event that the information obtained from you signifies potential safety concern, this will be reported through appropriate channel identified by the unit head. Possible measures to protect your identity will be employed.

Who has ethically reviewed the project?

Before any research starts, it is checked by a Research Ethics Committee to ensure its appropriateness. This study has been approved by the Research Ethics Committee of the University of Sheffield and that of your Hospital.

Who is organising and funding the research?

This research is being carried out as part of a PhD study undertaken at the University of Sheffield.

Contact for further information

If you would like more information about this research project or want to take part, please contact the Researcher:

Habiba Aminu
The University of Sheffield (SchARR),
30 Regent Street Sheffield, S1 4DA.
Mobile...
Email to hasaddiq1@sheffield.ac.uk

If you have any concerns about the study or any aspect of the way you have been approached or treated during the course of this study, please contact one of the following:

School Dean
Professor Jon Nicholl
SchARR, The University of Sheffield
30 Regent Street
Sheffield S1 4DA

Research supervisor:
Dr Rachel O'Hara
SchARR, The University of Sheffield
30 Regent Street
Sheffield S1 4DA

Tel : +44 (0)114 222 5453
Email : j.nichol@sheffield.ac.uk

Tel : +44 114 222 4293
Email: ohara@sheffield.ac.uk

Appendix 9: Consent form

Understanding the role of organisational factors in maternity care: a case study of a Nigerian tertiary hospital.

Participant Identification Number..... (To be completed by the researcher)

Please tick

1. I confirmed that I have read and understood the information sheet for the above study.
2. I confirm that I have had the opportunity to ask questions about the study.
3. I confirm that I have been given enough time to consider my participation.
4. I understand that my participation is voluntary and that I am free to withdraw from the study without giving any reason and without any negative consequences (by contacting).
5. I understand that should I not wish to answer any particular question(s), I am free to decline.
6. I am aware that information collected from me can only be withdrawn within two weeks after the interviews but not after.
7. I understand that the information collected about me will be kept confidential and that my name will not be identifiable in the report or other publications that may follow this research.
8. I give permission to other members of the research team to have access to my responses.
9. I agree to the interview being audio recorded.
10. I agree for anonymised transcripts of data collected from me to be used in future research and training.
11. I agree to take part in the above research study as described in the information sheet.

Name of participant

Date

Signature

Name of researcher

Date

Signature

Appendix 10: A snap shot of how codes were generated.

	Name	Sources	Referen...	Created On
SOURCES				
Internals	Referral practice	6	6	6 Nov 2017 at 21:55
Externals	▼ Infrastructure	68	229	15 Mar 2018 at 13:46
Memos	Consumables	24	42	6 Nov 2017 at 20:19
NODES	Electricity	4	11	23 Nov 2017 at 21:...
Nodes	Emergency drugs	24	34	6 Nov 2017 at 22:49
Cases	▼ Equipments	30	63	23 Nov 2017 at 19:...
Node Matrices	Ultrasound scanning	10	11	6 Nov 2017 at 21:47
CLASSIFICATIONS	Instruments	36	64	6 Nov 2017 at 21:35
Source Classificati...	Oxygen supply	7	9	23 Nov 2017 at 21:...
Case Classifications	Water supply	6	6	3 Dec 2017 at 21:57
COLLECTIONS	▼ Personnel	87	303	19 Mar 2018 at 16:31
QUERIES	Skill	6	7	23 Nov 2017 at 13:...
MAPS	Staff training	16	21	23 Nov 2017 at 19:...
	Staffing	65	182	6 Nov 2017 at 21:56
	Supervision	35	81	6 Nov 2017 at 17:27
	Support	12	12	6 Nov 2017 at 21:32
	Priority areas	21	25	14 Dec 2017 at 09:...
	▼ Relationships	64	153	19 Mar 2018 at 16:28
	Patient-carer relations...	29	55	6 Nov 2017 at 18:04
	Staff working relations...	40	66	6 Nov 2017 at 19:09
	Staff- management rel...	18	32	28 Dec 2017 at 20:...
	▼ Services	24	40	15 Mar 2018 at 13:31
	ANC care	5	5	7 Nov 2017 at 10:07
	▼ Lab tests	17	30	6 Nov 2017 at 17:22
	Sample collection pr...	9	11	6 Nov 2017 at 22:24
	Theatre	3	4	16 Feb 2018 at 18:09
	Welfare	1	1	20 Mar 2018 at 13:...
	Unsure	9	10	6 Nov 2017 at 17:56
	▼ Work environment	40	75	20 Mar 2018 at 14:13
	Gynae emergency	12	17	23 Nov 2017 at 19:...
	Labour ward	13	29	23 Nov 2017 at 19:...
	Obstetric ward	5	8	24 Nov 2017 at 11:36
	Whole environment	19	21	20 Mar 2018 at 13:...

Appendix 11: Fieldwork approval



Downloaded: 05/01/2017

Approved: 04/01/2017

Habiba Saddiq

Registration number: 150211840

School of Health and Related Research

Programme: School of health and related research

Dear Habiba

PROJECT TITLE: The role of organisational factors in maternity care adverse events: a case study of a Nigerian tertiary hospital.

APPLICATION: Reference Number 011694

On behalf of the University ethics reviewers who reviewed your project, I am pleased to inform you that on 04/01/2017 the above-named project was **approved** on ethics grounds, on the basis that you will adhere to the following documentation that you submitted for ethics review:

- University research ethics application form 011694 (dated 13/12/2016).
- Participant information sheet 1024605 version 7 (13/12/2016).
- Participant information sheet 1024604 version 2 (06/11/2016).
- Participant information sheet 1024476 version 2 (02/11/2016).
- Participant consent form 1024477 version 5 (12/12/2016).

If during the course of the project you need to [deviate significantly from the above-approved documentation](#) please inform me since written approval will be required.

Yours sincerely

Jennifer Burr

Ethics Administrator

School of Health and Related Research

Tel: [REDACTED]

Fax: [REDACTED]

NHREC/25/10/2013

13th December, 2016.

Our Ref: _____

Date: _____

Habiba Aminu Saddiq

Department of School of Health and Related Research,

University of Sheffield.

United Kingdom.

Ethical Clearance

I am directed to inform you that your application and proposal Titled: 'THE ROLE OF ORGANISATIONAL FACTORS IN MATERNITY CARE: a CASESTUDY OF A NIGERIAN TERTIARY HOSPITAL. Submitted to the Hospital Research and Ethics Committee, have been duely reviewed and approved.

The Committee will like to know the progress of your research work periodically please.

On behalf of the committee, I wish you a successful execution.

Thank you,

[REDACTED]

Secretary R&EC.

A RESEARCH STUDY TO UNDERSTAND THE CARE PROVIDED TO WOMEN IN CHILDBIRTH IS BEING CARRIED OUT

WHERE

**LABOUR AND
OBSTETRICT WARDS**

WHEN

**3rd April – 30th June,
2017**

For 2-3 days per week

BY

Mrs. Habiba Saddiq - PhD student - University of Sheffield



The
University
Of
Sheffield.

DETAIL INFORMATION

PATIENTS / RELATIVES

You may be asked if it is okay for me to observe your care while in these wards as part of the research study.

The focus is to observe the activities surrounding the care provided to you but none of your information such as name or clinical notes will be taken.

STAFF

You may see me on the ward shadowing staff as they provide patient care.

You may be approached to ask if you would like to take part in an interview.

NOTE

If you do not wish me to observe your care or activity, please inform me, your attending staff, or ward manager.

For patients, your decision will **NOT** affect your treatment at all.

Appendix 13: Flyer

Who am I?

My name is Habiba Sadiq.

I am a PhD research student at the University of Sheffield.

As a registered nurse/ midwife, I had previously worked in hospitals providing patient care and taught nursing and midwifery students in Nigeria.

What will I be doing?

You will be seeing me in the Gynecology emergency, Obstetrics and Labour wards observing/shadowing some of the staff as they go about their normal daily patient care activities from 3rd April 2017 to 30th June 2017.

I may be asking you a few questions in order to understand the way things are done in your hospital.

I may also ask you to participate in an interview study, which is also part of this research.

Who will be involved?

Any healthcare professional involved in providing care to women during childbirth.

What do I want from you?

Your voluntary participation by allowing me to observe your activities and interview you.

None of your personal information will be taken without your consent.

What will I do with the results?

The results will be included in my final student project and other publications after removing all information related to you or your hospital.



If you are interested, contact me

Mobile : +2349021015833

Email: hasaddiq1@sheffield.ac.uk

Appendix 14: Risk assessment for fieldwork.



Fieldwork Risk Assessment Form

Examples of Potential Hazards

1.	Physical and personal safety (e.g. personal attack, abuse, assault, getting lost)	2.	Wildlife attacks (e.g. bears, monkeys, boars, etc.)	3.	Exposure (e.g. weather leading to injury or illness)	4.	Methods-related (e.g. lone working, interviews in private spaces)	5.	Security (e.g. theft)
6.	Accommodation (e.g. security, emergency procedures/fire risk)	7.	Local customs (e.g. religious practices, dress codes)	8.	Security of data and prevention of harm to participants	9.	Economic (e.g. loss of bank card, theft of cash)	10.	Legal (e.g. specific local laws and customs, alcohol prohibition)
11.	Political stability & Terrorism (protests, civil unrest, terrorist activities)	12.	Transport and vehicular (e.g. local driving conditions, excessive driving hours, road-worthiness of vehicles, remote or hazardous terrain, check validity of licence & insurance)	13.	Food and drink (e.g. safety of local water, allergic reactions from air or food, food poisoning)	14.	Illness, Disease (e.g. malaria, rabies, other infectious diseases)	15.	Climate, natural disaster (e.g. earthquakes, tsunami)
16.	Naturally occurring poisons (e.g. snakes, spiders, plants etc.)	17.	Working in an isolated area (problem in summoning help when in difficulty)	18.	Terrain (slips, trips and falls)	19.	Allergies (allergic reactions causing discomfort and in severe cases anaphylactic shock)		
Date of planned fieldwork:		Start: 03/04/2017			Finish: 30/06/2017				
Name of supervisor:		Dr Rachel O'Hara and Dr Susan Baxter							
Short summary of fieldwork:		The study is looking at the role of organisational factors in maternity care adverse events. It includes shadowing the activities of staff who provide care to women in childbirth, examining working documents and interviews with the staff and other key managers.							

Instructions for assessing the risks

- 1) Complete column 1 by listing specific hazards foreseen for your activity. The above examples should be considered, but please note, this is not an exhaustive list and there could be other risks that are more relevant to your planned work or location which need to be considered.
- 2) List the potential outcomes of the hazards you have identified in column 1.
- 3) Using the risk matrix below, give each identified hazard a score between 0 – 3.
- 4) Add up your initial risk level and discuss this with your Supervisor
- 5) If the risk has been identified as 'high', complete column 4 detailing the control measures you will put in place to reduce the risk to an acceptable level
- 6) Complete column 5 giving each activity a score of 0 – 3 taking into consideration the control measures you have put in place
- 7) Again discuss this with your Supervisor

Column 1: Hazard (Detail specific hazards foreseen for this activity)	Column 2: Potential consequences (Detail potential outcomes of hazards)	Column 3: Initial Risk Level (insert numerical value 0-3)	Column 4: Minimise risk by: (What control measures will you take to reduce the level of risk?)	Column 5 Residual risk (Severity/Harm)
1. Physical and personal safety between home and hospital.	Personal attack from thieves, kidnappers or insurgents: The research environment (hospital) is generally safe but outside the hospital may be of potential safety risk. This is because, Nigeria is generally not a completely safe country as there had been reports in the media of people been attacked in the process of robbing them of their valuables. The recent insurgency that affects the country's North Eastern part including the hospital community has also seen a few cases of peoples' kidnappings for ransom and bombings particularly in public places like transport stations and markets.	2	<ul style="list-style-type: none"> ➤ The researcher will avoid meeting with people met in the hospital at places outside the hospital environment. Thus the interview part of the data collection that requires the researcher to be in an isolated place with one person will be strictly conducted in an office within the hospital environment at least during working hours (8am-5pm). ➤ Being a native of the country, the researcher is aware of the areas and hours that could pose potential risk to her personal safety. Therefore, the following measures will be adopted: <ul style="list-style-type: none"> • The researcher is going to live in a flat within a family friend's compound. The family is known to be of a good reputation and the house is regarded by the researcher as generally safe. 	1(2) Risk score=2

			<ul style="list-style-type: none"> • An arrangement will be made with a cab driver known to the host family. This person will be dropping and picking the researcher from the field or any other place within the town. • As much as possible, movement will be restricted between home and hospital with avoidance of known places of potential danger such as markets. • The researcher will keep movement to and from the hospital to safer hours (7am -7pm). • In line with a lone working policies the researcher has identified a member of the host family (Name hidden), with whom she will be in communication and will be informed when she leaves and arrive home or hospital safely. Since the journey to the hospital from home is about 10 minutes, the cab driver will be contacted by "Name hidden" if she did not hear from the researcher after one hour of leaving home or hospital. Additionally, she will call the ward (if phone is available) in case she could not reach the driver. The researcher's husband who lives in Sheffield will be in communication daily with her, thus will also be aware of her movements. ➤ Note – The researcher will be consulting with the supervisor(s) regarding any other safety issue that may arise 	
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<p>2. Economic loss.</p>	<p>Theft of bank card, cash or laptop: Stealing and robbery are common in all parts of Nigeria. The most targeted items are cash, bank cards and other valuables like laptops, that could be easily sold.</p>	<p>1</p>	<ul style="list-style-type: none"> ➤ Sufficient sum of money for living expenses will be kept in the researcher's local bank account. ➤ Cash and bank card will be kept away from peoples' eyes by keeping them in a purse and then into a cross-body bag that will be kept with the researcher outside home. ➤ Laptop will be kept at home in a safe place or in the researcher's handbag when necessary. 	<p>1(1) Rick score=1</p>
<p>3. Transport and vehicular.</p>	<p>Road traffic accidents: Accidents, particularly on the Nigerian highways are common. This is generally due to lack of good road, poorly maintained vehicles as well as poor driving attitude of the drivers such as over speeding and dangerous driving.</p>	<p>2</p>	<ul style="list-style-type: none"> ➤ Highway travels will be restricted to a few essential family visits. ➤ The researcher will use her discretion to decide whether a public vehicle looks okay to travel in. ➤ When travelling and the driver appear to be driving dangerously, the researcher will call his attention. ➤ Travel insurance will be obtained. This will be helpful in case of hazard number 4 & 5. 	<p>1(2) Risk score=2</p>

<p>4. Illness</p>	<p>Malaria fever: Nigeria is known to be among the countries affected by this mosquito carrying disease</p>	<p>2</p>	<ul style="list-style-type: none"> ➤ Before leaving for data collection, the researcher will have an appointment with a travel nurse for advice. All prophylaxes given will be taken as prescribed. Also, advices given will be adhered to. ➤ As much as possible, doors will be kept closed and bed nets will be used while in bed. ➤ Insect repellent will be used to prevent getting mosquito bites at night times while not in bed or during night fieldwork times. ➤ Doctor will be seen as soon as the researcher feels unwell. 	<p>1(2) Risk score=2</p>
<p>5. Food and drink poisoning</p>	<p>Typhoid fever, diarrhoea or cholera: These are illnesses known to be contracted from eating contaminated food and water and are common in Nigeria</p>	<p>2</p>	<ul style="list-style-type: none"> ➤ As much as possible, meals will be cooked from home and where necessary, recommended good places will be used when eating out. ➤ Roadside food vendors will be avoided. ➤ Drinking water will be restricted to a bottled water, which is generally potable and readily available. 	<p>1(2) Risk score =2</p>

Declaration

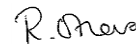
In submitting this form, I acknowledge that I:

1. Have completed the risk assessment to the best of my knowledge.
2. Have been provided with appropriate safety information and instruction for the fieldwork by my first supervisor.
3. Have read and will take account of the guidance above and in 'The Management of Health and Safety on Fieldwork and Other Off-campus Activities Policy and Guidance.' (<https://hs.shef.ac.uk/attachments/333?updated=1476266384>)



Student Name: Habiba AminuSigned

Supervisor Name: Dr Rachel O'Hara..... Signed



Date: 06/03/2017

*Immunization/Vaccination.

Immunization against tetanus is recommended for all persons working in rural environments and is particularly important for those performing manual tasks in contact with soil, animals or if the fieldwork or other off-campus activities could result in exposure to certain pathogenic organisms. The University's Occupational Health Service can offer advice and provide a vaccination programme for staff.

Students should make similar immunisation arrangements through their GP.

Appendix

Risk Matrix

Guide to Risk Level Rating

For each risk identified in your initial risk assessment (each row in the table on page 10) plot a score using the matrix below, which multiplies severity by probability. Any score of 3 or more must entail further control measures to be put in place or even cancellation of the activity as per the final risk rating chart below.

Risk Score = S x P		SEVERITY OF HARM (S)			
		Very Minor = 0	Minor = 1	Serious = 2	Fatal = 3
PROBABILITY (P)	Very Unlikely = 0	0	0	0	0
	Unlikely = 1	0	1	2	3
	Possible = 2	0	2	4	6
	Likely = 3	0	3	6	9



Final Risk Rating	High (H)	6-9	Activities that are High must not start (or will need to be suspended), without appropriate controls in place to reduce the risk to an acceptable level.
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	Medium (M)	3-5	Lesser priority risk should be assessed to see if further control measures can be applied to reduce to low risk.
	Low (L)	0-2	No further action is required.
1	L	0-2	No further action is required.
2	L	0-1	No further action is required.
3	L	0-2	No further action is required.