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Human Well-being and Open Spaces in and around Terraced Housing

By:

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Supervisors: Dr. Kevin Thwaites and Dr. Nicola Dempsey

Abstract

While the impact of the public open spaces on the well-being of urban dwellers has been considerably studied and precise, research on the significance of the private and shared open spaces in the residential environment to the well-being of the residents are limited and unclear. This limitation may be connected with the heterogeneity nature of the residential environment.

This study examines the contributions of private and shared open spaces to the well-being of residents in terraced housing in Sheffield, UK, a typical high-density housing, from the perspective of these residents using a combination of mapping and survey approaches.

The study collects and analyses both qualitative and quantitative data from 200 households living in terraced housing in Walkley neighbourhood, Sheffield, who were selected through a systematic random sampling strategy. The questionnaire and the sitemap designed for the study gathered information from the study population about the typologies, features, and usage of open spaces and how these open spaces impact their well-being. The resulting qualitative and quantitative data were analysed using thematic, descriptive and inferential statistical analysis.

The results of the research suggest that residents of the terraced housing perceive that both private and shared open spaces in and around their houses contribute to the multi-dimension of well-being, physical, social, emotional and economical, in their households. The emotional and social well-being constitute the greater level of well-being expressed. However, neighbour's behaviour, privacy, and open space design are significant predictors to the usage of private and shared open spaces, and proportionately impact the perceived sense of well-being of the residents. Moreover, results indicate a significant association and positive correlation between greenery of the private and shared open spaces and perceived well-being of the residents.

Besides, both the private or shared open spaces and the neighbourhood open spaces were indicated to be complementary or supplementary as results showed a significant association and positive correlation between them and 80% of the respondents use both. However, 74% of these respondents preferred the private open spaces abutting their houses to the shared and neighbourhood open spaces in their residential environment.

The study concludes that private and shared open spaces in the residential environment contribute to the positive well-being of residents, especially in terraced housing, and therefore, should be designed to enhance residents' well-being.

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CHAPTER ONE INTRODUCTION

1.1 Introduction

The subject of human well-being is increasingly being considered significant and recognized all over the world (Summers et al., 2012). For example, the third goal of the seventeen Sustainable Development Goals recently adopted by world leaders and designated as the 2030 Agenda for Sustainable Development (UNDP, 2016) is related to health and well-being and clamours to 'ensure healthy lives and promote well-being for all at all ages' (UN, 2015, p.18). The contributions of the environment to human well-being are long-familiar and acknowledged (Villamagna and Giesecke, 2014; Bizikova, 2011; MEA, 2005; Dasgupta, 2004).

In recent years across the globe, the theme of the relationship between the natural environment and well-being is a growing agenda among academics, researchers, practitioners, policymakers and government (Bull, 2013; Coles and Millman, 2013; Velarde et al., 2007; Council of Europe, 2000). The natural environment is reported to be 'critically important to our well-being and economic prosperity' according to the UK National Ecosystem Assessment (UKNEA, 2014, p. 7). Similarly, the UK White Paper on The Natural Choice revealed that the 'human well-being is intimately connected with our natural environment' (HMG, 2011, p. 12). Also, there are significant numbers of studies across disciplines, with strong empirical evidence based on relevant theories that engagement with the natural environment has positive impacts on health and well-being (Hartig et al., 2014; O'brien and Morris, 2014; Jackson et al., 2013; Keniger et al., 2013; Brown et al., 2011; Abraham et al., 2010; HCN, 2004).

There is an increasing understanding that the natural environment is a 'resource' or an 'asset' that can enhance well-being, and is being applied for intervention to improve and promote the well-being of individuals, families, and communities (Ward Thompson et al., 2013). Although further exploration for better understanding about the mechanism is suggested and ongoing (Van Herzele and De Vries, 2012; Brown et al., 2011), the knowledge and evidence of this positive relationship between the natural environment and well-being are being applied in both local and national contexts (Muirhead, 2011) as well as across different systems and sectors of the society, especially the public realm. Examples include among others: therapeutic gardens (Detweiler et al., 2012; Ousset et al., 1998), therapeutic horticulture in clinical depression, therapeutic retreats, blue gym, green gym, forest schools, healing gardens, care homes, hospitals and creating healthy places (Nilsson et al., 2011; Gonzalez et al.,

2010; Depledge and Bird, 2009; Yerrel, 2008; Pretty et al., 2007; Sempik et al., 2005; Sempik et al., 2003).

In cities, the natural environment is often described as 'open space' and includes 'green space' (parks, gardens, forest, woodland, waterfront) (Jennings et al., 2016). Open spaces are considered to have a significant role in the quality of life or well-being agenda (Wong, 2007). The variety of open spaces through the urban fabric can provide benefits and opportunities to enhance the quality of life of every category of people living in the city (Souter-Brown, 2014; Woolley, 2003).

There is a considerable, substantial body of research on the influence of open spaces on the well-being of city dwellers in the public realm focusing on different specific types of open spaces and the results are consistent. However, studies addressing the influence of open spaces on the well-being of dwellers in residential environments have demonstrated mixed results. In residential settings, the same benefits of open spaces for human well-being seem unarticulated. While some studies applaud positive relationship between open space and well-being in residential dwellings with attendant benefits (Ward Thompson et al., 2013; Groenewegen et al., 2012; De Vries et al., 2003; Takano et al., 2002; Kuo, 2001; Wells, 2000), others report no or limited association (Maas et al., 2008; Hillsdon et al., 2006) or raise the possibility that only large green spaces may be significant in improving well-being (Mitchell et al., 2011). This makes the evidence seems ambiguous and inconclusive (Van Herzele and De Vries, 2012).

The contradiction may be connected with the peculiarity and complexity of the residential environment, having a diverse and multicomponent nature (Pejchar et al., 2015), which may not have been considered, as studies have looked at residential environments as homogeneous. For example, within the residential settings, there are public green space and private green space, and they cannot be substituted for each other or serve the same functions (Coolen and Meesters, 2012). The mechanism applied to other environments like public parks and woodlands may not apply exactly or may be entirely different. The 'place effect,' e.g., residential density, the spatial layout of the site, housing type, which may not be significant in other environments, may have a role in residential settings and influence outdoors experience (Dempsey, 2012).

Besides, most studies of open spaces in the residential environment have focused on the wider neighbourhood environment, neglecting other types of open spaces, and only a few have investigated the more immediate open spaces around homes (Burton et al., 2015). However, the immediate open spaces around a home that are

encountered on a daily basis may have implications for individual or resident's well-being. Thwaites et al. (2005) have suggested that the different open spaces which form the network of urban open spaces must be understood, not as a separate entity but as a unique and distinguishable part of a larger whole (p. 542).

In addition, some of the limited studies on residential environment focused on specific settings (e.g., hospital, hospice) and population (e.g., elderly) (Whear et al., 2014), which may have a limitation in the generic application. Thus, while relationships between human well-being and open space have been studied in wide-ranging ways and contexts, it seems that the relationship may not yet be sufficiently understood in the context of residential settings, exposing the potential for limitations in design decision-making about the delivery of the well-being of residents. Therefore, the study proposes to fill this gap and provide a better understanding of the relationship between open spaces and well-being in residential environments.

However, because of the broad and heterogeneous nature of the residential settings, the study would focus on terraced housing, a particular house-type of the residential environment, with associated open spaces and extrapolate from these specific findings, benefits of open spaces for well-being that may apply more widely.

1.2 Research Aim

The principal aim of the research is to improve understanding of relationships between human well-being and residential open spaces with a focus on terraced housing in Sheffield, UK. It attempts to provide an understanding of residents' interpretation of their well-being in relation to the open spaces in their residential environment. Also, it identifies components of residential settings, amenable to design decision-making, which have the potential to improve the well-being of inhabitants. This is important in contemporary approaches to the residential provision because of a shift in political attitudes to public health and well-being; and it also affects how is interpreted in the context of a need for a significant increase in housing provision in the UK in the coming years.

1.3 Research Objectives and Questions

In order to achieve the overall aim of the study, the following seven research objectives have been set, and each objective will seek to answer one or two key questions.

The research objectives are:

1. To review the general theoretical understanding of the relationship between human well-being and open spaces and the extent of application of this in the context of residential open spaces, especially in terraced housing;
2. To explore a chosen Sheffield terraced residential area to identify the typology of open spaces typical of these settings;
3. To explore the various way the residents of the terraced housing use the open spaces typical of their settings and the contributory factors for this usage or otherwise;
4. To identify factors that determine or prevent usage of open spaces in the terraced housing setting;
5. To explore residents' perceived impact of the usage of the open spaces in their terraced housing setting on their well-being;
6. To determine the relationships between the types of open spaces in the terraced housing setting;
7. To identify components of the terraced residential setting amenable to design decision-making that are likely to promote the well-being of residents.

The research questions the study would seek to provide answers to include:

1. What are the typologies of open spaces in the terraced housing of the Walkley neighbourhood of Sheffield as typical of residential setting?
2. How do the residents of the terraced houses use the open spaces in their residential environment?
3. What factors determine or affect how residents of the terraced houses use the open spaces in their residential environment?
4. What are the benefits and problems that the residents of terraced housing derived or encountered from the use of their open spaces?
5. How do these benefits or problems experienced by the residents of terraced housing in the use of their open spaces relate to their well-being?
6. What is the relationship between the different types of open spaces available to residents of terraced housing in the residential environment?
7. How can the open space system of the terraced housing be improved to support the delivery of benefits for well-being of the residents in the residential environment?

1.4 Research Significance and Justification

The study would be important and necessary for at least five reasons:

First, at a personal level, the study is significant because I have always had interest in studies on health and well-being and related matters due to their importance to other sectors of life. Alongside, health and well-being issues have been a reoccurring challenging area in every generation, and more in the current century and perhaps the coming one, especially with the prevalent global warming and climate change and technological inventions. The study, therefore, relating to well-being and open spaces in the built environment will fulfil and satisfy my long-time aspiration of researching to support health and well-being issues in residential environments.

Second, there is an increasingly strong evidence base that the outdoor settings have the capacity to benefit human well-being (Thwaites et al., 2005), and the principles are being applied in hospitals, healing gardens, schools, woodlands and parks with positive results (Duvall and Kaplan, 2014; Souter-Brown, 2014; O'Brien and Snowdon, 2007). The study, therefore, will add to the body of knowledge on the impact of open spaces on well-being, especially in the residential environment where studies on immediate open spaces around homes are relatively limited (Burton et al., 2015).

Third, the study would be beneficial for policymaker and stakeholders with well-being agenda. It would provide an empirical clearer understanding about the relationship between open spaces and well-being in the residential environment, taking into consideration the heterogeneity of the housing sector and underscore how residents interpret their well-being in relation to their open spaces. This could be substantial for relevant policies in the built environment.

Fourth, access to parks provides an incredible opportunity for contact with nature, which gives health and well-being benefits. However, due to certain limitations, like disability, distance, phobia, and weather, access may be impossible, and home becomes the only option to encounter nature. Therefore, the study would provide an understanding of how to maximize access to well-being benefits of open spaces within the housing stock in the residential environment, especially the terraced housing.

Fifth, there is an increasing demand for housing stock in the country, and with increasing urbanization and densification, more people would have to live in less green residential environment especially low-income group (Groenewegen et al., 2006). The study would, therefore, contribute to theoretical and empirical basis for pragmatic landscape design that could promote an active delivery of well-being benefits in these future homes in particular and the urban area in general.

1.5 Research Scope

The residential environment is heterogeneous and consists of a mix of different dwelling types, with each having its peculiar morphology. The housing types available in the residential area of Sheffield like any typical UK city are the small terraced house, medium terraced house, large terraced house, semi-detached house, detached house, bungalow, converted flat, purpose - built flat, low-rise and high-rise building (DCLG, 2013). It would be over ambitious proposing to study all these together, hence the need for a choice of specific housing types in the residential environment.

Therefore, for the scope of this research, terraced housing and associated open spaces is the study specific target in the residential environment. Terraced house types are the prominent dwelling type in the United Kingdom and constitute about largest housing stock by type (DCLG, 2013). In Sheffield, terraced houses represent 27.3% of the housing stock (SCC, 2014). Terraced houses are reported to be a cost-efficient and more ecological alternative to detached single-family houses as well as more affordable to young families and average income class (Wiegelmann, 2006). Terraced houses emerged during the seventeenth century in the United Kingdom and had remained consumer relevant, acceptable and accessible to date (Levitt, 2010; Wiegelmann, 2006).

The choice of this high-density terraced house type in this research is attached to their prospect of remaining the predominant form as housing provision continues to expand, in particular on the fringes of town and cities. It, therefore, follows that apart from the broad application of the results to the residential environment, it will contribute to the landscape development in this type of residential development that would be in favour of resident well-being in future housing projects.

1.6 Thesis Organization

The thesis is divided into six chapters. The first chapter provides the background information and study focus. The second chapter is the review of relevant literature on the subject of inquiry, covering concepts of well-being, open spaces, benefits of open spaces, and the relationship of open spaces and well-being. It includes some prevailing theories relevant to the relationship between open spaces and well-being. The third chapter contains the methodology of the study and explains the research design. It also provides contextual information about the study area.

The fourth chapter of the thesis gives the analysis of the research data; quantitative and qualitative, and the results. The fifth chapter provides the discussion of the findings. Chapter six presents the summary of findings, and recommendations for

built environment professionals on designing of open spaces for well-being, especially in the terraced housing. Besides, it provides research study limitation and suggests future research.

CHAPTER TWO LITERATURE REVIEW

2.1 Introduction

This chapter provides reviews of the concepts and studies on human well-being and open spaces, as well as the general understanding of the relationship between them. Part of the aim of the review is to understand how the relationship between well-being and open spaces has been conceptualized and applied.

The chapter begins with a glossary of terms used in the study and then discusses the meaning and concepts of human well-being, the components and dimensions of human well-being, and approaches to the measurement of human well-being. Further to this, it reviews the definition and meaning of open spaces, the typology, classification, functions, benefits, and disadvantages of open spaces as well as open spaces in residential environment.

The latter part of the chapter reviews the general relationship or link between human well-being and open spaces, and the impact of open spaces on the well-being of different population subgroups, levels of human connection with open spaces, and criteria for designing open spaces for well-being. Also, it reviews the relationship between human well-being and open spaces in residential settings, and dominant theories related to open spaces and well-being. It ends with the summary and conclusion of the literature.

2.2 Glossary

This part provides a brief description of some terms used in the thesis.

Eudaimonic well-being: This is a view that regards well-being in term of self-meaning and self-actualization or realization beyond ordinary happiness.

Flourishing: This is a term used to describe well-being as an experience of a life going well, and combines the aspects of feeling good and functioning well in life.

Happiness: This is construed as a dominance of positive affect over negative affect.

Hedonic well-being: This is a view that regards well-being in terms of happiness, maximizing pleasure (positive affect) and minimizing pain (negative affect).

Life satisfaction: This is the degree to which individual feels their life as a whole is going well.

Neighbourhood open space: This is a composite name for all the public open spaces within a neighbourhood.

Objective well-being: This is a non-feeling aspect of a person's life and includes social attributes like education, health, and employment status. It is considered as an evaluated well-being.

Open space: This is an external environment or outdoor space. It may be grey, blue or green, and private or public.

Private open space: This is an outdoor space in a residential environment that is restricted to the use of occupants of a house only or entirely for a household use and unshared with a neighbour. It includes front, back or side yard/garden, and terraces in terraced housing.

Public open space: This is an outdoor space that is accessible to the community or public. The neighbourhood open space is a public open space.

Psychological well-being: This is a combination of a state of positive affect and excellent functioning in individual and relational life effectively.

Quality of life: This is a subjective evaluation of one's position in life with respect to the culture and value systems of where one lives and about their goals, standards, and expectations.

Satisfaction: This refers to the cognitive part of happiness and provides a reflective evaluation of how well things are going both now and in the past.

Shared open space: This is an outdoor space in a residential environment that is shared by two or more households or neighbours. It is a communal space and may include front, back or side yard or garden, and an alleyway in the case of terraced housing.

Subjective well-being: This is an aspect of well-being concerned with individual's experience of their life. It is regarded as an experienced well-being.

Terraced housing: A row of similar three or more houses joined along their side walls.

Well-being: This is regarded as a dynamic, positive physical, social and mental state connected with how people feel and function in life.

2.3 Human Well-Being

2.3.1 Definition and Meaning of human well-being

The subject of human well-being has continued to draw significant attention from scholars, researchers, practitioners and policymakers in recent time (Schwanen and Wang, 2014; Atkinson et al., 2012; Summers et al., 2012). Many concepts and definitions of well-being have emerged from different disciplines and fields (Palmer Fry, 2015; Conradson, 2012), and examples of such disciplines include economics, psychology, political science, sociology, geography, and health (Gough and McGregor, 2007). The literature on the subject of well-being is broad and varied (Sowman, 2013; Muirhead, 2011; McGillivray, 2007; Prilletensky, 2005), and today, there are copious definitions and multifaceted concepts of well-being with application in different contexts (Hurley and MacQueen, 2015; Scott, 2012a; Fleuret and Atkinson, 2007: Gough and McGregor, 2007; Shah and Marks, 2004). However, while each definition differs in emphasis or focus, they all, nevertheless, have some significant overlap (Palmer Fry, 2015; Summers et al., 2012).

The review of well-being literature by Pollard and Rosenberg (2003) indicates that well-being has been defined "by positive individual characteristics, such as happiness, and on a continuum from positive to negative, such as how one might measure self-esteem." (p.18). Moreover, well-being has been defined regarding "an individual's context, such as standard of living," and by the absence of well-being, such as the lack of depression, as well as "in a collective manner (shared understanding)" (p. 18).

In another dimension, Diener et al. (1999) defined well-being as "a broad category of phenomena that includes people's emotional responses, domain satisfactions and global judgment of life satisfaction" (p. 277). Moreover, Diener and Seligman (2004) suggest that well-being is "people's positive evaluations of their lives, which includes positive emotions, engagement, satisfaction and meaning" (p. 1). They claimed that the traditional economic indicators of well-being did not capture essential components of well-being and provided significant well-being components to include "positive and negative emotions, engagement, purpose and meaning, optimism and trust, and the broad construct of life satisfaction" (Diener and Seligman, 2004, p.1). However, Boarini et al. (2006) argued that "individual derive well-being from the satisfaction of their wants according to their own preferences" (p.9).

In a dynamic perspective or a life course approach, well-being is defined by Bornstein et al. (2003) as:

> "a state of successful performance throughout the life course integrating physical, cognitive and social-emotional function that results in productive activities deemed significant by one's cultural community, fulfilling social relationships, and ability to transcend moderate psychosocial and environmental problems" (p.14).

Well-being, therefore, transverses different domains which include physical, cognitive, social, emotional, and economic (Pollard and Rosenberg, 2003).

Furthermore, well-being is defined regarding flourishing and good life (Seligman, 2011). Baylis (2005) defined well-being as "a positive and sustainable state in which we can thrive and flourish" (p. 246), and he suggested that the science of well-being at its best is about 'exploring how good life can become and how good we can become at living it" (Baylis, 2005, p.246). The definition seems to be in agreement with Clark and McGillivray's submission, that well-being "is a concept or an abstraction that has to do with the state of a person's life and reflects different activities that make up a good form of life" (2007, p.1).

In a wider view, well-being is defined by Prilleltensky (2005) as "a positive state where the personal, relational and collective needs and aspirations of individuals and communities are fulfilled" (p.54). He claimed that the well-being of a person (personal well-being) is highly depended on the well-being of that persons' relationships (relational well-being) and in the community (community well-being) where the person is located. He links well-being to a satisfactory state of affairs for individual and community and suggests that many aspects of the psychosocial, political, economic and physical environment could impact the state of well-being. Also, based on this conceptual definition, Prilleltensky (2005) proposed that well-being has three sites; personal, relational and collective, and suggests that each of the sites of well-being has definite signs, determinants, and strategies, although they are interdependent. The definition brings in an apparent and wider concept of personal and community well-being (Wiseman and Brasher, 2008).

However, in a broad perspective, Steuer and Marks (2008) defined well- being as:

> "a positive physical, social and mental state; it is not just the absence of pain, discomfort, and incapacity. It arises not only from the actions of individuals but from a host of collective good and relationships with other people. It requires that the basic needs are met, that individuals have a sense of purpose and that they feel able to achieve important

personal goals and participate in society. It is enhanced by conditions that include supportive personal relationships, strong and inclusive communities, good health, financial and personal security, rewarding employment and a healthy and attractive environment" (p.8).

Well-being is therefore regarded as a dynamic, positive state and varies from person to person (Ryff et al., 2004), comprising feeling good and functioning well (Muirhead, 2011). The notion of feeling good has to do with an individual's inner experience of positive feelings of happiness and contentment while functioning well deals with an individual's relationship with his world, and these are all in the domain of positive physical, mental and social realms.

2.3.2 Theoretical approaches to definition of well-being

Different theories have been suggested to provide an understanding of well-being. From a theoretical viewpoint, Fleuret and Atkinson (2007) in the critical review of well-being, health and geography identified three theoretical strands associated with distinct approaches for discussion and research on well-being. These include theory of needs, relative standards theory, and theory of capability (capabilities approach) (Figure 2.1).

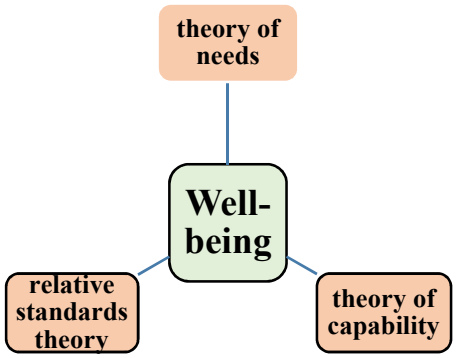


Figure 2.1 Three theoretical strands associated with definitions of well-being (Adapted from Fleuret and Atkinson, 2007).

A theory of needs based on Maslow's hierarchy of needs considers well-being in terms of satisfaction of individual needs, which are represented in a hierarchical structure. This approach, however, has been criticized as having a shortcoming, because people's needs may not always proceed in the predicted hierarchical order, and their basic needs may vary considerably (Fleuret and Atkinson, 2007; Diener and Lucas, 2000).

The second theoretical stance of relative stands theory explains the well-being concept as relative and subjective. The theory "seeks to find the standards against which people compare themselves, and strive to understand the processes by which these comparisons are made" (Diener and Lucas, 2000, p.47). For example, it associates well-being with 'individual happiness and conditioned by individual's perception of the context in which he or she is living' (Fleuret and Atkinson, 2007, p. 109). Therefore, happiness is relative, and well-being is considered subjective. The theory has been criticised for approaching well-being as subjective, and the possible challenge it may pose in its application to inform policy.

The third theoretical perspective is 'capabilities approach.' The approach considers well-being in terms of positive freedom to live a flourishing life. It was suggested by Sen (1993) and concerns ability to achieve various 'functionings' as part of living. Functioning according to Sen represent parts of the state of a person, the different things the person manages to do or be in leading a life (p.31). The approach, therefore, considers living as a combination of various 'doings' and 'beings' with the quality of life of a person being evaluated based on the capability to achieve valuable functionings (Sen, 1993, p. 30). For example, development is understood as capacity expansion, inequality as disparities in primary human capacities, and poverty as a capacity failure (Clark and McGillivray, 2007, p.2). The theory has also been criticised that potential capabilities may be hard to operationalize and measure (Fleuret and Atkinson, 2007).

2.3.3 Different conceptualizations of well-being

A variety of conceptualizations have been suggested in the study of well-being (Cooke et al., 2016) and a plurality of well-being concepts is evident from the well-being literature (Gasper, 2007).

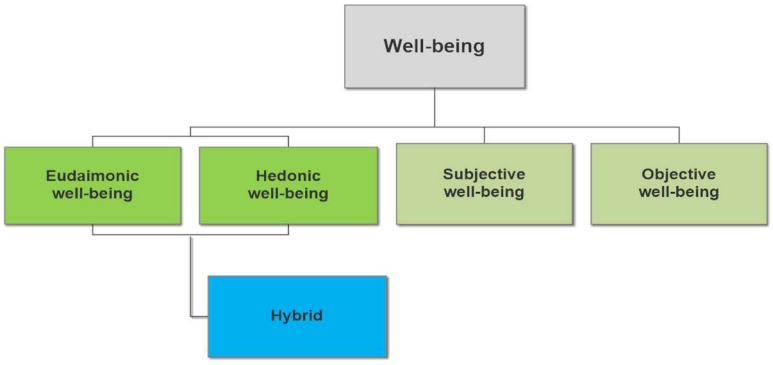


Figure 2.2 Well-being conceptualizations

Examples of these concepts include subjective or objective well-being, hedonic and eudaimonic well-being and hybrid well-being (Fletcher, 2016; Deci and Ryan, 2008; Gasper, 2007). See figure 2.2. above.

1. Objective and Subjective well-being

Well-being is conceptualized to exist in subjective and objective forms (Dodge et al., 2012; WHO, 2012; Eurostat, 2008; Gough and McGregor, 2007), although the distinction is argued to be contentious (Gough et al., 2007). Sowman (2013) argued that well-being is a combination of objective and subjective factors, an encompassing concept that includes all aspects of a person's life (p.59). See figure 2.3 below.

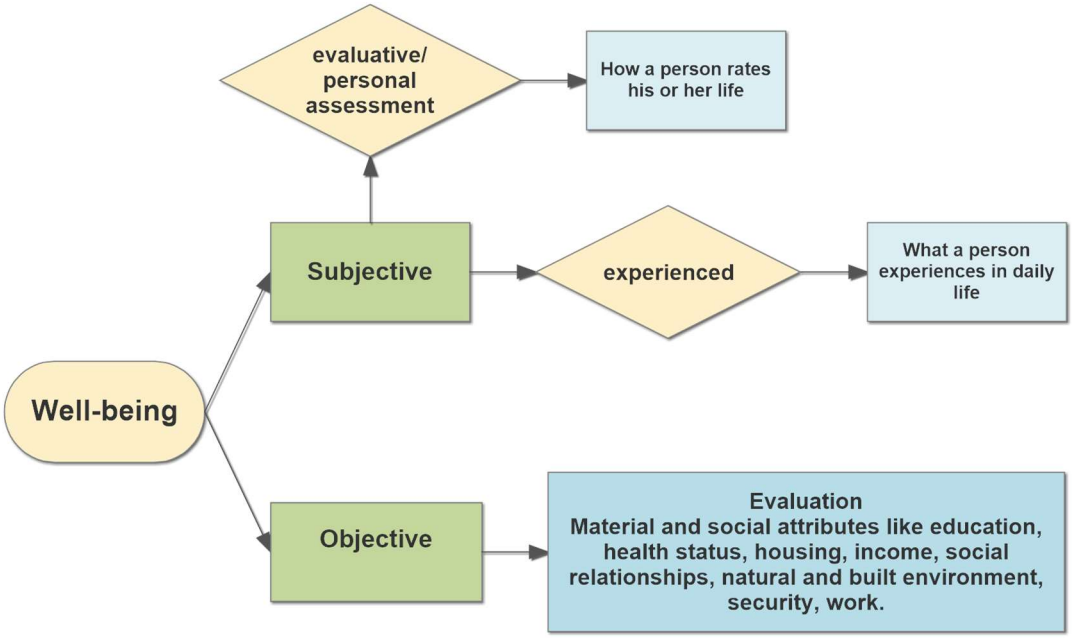


Figure 2.3 Objective and Subjective well-being (Adapted from WHO, 2012, p.10-Gallup model for measuring well-being)

Objective well-being focuses on material and social attributes like education, health status, housing, income, social relationships, natural and built environment, security, work, governance, and compares with social norms and values (WHO, 2012). Objective well-being deals with the non-feeling features of a person's life in contrast to subjective well-being and regarded as evaluated well-being (Evers et al., 2012; Gasper, 2007).

Subjective well-being deals with an individual's experience of his or her life, and therefore, it is viewed as experienced well-being (Evers et al., 2012; Diener et al., 1999; Diener et al., 1998). It consists of three components: life satisfaction, the presence

of positive mood, and absence of negative mood (Ryan and Deci, 2001; Ryff and Keyes, 1995). Generally, Subjective well-being relates to how people feel and how they assess their circumstances; how they think and feel. It is a personal assessment of one's life (Newton, 2007; Dolan and Peasgood, 2006; Diener et al., 1998). The evaluation can be in the form of cognitive states such as satisfaction with one's marriage, work, and life and it can be in terms of ongoing affect (Diener et al., 1999).

Mostly, Subjective measures of well-being focus on the cognitive judgement of life satisfaction (Conradson, 2012), and covers three domains: emotional well-being, psychological well-being and social well-being (Moore and Keyes, 2003). So, individuals evaluate their lives regarding whether they feel good about it, function well personally, and function well socially. Similarly, individual may view their lives in terms of psychological well-being, which consists of dimensions such as a sense of personal growth, a purpose in life, and self-acceptance.

2. Hedonic and Eudaimonic well-being

Well-being has also been conceptualised or derived from two distinct perspectives and paradigms: hedonic and eudaimonic (Disabato et al., 2016; Ryan and Deci, 2001; Waterman, 1993; Waterman,1990). See figure 2.4.

Hedonism regards well-being in terms of happiness or pleasure (Ryan and Deci, 2001; Kahneman et al., 1999). It is usually defined as more positive affect, less negative affect and greater life satisfaction (Diener et al., 1999). Happiness is therefore sourced in the experience of pleasure and pain, the attainment of pleasure and avoidance of pain (Palmer Fry et al., 2015; Ryan and Deci, 2001). It considers well-being as subjective happiness and employs assessment of subjective well-being (Dolan et al., 2011; Kahneman et al., 1999).

The eudaimonic approach considers well-being to go beyond happiness and focuses on meaning and self-realization, and define well-being in terms of the degree to which a person is fully functioning, focusing on psychological well-being (Waterman, 1993; Winefield et al., 2012; Ryan and Deci, 2001). Psychological well-being "is about lives going well. It is the combination of feeling good and functioning effectively" (Huppert, 2009, p. 137). Ryff (1989) operationalized this as a set of six dimensions which include self-acceptance, positive relations with others, autonomy, environmental mastery, purpose of life and personal growth (p.1071). So, happiness is obtained in the experience of life satisfaction and fulfilment (Palmer Fry et al., 2015).

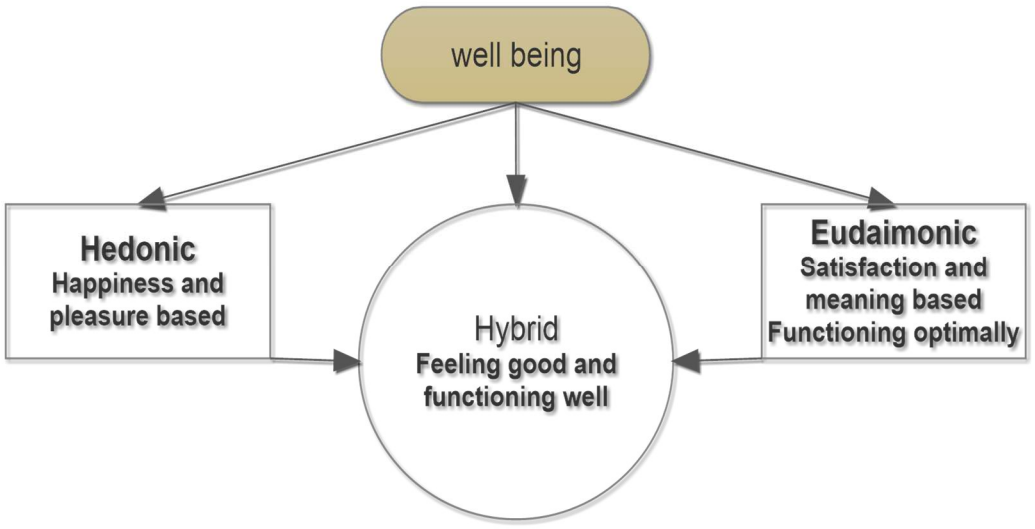


Figure 2.4 Hedonic and Eudaimonic well-being

However, beyond the two distinct traditional perspectives of hedonic and eudaimonic well-being, a more integrated well-being conceptualization has been suggested (Seligman, 2011; Gough and McGregor, 2007). The hybrid concept combines hedonic and eudaimonic well-being components to emerge what is referred to as 'flourishing' (Henderson and Knight, 2012; Seligman, 2011). Flourishing applies to the experience of life going well and covers the aspect of both feeling good and functioning adequately (Huppert and So, 2013, p.838).

3. Key terms in well-being description

In the description and measurement of well-being, different terms have been used (Fletcher, 2016). Some of the common terms include satisfaction, happiness, quality of life, enjoyment, contentment and flourishing (Haworth and Hart, 2007). The most prominent and dominant of these terms or concepts are satisfaction (life satisfaction), happiness and quality of life (Boarini et al., 2006).

Quality of life, life satisfaction, and happiness have been used interchangeably to mean or measure well-being (Selwyn, 2015; Spence et al., 2011). However, some researchers argued that each of the terms represents elements of well-being rather than an all-inclusive definition for well-being (Selwyn, 2015; Dodge et al., 2012; Statham and Chase, 2010). However, each of these key concepts has been used to describe or measure well-being (Galloway et al., 2006; Ryff and Keyes, 1995; Headey et al., 1993). See figure 2.5.

Figure 2.5 Key terms in well-being description and measurement

Quality of life

Quality of life has been used in describing well-being in the majority of the definitions of well-being (Dodge et al., 2012; Ryff and Keyes, 1995; Shin and Johnson, 1978), and similarly, quality of life has been conceptualized in relation to well-being (Felce and Perry, 1995). Also, some researchers use the two terms interchangeably (Dodge et al., 2012; CABE, 2010; Statham and Chase, 2010; Clark and McGillivray, 2007; Galloway et al., 2006; Diener and Suh, 1997; Felce and Perry, 1995).

Quality of life has also been defined widely, and some researchers described it in relation to life satisfaction, happiness, living conditions, and health status (Galloway et al., 2006; Moons et al., 2006).

WHO (1997) defined quality of life as:

> "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, personal beliefs, social relationships and their relationship to salient features of their environment" (p. 1).

Also, quality of life is defined by Felce and Perry (1995) as:

> an overall general well-being that comprises objective descriptors and subjective evaluations of physical, material, social and emotional well-being together with the extent of personal development and purposeful activity, all weighted by a personal set of values" (p. 60).

Well-being is therefore regarded as a domain of quality of life and deals with one's subjective perception of and feelings about life, which is commonly operationalized in terms of 'happiness' or 'satisfaction' (Meiselman, 2016; Galloway et al., 2006, Moons et al., 2006). Quality of life is argued to be exclusively about subjective well-being, rather than objective life circumstances. So, study about the subjective aspects of

quality of life is suggested to be a study of well-being or measures well-being (Meiselman, 2016; Galloway et al., 2006). Subjective well-being is, therefore, a component or part of quality of life (Christoph and Noll, 2003).

From the literature, physical well-being, material well-being, social well-being, emotional well-being and development and activity are relevant domains to quality of life (Felce and Perry, 1995, p. 60). Diener and Suh (1997) argued that while quality of life covers a broad range of objective and subjective components, it inclines more to objective assessment of well-being, thereby making it applicable in research as an alternative measure of well-being (Galloway et al., 2006).

Life satisfaction

Life satisfaction is one of the conceptual elements of well-being (Prasoon and Chaturvedi, 2016; Strack et al., 1991), and regarded as one of the indicators and dimensions of well-being (Prasoon and Chaturvedi, 2016; Headey et al., 1993). Different definitions have been used for life satisfaction depending on context (Prasoon and Chaturvedi, 2016), and satisfaction, domain satisfaction, and life satisfaction are related but distinct.

Satisfaction is one of the primary constituents of happiness. While joy is the emotional part, satisfaction is the cognitive part and concerns a "reflective appraisal, an assessment of how well things are going and have been going" (Argyle, 2002, p. 39). Domain satisfaction represents satisfaction with a particular 'domain' of life and is the judgment people make in evaluating or appraising an especially important life domain (Prasoon and Chaturvedi; Diener, 2006). Examples of life domain are physical, health, family, social relationship, leisure, housing, and the environment (Headey et al., 1993). Satisfaction with particular activities and domain has been recommended for measurement of subjective well-being (Diener, 2006). This is commonly measured by asking people to indicate how much they like their lives in each area or enjoyment experienced in each area and how much they would like to change their lives in each area (Prasoon and Chaturvedi, 2016; Diener, 2006).

However, life satisfaction is the evaluation of satisfaction with one's life as a whole or in general (Singh and Jha, 2008; Diener, 2006). It is defined as "the overall assessment of feelings and attitudes about one's life at a particular point in time ranging from negative to positive" (Singh and Jha, 2008, p. 26). Life satisfaction, therefore, reflects the degree to which one feels his life is going well (Headey et al., 1993), and

has been emphasized as the key indicators of well-being (Ryff and Keyes, 1995) and applied as a measure of well-being (Ellaway, 2014; Diener and Suh, 1997).

Happiness

Happiness has been operationally defined or interchangeably used as well-being (Fletcher, 2016: Lewis et al., 2011). It is regarded as one of the constituents of well-being, and an experiential state, although argued by some researchers not to be the same with well-being (Dasgupta, 2004). Therefore, happiness had several meanings and interpreted widely depending on context (Diener, 2006). It is described as the balance between the positive and negative affect (Ryff and Keyes, 1995; Headey et al., 1993). Positive affect includes pleasant moods and emotions, while negative affect comprises of moods and emotions that are unpleasant (Diener, 2006). Singh and Jha (2008) defined happiness as:

> "the average level of satisfaction over a specific period, the frequency and degree of positive affect manifestations or the extent to which an individual experiences positive emotional states, and the relative absence of negative affect (p.40).

Happiness includes satisfaction (both global and satisfaction with specific domains), pleasant affect and low negative affects (Argyle, 2002; Strack et al., 1991). See figure 2.6. Life satisfaction theories of happiness take happiness to be contingent on being satisfied with one's life as a whole (Fletcher, 2016). However, Fletcher argued that whether one is satisfied with his life as a whole depends on how much one enjoys its constituent elements (2016).

At another level, Veenhoven (1989) defined happiness as "the degree to which an individual judge the overall quality of his life as a whole favourably. In other words, how well he likes the life he leads" (p.22). Based on this definition of Veenhoven, happiness is related to one's quality of life.

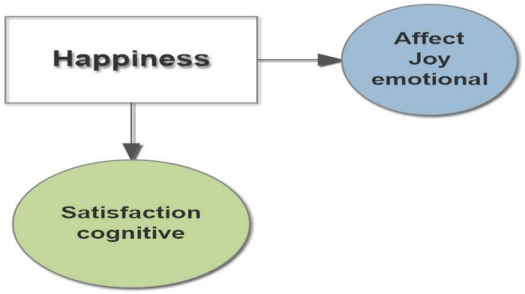


Figure 2.6 Constituent of Happiness

In comparing happiness and satisfaction, Samman (2007) observed that many economists use the two measures of happiness and life satisfaction interchangeably although distinguished by psychologists, and argued that both are not capturing the same concept. Happiness is considered as an emotional or feeling state while life satisfaction is regarded as a more cognitive assessment (Lewinsohn et al., 1991). Some researchers recommend life satisfaction to be evaluated rather than happiness in domain level items because of this advantage (Galloway et al., 2006). Another distinction is the argument that self-rating happiness reflects 'short time' situation which is dependent on (affective) expression of mood while self-rating of life satisfaction appears to measure long-term, more stable (cognitive evaluation) situation (Galloway et al., 2006).

Nevertheless, happiness, life satisfaction and quality of life are related concepts, and well-being is widely understood and measured either in quality of life, life satisfaction or happiness conceptions (Gough and McGregor, 2007). See figure 2.5 above and 2.7 below.

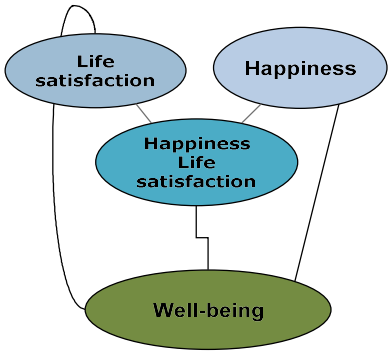


Figure 2.7. Relationship between happiness, life satisfaction and well-being

4. Summary on definition and meaning of human well-being

From the literature, there is no standard or single definition for well-being (Dodge et al., 2012; Summers, 2012), and, there is no particular definition, concept or measure that is regarded 'above all others' (Clark and McGillivray, 2007, p. 1). However, despite the range of views and arguments about the definition of well-being, there are points of consensus (Dodge et al., 2012).

Well-being is a complex and multifaceted state and process. It is a holistic concept of human functioning that covers physiological, emotional, social and spiritual dimensions of what it means to be human (Conradson, 2012, p. 17). Similarly, it is a positive and dynamic multidimensional construct (Dodge et al., 2012) that encompasses personal, interpersonal and collective needs which are interrelated, and well connected

to the physical, cultural and technology environment. Besides, well-being varies across different societies as well as over the life course of any given individual (Haworth and Hart, 2007). Moreover, well-being can be improved and intervention to promote or improve well-being may take different forms and may be conducted at the individual, community and societal levels (Haworth and Hart, 2007, p. 19).

2.3.4 Dimensions of well-being

Well-being is a complex construct that relates to experience and function, and used in different contexts (Scott, 2012b; Ryan and Deci, 2001). From the literature, well-being is expressed as one-dimensional or multi-dimensional (Palmer Fry, 2015; McGillivray, 2007), and researchers have suggested different aspects of well-being or dimensions depending on the meanings of well-being and approaches to studying well- being.

Schiff and Moore (2006) in their research study suggested and examined the physical, mental, emotional and spiritual domains of well-being, while, MEA (2005) uses five dimensions to assess human well-being about the ecosystem. These dimensions are designated as necessary materials for a good life, freedom and choice, health, social relation, and security. Similarly, Russel et al. (2013) on their review of the literature on how knowing and experiencing nature affect well-being identified ten components of human well-being. These include physical health, mental health, spirituality, certainty and sense of control and security, learning or capability, inspiration or fulfilment of imagination, sense of place, identity or autonomy, connectedness or belonging, and subjective (overall) well-being.

Moreover, there is a general agreement from the literature that childhood well-being is multi-dimensional and include dimensions of physical, emotional and social well-being (Statham and Chase, 2010). Also, for the older populations, the dimensions of well-being include material, physical and cognitive, emotional and social engagement or social well-being (Kaneda et al., 2011).

Generally, from the literature, well-being is multidimensional and embraces all aspect of human life (Gough and McGregor, 2007). The different common dimensions or domains include emotional, physical, social or relational, intellectual or mental and financial or economic well-being (Figure 2.8) (O'Brien and Morris, 2014; Keniger et al., 2013; Pollard and Rosenberg, 2003).

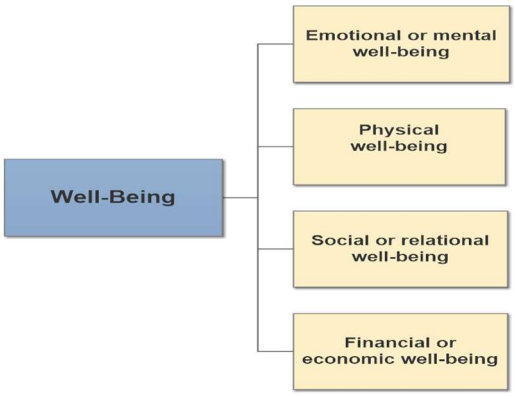


Figure 2.8 Common Dimensions of Well-being

Emotional well-being concerns "the emotional quality of an individual's everyday experience, the frequency, and intensity of experiences of joy, fascination, anxiety, sadness, anger, and affection that make one's life pleasant or unpleasant" (Kahneman and Deaton, 2010, p. 16489). Aspects of emotional well-being, according to Moore and Keyes (2003) that contribute to subjective well-being include feeling satisfied and happy about one's life and experiencing more positive than negative emotion over time.

Physical well-being concerns "the ability to perform physical activities and carry out social roles that are not hindered by physical limitations and experiences of bodily pain, and biological health indicators" (Capio et al., 2014, p. 4805). The vital elements of physical well-being according to Bornstein et al. (2003) include good nutrition, preventive health care, physical activity, safety, security, substance abuse prevention and reproductive health. In contrast, individual may consider their lives regarding social well-being, and this includes a sense of belonging to one's communities (social integration), a positive attitude towards others or supportive relationship. Other indicators include a feeling of contributing to society (social contributions), trust, and engaging in the pro-social behaviour (Payne et al., 2014; Bornstein et al., 2003; Keyes and Haidt, 2003; Keyes, 1998).

One of the important features of well-being is that the dimensions and elements of well-being are closely interrelated or overlap (Russel et al., 2013; Zaff et al., 2003). For example, elements of one domain may impact and influence the elements of the same domain or other domains (Bornstein et al., 2003). Also, the elements of well-being can be targeted for promotion and may be responsive to intervention activities. Many aspects of a person's environment including family system, neighbourhood security, provision of basic needs may contribute or determine well-being within any domain (Bornstein et al., 2003). In the context of this study, the multidimensional nature

of well-being is considered and useful in the development and analysis of the research instrument.

2.3.5 Well-being definition for the thesis

In this study, well-being is regarded as a dynamic, positive and multi-dimensional state: physical, social and emotional (Steuer and Marks, 2008) relating to how people feel and function in life (Brown et al., 2012; Newton, 2007). It is linked to feeling good and functioning well (Muirhead, 2011; Dolan and Peasgood, 2006) at personal and interpersonal levels, which are expressed by individual happiness or satisfaction in a particular domain (Muirhead, 2011; Fleuret and Alkinson, 2007). The external residential environment is the area of focus or domain level, and therefore, the conception of well-being is related to the external environment or experience of a place (Burton et al., 2011). In addition, well-being encompasses all aspect of human life, and dimensions of well-being include physical, emotional, social or relational, intellectual or mental and financial or economic well-being (O'Brien and Morris, 2014). The concept was important in the development of the research instrument for the study.

2.3.6 Approaches to the measurement of human well-being

The way well-being is defined and conceptualized has shaped and affected the way well-being measurements are developed and how well-being is measured (Scott, 2012b). The common measure of human well-being has been an objective measure, which was based on income or economic indicators (McGillivray and Clarke, 2006). However, this approach of measurement has been criticized because of the limitation that income-based measures alone cannot wholly capture human well-being (Diener and Seligman, 2004).

The choice of the indicators to be used in the measurement of well-being is dependent on the purpose of the study (Sumner, 2006). While the economic measure is suggested to be best for quick and short-term, the non-economic measure is excellent when depth about medium or long-term trends of well-being are considered, and when capturing more meaning-based well-being (Sumner, 2006). While there are several different means of assessing well-being (Haworth and Hart, 2007), the measurement of well-being involves two approaches: objective measure and subjective measure (Conradson, 2012; Grough and McGregor, 2007).

The objective measure (externally acquired) is based on the assumption about human needs, and indicators set to evaluate how far the needs have been met. Examples include the level of educational achievement, crime rate, income, employment status, and water quality (Selwyn, 2015; Hicks, 2011). In contrast, subjective measure (self-reported) requires that people evaluate their own well-being, and provides for individual differences in values and preferences (Selwyn, 2015; Conradson, 2012). Objective well-being measure could be obtained from population-objective level indicators or by taking direct measurements from individuals while subjective evaluation is derived from subjective self-report measures (Conradson, 2012). The subjective measures are regarded as more valid for assessing subjective well-being, while objective measures are more appropriate for objective well-being (Eurostat, 2008).

However, subjective well-being is not regarded as subjective because it relies on self-reported subjective measures, but because the concept being measured is subjective, for example, happiness and life satisfaction (Hicks, 2011). Objective measures may also depend on self-reported measures, for example, employment status (Selwyn, 2015; Hicks, 2011). From the literature, several available frameworks to study well-being favour the integration of an objective and subjective measures. Such combines an objective measure of a person's welfare and a subjective evaluation of the quality of life the person is experiencing, producing a comprehensive picture or overall well-being (Selwyn, 2015; Eurostat, 2008; Grough and McGregor, 2007). The integrative approach combines quantitative and qualitative data (Daw et al., 2016; McGregor, et al., 2015). However, in recent years, apart from combining the objective and subjective measures, there is a shift to subjective self-report measures alone (Dolan et al., 2011; Diener et al., 1998) and qualitative research methods (Conradson, 2012).

Moreover, different research methods and strategies have been used in well-being studies, and these include survey, experiment (randomised and non-randomised control), household survey, open ended questionnaire, ethnography, participants observation. Others include interviews, focus group, field notes, and researchers' reflection, concept maps, mapping, drawing, secondary sources, and a psychological instrument (Ohly et al., 2016; Bevan, 2007). In addition, well-being has also been measured in many ways. While some measurement scales were unidimensional and utilised only a single item which measured life satisfaction or happiness, others were multidimensional and assessed multiple domains. (Cooke et al., 2016; Ruggeri et al., 2016; Lindert et al., 2015). The most frequently encountered domains reported from the review of measurement scales for measuring well-being include affect, social relations,

life satisfaction, physical health, meaning or achievement, and spirituality (Lindert et al., 2015).

Different well-being measurement tools or instruments have been developed over time and used in well-being research studies. Examples include Satisfaction with life scale, Positive and negative affect Schedule, Comprehensive Quality of life scale, Gallup-Healthways well-being index, Quality of well-being scales and Ryff Scales of psychological well-being. Others include Warwick-Edinburg Mental well-being scale, The psychological general well-being Index, WHO well-being index, Ecological Momentary Assessment, Personal well-being index, UK ONS Survey, Wellness Evaluation of lifestyle, General well-being schedule, Flourishing Scale, SCL/PRB index of well-being for older populations and Well-being apps (Cooke et al., 2016; Linton et al., 2016; Dronavalli and Thompson, 2015; Selwyn, 2015; Lindert et al., 2015; OECD, 2013; Kaneda et al., 2011; Spence et al., 2011; Eurostat, 2008; Dasgupta, 2004).

In the study, the integrative approach was adopted, combining subjective evaluation and objective measure, thereby producing quantitative and qualitative data. The questionnaires were therefore structured to capture terraced housing resident's well-being in relation to the specific domain, external residential environment. However, apart from providing an understanding of the meaning of well-being through the review, the understanding of open space would also be necessary for this study. Therefore, the next section discusses information about open spaces and its relationship to well-being.

2.4 Open Spaces

2.4.1 Definition and Meaning of open spaces

Open space has many meanings and defined in different ways (Klaiber and Phaneuf, 2010; Swanwick et al., 2003). Open space is defined as an undeveloped (has no buildings or other built structures), open piece of land that is accessible to the public (USEPA, 2016). As a behavioural definition, open space is a space that allows people to act freely without any imposed limitation by ownership, size, type or character (Lynch et al., 1995). As a form, open space is defined as "all geographical area (land or water) within or reasonably adjacent to a city or urban concentration that is not covered by buildings" (p. 348). Moreover, with emphasis on function rather than form, Wilkinson (2003) defined open space as:

> "an areal form, regardless of grade, public or private ownership, covered or partially covered factors, which provides opportunities for physical,

physiological, and visual access together with an emotionally satisfying ambience" (p.348).

Wilkinson (2003) argued further that on the ideal form, an opportunity should also exist to serve the needs and desires of the possible users irrespective of age and disability to allow free choice. Moreover, other definitions combine both form and function, conceiving open space as an outdoor area that is open to diverse and spontaneous activity, movement, or visual exploration by people (Wilkinson, 2003, p. 348). Similarly, according to the UK Planning practice guidance, open space is taken to mean:

> "all open space of public value, including not just land, but also areas of water such as rivers, canals, lakes and reservoirs which offer important opportunities for sport and recreation and can also act as a visual amenity" (DCLG, 2006, p.13).

The term open space has also been used interchangeably for green space in the literature (James et al., 2009) and some authors associate open space with public space and green space. Besides, authors presented different definitions in showing the relationship between the two (Swanwick et al., 2003). For USEPA (2016), while green space is a partly or entirely covered land with grass, trees, shrub, or other vegetation, open space consists of green space, schoolyards, playground, public seating areas, public plazas and vacant lots. Hence, green space is regarded as a component of open space. However, Swanwick et al. (2003) admitted that the term open space had been broadly used in the literature, and suggested that the urban area consists of building and outside area, and defined the external environment (outside area) as comprises of green space and grey space. While the green space is composed of linear, semi-natural, functional and amenity green spaces, the grey space consists of the functional grey space and civic space. The combination of the green space and civic space is regarded as open space while the open space that gives public access is designated as public open space (See Figure 2.9 below). Therefore, Swanwick et al. 2003 defined open space as that part of the urban area comprising of urban green spaces and civic spaces which contribute to its amenity, either visually or by public access (p. 98).

Nevertheless, most of the definitions of open spaces only recognise the public open space and not private open space. However, since the focus of this study is the residential environment in the urban area, it is important to adopt a definition to suit residential environment where more than only public accessed and managed open

spaces are encountered. Therefore, for this study, open space is defined as an external environment, which is the space outside the building, outdoor space, that may be grey or green, and private or public (Lynch et al., 1995).

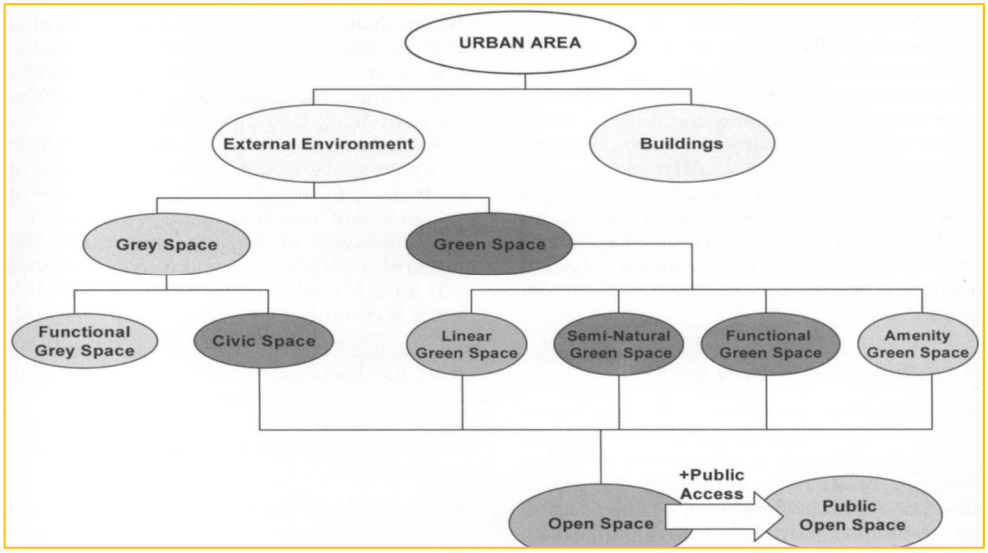


Figure 2.9 Open Space Definitions. (Source: Swanwick et al., 2003, p. 97)

Similarly, private open space is described as an outdoor space in a residential environment that is restricted to the use of occupants of a house only or entirely for a household use and unshared with a neighbour. It includes front, back or side yard/garden, and terraces in terraced housing. Public open space is considered as an outdoor space that is accessible to the community or public.

2.4.2 Types of open spaces

Two different planning approaches have been identified for planning public open space over time by Maruani and Amit-Cohen, (2007). These approaches are designated as 'demand approach' and 'supply approach'. While the demand approach bases planning on responding to the needs of the population for their demand for recreation, amenities and environmental quality, the supply approach is founded on the principle of conservation of existing landscape and natural values. The categorization of open space into different types is therefore implicated by the scale of the two approaches (Maruani and Amit-Cohen, 2007). In addition, various authors have provided a different categorization for types of open space; however, they all overlap and are similar (SG, 2008; Maruani and Amit-Cohen, 2007; PSDOE, 2004; Swanwick et al., 2003). For example, some authors categorised open space into urban open space, agricultural land,

Table 2.1 Types of urban open spaces

	Type	Description
1.	Public parks and gardens	Areas of land normally enclosed, designed, constructed, managed and maintained as a public park or garden. These may be owned or managed by community groups. Examples include urban parks, country parks, forest parks and formal gardens.
2.	Private gardens or grounds	Areas of land normally enclosed and associated with a house or institution and reserved for private use.
3.	Amenity greenspace	Landscaped areas providing visual amenity or separating different buildings or land uses for environmental, visual or safety reasons and used for a variety of informal or social activities such as sunbathing, picnics or kickabouts.
4.	Play space for children and teenagers	Areas providing safe and accessible opportunities for children's play, usually linked to housing areas.
5.	Outdoor sports areas/facilities	Large and generally flat areas of grassland or specially designed surfaces, used primarily for designated sports (including playing fields, golf courses, tennis courts and bowling greens) and which are generally bookable.
6.	Green corridors	Routes including canals, river corridors and old railway lines, linking different areas within a town or city as part of a designated and managed network and used for walking, cycling or horse riding, or linking towns and cities to their surrounding countryside or country parks. These may link green spaces together.
7.	Natural/semi-natural greenspaces	Areas of undeveloped or previously developed land with residual natural habitats or which have been planted or colonised by vegetation and wildlife, including woodland and wetland areas.
8.	Allotments and community growing spaces	Areas of land for growing fruit, vegetables and other plants, either in individual allotments or as a community activity.
9.	Civic space	Squares, streets and waterfront promenades, predominantly of hard landscaping that provide a focus for pedestrian activity and can make connections for people and for wildlife.
10.	Burial grounds	Includes churchyards and cemeteries.
11.	Other functional greenspace	May be one or more types as required by local circumstances or priorities.

Source: Scottish Government, 2008; DCLG, 2006.

rural non-agricultural land, natural area or countryside and wilderness area (Maruani and Amit-Cohen, 2007). The urban open space is further classified into Public parks and gardens, Private gardens or grounds, Amenity greenspace, Playspace, Sports areas, Green corridors, Natural/Semi-natural greenspaces, Allotments and community growing spaces, Civic space, Burial grounds and other functional green spaces (Table 2.1). However, according to Woolley (2003), based on user's point of view, urban open space can be categorised into three types: domestic open space, neighbourhood open space, and civic open space. The domestic open spaces consist of private gardens, community gardens, and allotments. The Neighbourhood urban open spaces include parks, playgrounds, playing fields and sports grounds, streets, city farms, and incidental spaces and natural green space. The civic open spaces include among others cemeteries, squares, plazas, roof gardens, ports and docks, transport and waterway corridors, woodland, and golf courses (Woolley, 2003).

2.4.3 Classification of open spaces as public and private

Open space is usually classified based on accessibility, ownership, and management. The organization of spaces is commonly done to define some areas as public and others as private (Madanipour, 1999). Open space can, therefore, be classified as private and public open space. However, a class in-between the two is semi-public or semi-private open space. Open spaces are categorized as public, private, semi-private and semi-public open space (Woolley, 2003).

Public open space is defined as outdoor areas with free access for all (Nasution and Zahrah, 2012; Grose, 2009) and popularly managed by the public sector or authority. Most successful public open spaces are multi-purpose spaces apart from providing physical access to all people irrespective of age, social and economic status, and distinguished from the demarcated territories of household (Madanipour, 1999). Public open space may be classified based on scale as local, district, regional and national public open space with National Parks at the highest level (Grose, 2009).

Private open space is any outdoor space with restricted access to the public and usually protected by temporal mean or spatial means like fences or walls (Grose, 2009; Madanipour, 1999). Visitors or strangers may have access only with permission or negotiation. Common private open spaces in a residential area are private gardens (Grose, 2009). However, in recent time, the privatization of public open spaces has been noted with the mixed attendant consequences (Nasution and Zahrah, 2012; Van Melik et al., 2009; Kirby, 2008; Kayden, 2000).

Semi-private open spaces are outdoor areas with restricted access to residents and their associated people only. They are neither exclusively private as they are shared and not public as people do not have access without invitation. In the residential area, semi-private open space includes outdoor areas around the buildings that are shared by the residents only (Shabak et al., 2015). These include courtyards to houses, communal gardens and play space (Woolley, 2003). Semi-public open spaces are outdoor spaces open to the public but limited to particular groups in the society or area. It, therefore, has an element of private character. These include a school playground, a small park or pocket park in a residential street used by surrounding houses (Woolley, 2003).

The open space classification associated with the residential environment is essential in the study, and this includes private open space, semi-private open space or shared open space, and public open space (Sivan, et al., 2012).

2.4.4 Functions, Benefits, and Demerits of open spaces

Open spaces are increasingly being recognized in the urban area to contribute to the quality of life of people in many ways (DCLG, 2014; Chiesura, 2004). Open spaces provide several benefits which some researchers designate as functions or values (Clawson, 2015; PSDOE, 2004; Lynch et al., 1995). The benefits or functions of open spaces are categorized into environmental and ecological, social, health, educational, cultural and economic benefits (RPH, 2010; Clawson, 2015; Morris, 2003; Woolley, 2003).

Environmental and ecological benefits of open spaces include climatic and environmental amelioration, noise screening, reduction of air and noise pollution. Others include storm water management, provision of air and light to buildings, environmental protection of significant values and provision of habitats for wildlife (Clawson, 2015; Gidlöf-Gunnarsson and Öhrström, 2007; Morris, 2003; Woolley, 2003).

On social benefits, evidence suggests that open spaces perform a critical role in the social life of communities. These advantages include an opportunity for children play which has several implications for children development, health, and well-being (Sanders et al., 2015; Louv, 2008), an opportunity for active and passive recreations for adults, and an establishment of a sense of place and belonging. Open spaces provide areas and facilities for leisure and recreation which facilitate social contact and

communication, and may thereby increase the sense of community, contribute to lowering of crime, and enhance of self-esteem (Wilkinson, 2003; Woolley, 2003).

On the health benefits of the open spaces, studies indicate that open spaces contribute to physical health through physical exercise, which is essential for the reduction of the risk of cardiovascular disease and other diseases, mental and spiritual health (Morris, 2003). Also, access to, and experience of, nature influence human physical and psychological health and well-being (CABE, 2009), sensory and aesthetic awareness, reduction of stress (Ulrich et al., 1991), and restorative effect (Heerwagen, 2009; Morris, 2003; Woolley, 2003; Kaplan, 1995). Likewise, educational benefits of the open spaces include the provision of 'outdoor classroom' for educational instructions and groups, and education resources for children with special needs (O'Brien and Morris, 2014; Bilton, 2010; Morris, 2003; Woolley, 2003).

On cultural significance, open spaces enhance culture by preserving the cultural and historical landscape, as well as provide opportunities for cultural expression and interactions in the community as people of different cultures come together for various celebrations of local traditions and cultures in open spaces (RPH, 2010). Similarly, economic benefits of open spaces are manifested in their impact on property and land values, provision of employment opportunities, attraction for tourism, and opportunity for fruit and crop productions (McConnell and Walls, 2005; Woolley, 2003).

However, studies have also suggested certain measures of demerits with open spaces in the urban area. These shortcomings include leapfrog development, social and individual risk factors like crime, violence, social exclusion, inequality of access, perception of fear, and increased risk factors for certain diseases (Sreetheran and van den Bosch, 2014; Jansson et al., 2013; Douglas, 2012; Nilsson et al., 2011; Jorgensen et al., 2007; Morris, 2003).

While the review of these benefits and demerits of open spaces in the urban area provided insight on the broad impacts of open spaces and was helpful in the development of the research instrument for the study, a review of open spaces issues peculiar to the residential environment is critical because of the context of the study. Therefore, the following section provides the review of information on open spaces in the residential environment.

2.4.5 Open spaces in Residential areas/Environment

Residential areas are an integral part of a city and are mostly comprised of dwelling units. They have their peculiar characteristics and are typically served by community facilities and consist of different residential developments of various dwelling types in the UK: flats, terraced houses, semi-detached house, detached house, bungalow, converted flat, low-rise and high-rise apartments (DCLG, 2013; Orford and Radcliffe, 2007). Open spaces are important components of the residential environment (Sivan et al., 2012) and are acknowledged in the UK planning policy (DCLG, 2014; DCLG, 2006; PSDOE, 2004). Residential open spaces are open spaces associated with residential settings and may include open spaces around, or closest to, home and open spaces away from home in the neighbourhood (See figure 2.10).

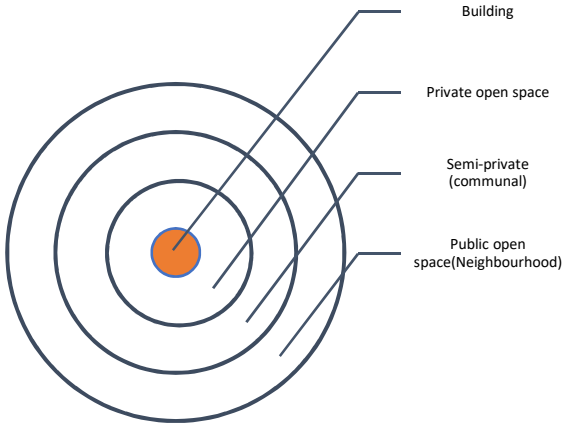


Figure 2.10 Classification of open spaces in residential area

Open spaces that are physically closest to home and are entirely for a household use, which is not shared with neighbours are designated as private open spaces (Hall, 1987). Access to visitors may only be possible through permission or invitation (Grose, 2009), although Hall (1987) suggested that being private open space does not mean freedom from intrusion. In contrast, shared open spaces are open spaces around the home that are shared by households. They may be semi-private or semi-public (Shabak et al., 2015; Woolley, 2003). Neighbourhood open spaces are the public open spaces in the residential area that are accessible to the public. They are in most cases physically further from home. These include parks, public squares, playgrounds, playing fields, streets, city farm, woodland area, allotments, river-bank, incidental space, and natural green space (DCLG, 2006; Woolley, 2003).

The implications of the public or private character of space may be more crucial in the residential environment than any other environment. The comprehension of the

peculiarity of each of this class or level of open spaces may be critical to interpreting residential open spaces. Similarly, the extent and nature of the open spaces encountered in the residential area may depend on the types of dwelling. While some dwelling types would afford access to all the levels of open spaces, some may provide an opportunity for public open spaces only, or private and public open spaces or semi-private and public open spaces.

Apart from the differences in the physical context of these open spaces in the residential areas: private, shared and neighbourhood open spaces, the social context is not the same. The neighbourhood open spaces may provide an opportunity for social contact beyond the surrounding neighbours, unlike the shared open spaces where this may be limited. The social contact for a neighbourhood open space may include different networks of people in the whole neighbourhood who are users of the open spaces (Woolley, 2003).

In the UK, private open spaces might not be popular with flats, but houses and flats are commonly associated with communal open spaces rather than individual private gardens. However, starter homes in the form of terrace houses, are either provided with private gardens or communal gardens (Hall, 1987). In the residential environment, Lawrence (1981) argued that space around the house is the transition zone between the public and private world, and can be understood as geographical and social space. Private and public have been argued to be "social constructs that conceptualize different domains of everyday life- from the interiority and privacy of our bodies and homes to the publicness of city streets and public space" (Gieseking et al., 2014, p. 183).

Lawrence (1981) suggested further that in the UK, the private open space at the front of the traditional terrace houses are comparable with the open spaces in the front of groups of dwellings that are located around communal open space (p. 203). The front space is linked to the public domain and has significant value to the residents. The boundaries between public and private are sometimes not well-defined and debated, and private, and public spaces are suggested to operate at the multiplicity of scales which overlap and intercept, creating a mosaic of spaces and degrees of access (Gieseking et al., 2014, p. 183).

Similarly, in the residential environment, public and private space could be understood in regard to ownership, individual rights, and activities. While private defines personal space and intimate encounters, public space delineates the spaces for approved social contact and interaction (Gieseking et al., 2014). The way the spaces are

organized around the house is important and determines the transition between the public and private realms of residential areas (Lawrence, 1981, p. 203).

Most investigations of the residential open spaces have been noted to focused on public spaces, especially street sides and parks (Richard et al., 1984) neglecting the private open spaces which may also be important. Hall (1987) noted that studies on private open spaces have been limited, and there was a conceptual problem arising from over-reliance on generalization towards private open spaces. He reported that there was a general assumption that larger houses are occupied by households with children who require private gardens to play in, and families without children occupy small dwellings and flats, hence have no need for private gardens. While the assumption may be true, he pointed out it was not universal and results lacked evidence to back the argument that small household doesn't require private open space.

Moreover, Hall (1987) observed that communal open space (a type of semi-private/semi-public open space) are usually provided in association with small dwellings and argued that it does not mean it could provide for the same need as a private open space. The study by Coolen and Meesters (2012) on private and public green spaces have further confirmed this assertion, and Hall (1987) suggested studies of householders' preferences between communal and private open space and open space needs of households, both large and small, may be relevant and useful to make a conclusion.

On the one hand, the argument for the importance of private open space in residential dwellings was reported in the past to be based on the compensation for the production of the agricultural land lost in the urban area since they were used to grow fruits and vegetables. Therefore, low-density houses with garden developments were thought to have advantages over the high-density house with few or no gardens. This position has been debated and almost overthrown, especially with increasing standards of living (Hall, 1987).

Notwithstanding, the provision of private open space in the residential area have been privileged by the argument of 'defensible space' of Newman (Hall, 1987). Newman speculated that crime and intrusion on the household and spoilage of open space might be reduced or avoided where the household could observe the surrounding open space from their dwellings and have ownership feelings for it rather than belonging to the community (Newman, 1996; Hall, 1987). The different types and categories of open spaces in the residential environment are important, and they may have their associated advantages and challenges. The communal open spaces for blocks

of flats have been suggested to be related to maintenance problems which may not be same with private open spaces in houses (Hall, 1987).

Based on the literature, the open spaces system in residential area or environment is illustrated in figure 2.11 below. In the context of the study, the different types and categories of open spaces identified in the literature would guide in classification of the open spaces in the case study area and questionnaire development.

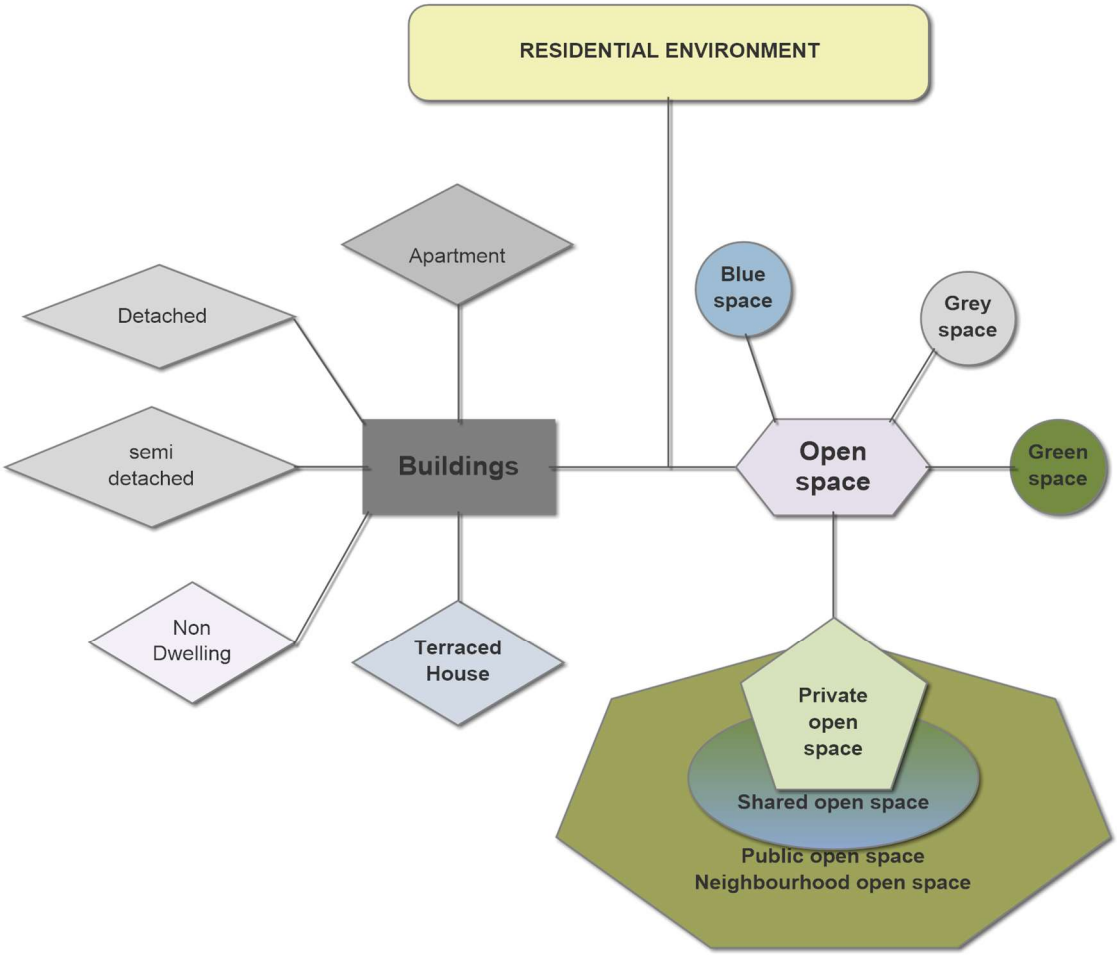


Figure 2.11 Open space system in residential area or environment

2.5 Human Well-Being and Open Spaces

2.5.1 Relationship between human well-being and open spaces

The subject of the relationship between human well-being and open spaces or outdoor spaces is widely researched today (Richardson et al., 2016; Hartig et al., 2014; O'Brien and Morris, 2014; Jackson et al., 2013; Brown et al., 2011; Jackson, 2003), and the notion of linkages between human well-being and landscapes is well established (Bieling et al., 2014; Warber et al., 2013, Abraham et al., 2010). Open space is

conceptualized as a resource and support for health and well-being (Tomao et al., 2016; Irvine et al., 2013).

The connection between humans and nature dates back to creation. Humans depended on nature for such things as food, water, and air, and had an intimate relationship with nature until the emergence of the industrialization and urbanization era. Urbanization had a strong effect on ecosystem functioning and human well-being (Pejchar et al., 2015). The impacts of urbanization are both negative and positive, and result in disconnection of human from nature (Katcher and Beck, 1987; Beck and Katcher, 1996). While the positive impact of urbanization with improved technology has increased humans' life expectancy, the changing way of living or lifestyle with new health challenges or diseases has also emerged (Maller et al., 2009; Murray and Lopez, 1996). Many of the health problems are related to the environment, and the direct effect of the environment may undermine human health and well-being, for example, air pollution, road traffic, floods and climate change (SDC, 2008).

Nature or open space in some ways may mitigate these effects, and across different cultures and societies, since ancient times to the modern day, these positive benefits of open space on health and well-being have been acknowledged and explored (Ward Thompson, 2001). Moreover, there is the application of this understanding to designs and projects, especially in hospitals, health facilities, urban design and design of gardens to improve well-being (Ulrich, 2002; Dilani, 2001). Although human well-being depends on some factors apart from the environment, evidence from the literature shows that engagement with nature or exposure to open space has positive effects on multiple dimensions of human well-being. These include physical, mental or psychological-emotional, spiritual, economic and social well-being (Tomao et al., 2016; O'Brien and Morris, 2014; Keniger et al., 2013; Nakau et al., 2013; Grinde and Patil, 2009; HCN, 2004; Morris, 2003; Irvine and Warber, 2002).

The aspect of well-being related to the built environment has been defined as a place related well-being construct by Burton et al. (2011). These researchers suggest that the place-related well-being construct can be classified into three groups: functional, social and emotional place-related well-being. Functional place-related well-being concerns some independence that participants feel they have in life, perceptions of safety, noise problems, air quality and incident of accidents or falling. Likewise, social place-related well-being deals with the perception of security or safety from crime, level of social interaction and perception of community spirit. Emotional place-related well-being encompasses self-rated quality of life, the perception of attractiveness

of the neighbourhood, satisfaction with the neighbourhood as a place and enjoyment of walking in the neighbourhood (Burton et al., 2011).

There have been empirical studies that confirm the positive relationship of open space with well-being. For example, Bertram and Rehdanz (2015) suggested that urban green space is an essential element of well-being, especially for most people in Europe living in the urban environment. And the result of their research on how urban green space affects the well-being of people in Berlin using two individual green space measures indicated that the amount of green space is related to positive well-being, with the amount of green space about a kilometre buffer produces the largest positive effect on life satisfaction. Kabisch et al. (2015) on a recent review of the subject matter, revealed that open spaces are beneficial for both the quality of life of residents of the city and the sustainability of the town itself.

Some studies found a positive association between green space and physical well-being or physical health of urban dwellers (Shanahan et al., 2016; Kabisch et al., 2015; Ward Thompson et al., 2012; Hansmann et al., 2007). For example, West et al. (2012) found an association between physical activity and park density, and Richardson et al. (2013) reported that independent of individual risk factors, neighbourhood green space was associated better with cardiovascular and mental health in a study conducted in New Zealand.

Similarly, open spaces are suggested to promote social well-being in the form of stimulating and improving social support, social cohesion, social contacts, sense of safety, social security and social integration. Besides, it reduces anti-social behaviour (Scopellit et al., 2016; Kemperman and Timmermans, 2014; Fan et al., 2011; Maas et al., 2009b; Groenewegen et al., 2006; Kweon et al., 1998). In like manner, research results from Peters et al. (2010) on social interaction in urban parks in the Netherlands suggest that urban parks may provide opportunities for intercultural interactions and thereby stimulate social cohesion.

Moreover, empirical results show that allotments and shared gardens can facilitate and promote social interaction and contribute to users' physical, emotional and spiritual well-being (HCN, 2004; Milligan et al., 2004). Likewise, in a study carried out by Warber et al. (2013) in Sheffield using large public green space to model well-being and the relationship between individuals and their environments, the results suggested that a complex holistic set of states are engendered in urban green spaces. And Warber et al. (2013) group these into seven domains or dimensions namely: physical, affective, place attachment, spiritual, cognitive, social and global well-being (p. 24). The finding

reveals multiple dimensions of well-being that are associated with urban green spaces: physical, mental, emotional, social, and spiritual, and these are interconnected and related (p. 32).

From the literature, the general pathways through which open space relates to well-being include air quality improvement, physical activity promotion, social cohesion and stress reduction, personal development and child development (Hartig et al., 2014; HCN, 2004). See Table 2.2 for dimensions of well-being benefits reported in the literature.

Table 2.2 Dimensions of human well-being benefits of engagement with open spaces or nature.

Dimension	Description	Evidence from research
Physical well-being	Positive effect on physical function and physical health	Increased physical activity, promoted recreational walking, physical outdoor activity, stress reduction, reduced blood pressure, reduced cortisol levels, reduced headaches, faster healing, addition recovery, reduced cardiovascular disease, reduced respiratory disease, reduced long-term illness, lose weight, enjoyment, and fun.
Mental well-being (Psychological and cognitive)	Positive effect on mental processes and cognitive ability	Increased self-esteem, improved mood, positive emotion, reduced anger or frustration, reduced anxiety, improved behaviour, attention restoration, reduced mental fatigue, improved academic performance, improved ability to perform task, improved productivity, improved cognitive function in children, improved learning, peace, opportunities, increased inspiration, improved safety perception, and nature connection.
Social Well-being	Positive social effect at all levels	Reduced crime rate, reduce violence, enabled social empowerment, facilitated social interaction, enabled social cohesion, social integration, and facilitated social support.
Economic Well-being	Material benefit	Food supply, money, jobs/employments.

Sources: (O'Brien and Morris, 2014; Keniger et al., 2013; Lee and Maheswaran, 2011; Abraham et al., 2010)

The importance of the quality of public open spaces to promote usage and delivery of well-being has been advanced (Adams, 2014; Francis et al., 2012; Lee and Maheswaran, 2011; Hillsdon et al., 2006; Gehl and Gemzoe, 2003). Adams (2014) suggest that an environment with high quality provides a sense of well-being and satisfaction to its users. Similarly, Gehl and Gemzoe (2003) argued that the use of public open space is influenced more by its quality than mere provision and accessibility. They suggest that while low quality open space may be used for necessary activities like dog walking, high quality open space conveys a high prospect of inviting potential users. Moreover, the results of a study by Francis et al. (2012) in Western Australian indicate that the quality of public open space is significantly and negatively associated with psychological distress, showing that quality may be more important than quantity to benefit from public open space.

However, some disadvantages of open spaces to human well-being have been noted. These disadvantages or negative effects include increased crime, and fear of crime, lack of maintenance leading to perceiving space as unsafe and opportunity for anti-social activities, and poor perception of personal safety (Sreetheran and van den Bosch, 2014; Jorgensen et al., 2007; Burgess et al., 1988). The fear of crime is associated with low quality of life (Jansson et al., 2013).

2.5.2 Human well-being and open spaces for different population subgroups

Apart from the general urban population, researchers over time have focused on specific populations or groups in the urban area to investigate the relationship between their well-being and open spaces. These include children, adolescents, elderly or senior citizens, refugees or migrants and homeless people (Orr et al., 2016; Van Hecke et al., 2016; Kabisch et al., 2015; Dooling, 2009).

Research studies and case studies show that children share many of the same benefits of well-being from contact with open spaces as adults (Dadvand et al., 2015; Sanders et al., 2015; Flouri et al., 2014; Roemmich et al., 2006). However, some specific aspects are particular or more important to children. For example, child development, and alleviation of ADHD symptoms (Munoz, 2009; Maller and Townsend, 2006). Flouri et al. (2014) have suggested from the study conducted in the UK on the subject that neighbourhood green space may promote emotional well-being in poor children.

Moreover, research studies directly related to older or senior citizens indicate an association between open spaces and positive aspects of well-being (Tang and Brown, 2006; Rodiek, 2002; Takano, 2002; Stuck et al., 1999). In the same manner, Burton et al. (2011) suggest that older people's residential environments, from the front door to the wider neighbourhood, have potential to contribute to their well-being.

Likewise, positive well-being has been reported from research results of some other distinct populations like the refugee, and hospital patients in the open spaces (Nakau et al., 2013; Haubenhofer et al., 2010; Rishbeth and Finney, 2006). For example, Nakau et al. (2013) based on their study suggest that integrated medicine put through in a green environment is helpful for the emotional and spiritual well-being of cancer patients. Also, Rishbeth and Finney (2006) found out that public open spaces provide an incredible element for integration of refugees into a new environment or society.

2.5.3 Levels of engagement with open spaces for Human well-being

The positive effects on well-being are possible by interaction or contact with nature or open space. However, people contact or engage with open space or nature differently. The contact may be indirect, incidental and intentional contact as suggested by Keniger et al. (2013) or through 'knowing,' 'perceiving,' 'interacting' and 'living with or in' as Russel et al. (2013) classified them. 'Knowing' is a metaphysical interaction that occurs through thinking about the ecosystem, its components or the notion of an ideal ecosystem in the absence of immediate sensory input (Russel et al., 2013). 'Perceiving' is associated with visual contact or information. This includes watching a nature picture or video or viewing a mountain. 'Interacting' involves active, physical and direct multisensory interaction. This includes gardening, touching plants and catching fish. 'Living in' consists of everyday repetitive, voluntary or involuntary interaction with the ecosystem in which one lives. Examples include living in woodland or forested area, or near an urban park, seashore or water corridor. However, these channels are inter-related in many ways.

Empirical evidence shows that viewing nature or open space without necessarily interacting with or living in it has a significant impact on the well-being of the viewer (see Velarde et al., 2007). The positive effects include short time recovery from stress, physical recovery from illness and overall improvement of well-being. Similarly, Ulrich (2002) reported that viewing a natural setting produced significant restoration within

less than five minutes. However, in the context of this study, being a living environment, the level of engagement of residents with open spaces or nature would include all the channels: knowing, perceiving, interacting, and living with or in (Russel et al., 2013).

2.5.4 Design criteria of urban open spaces for human well-being

Pleasant et al. (2013) identified from literature six important design principles of open spaces that would promote people's health and well-being. First is compatibility. The open spaces should be compatible with human activities and as well as encourage the activities. Second is safety and security. The open spaces should be developed to create a sense of security and safety for users (Coles, 2014). Third, the open spaces should be designed to promote sensory stimulation and target human senses. Fourth is to develop the open spaces to create 'present moment awareness' (Pleasant et al. 2013, p. 40). The fifth principle is cultural sensitivity. The open spaces must be developed to respond to the cultural heritage of the potential users to promote health and well-being. The sixth criterion supports the open spaces to be designed as a symbol or emblem for healing or metaphor for restoration or cure to which users bring their life to find meaning (spirituality). Besides, Pleasant et al. (2013) revealed that when applying these six principles, the existing site characteristics, hierarchical level of space and built landscape feature must be put into consideration. The universal design accessibility of the intended users must be given priority, and anticipated landscape materials must complement human well-being. The hierarchy of the available range of spaces which may include private, semi-private, semi-public and public must be considered, as well as the integration of appropriate landscape features into open spaces are necessary to contribute to its opportunity to promote human health and well-being.

Generally, literature has consistently suggested that engagement with natural environments or open spaces, especially in the public realm like parks, forests, woodland, leads to various benefits that relate to human well-being and involves the process of participation in physical activities, social interaction with people and exposure to natural elements (Cooper et al., 2014; O'Brien and Morris, 2014; Nilsson et al., 2010; Sugiyama and Thompson, 2007).

However, in the residential environment, the results are mixed, and it is not very clear the contribution of private open spaces to people's well-being in their dwellings (De Vries, 2006). The study seeks to investigate this and provides an understanding of

the contribution of open spaces to residents' well-being in the residential environment using terraced housing as a case study.

2.6 Human Well-Being and Open Spaces in Residential Settings

The residential environment provides the setting for daily living and various domestic activities. The residential open spaces are the settings for different family activities including gardening and other outdoor activities as well as habitat for wildlife and place to interact with nature (Booth and Hiss, 2012). The open spaces in the residential area comprise public open spaces (neighbourhood open space) and private open spaces around the house (domestic open space). However, a level between the two, semi-private open space (shared open space), exists.

Direct research studies on the relationship between open spaces and well-being in residential settings have been relatively limited compared to those in the public realm (Larsen and Harlan, 2006; Stuck et al., 1999). Most investigations on open spaces in the literature have focused on public open spaces or large open spaces in an urban area like woodland, parks, forests and street sides (Schipperijn et al., 2013; Nilsson et al., 2011; Richards et al., 1984).

Even within the literature on residential open spaces, a majority have focused on public open spaces, particularly neighbourhood open spaces (Gubbels et al., 2016; Beyer et al., 2014; Fan et al., 2011; Groenewegen et al., 2006). Besides, some previous studies have excluded private open spaces and generalized based on neighbourhood open spaces for the residential environment (e.g. Van den Berg et al., 2010).

Thus, the private open spaces in the residential settings have received little research attention in spite of their importance in the daily lives of urban dwellers (Peschardt et al., 2016; Richards et al., 1984). Some authors suggested that the little relative study on residential open spaces may be attributed to their incredibly diverse and challenging nature and possible exclusion from the direct subject of public policy and decision-making (Richards et al., 1984).

Nevertheless, the open spaces in the residential area are valuable resources that are impacted by public decisions, especially those relating to residential life (Richards et al., 1984). The importance of the residential open space, both public and private open spaces is well expressed in the UK Planning Policy Statement. The policy specifies that in any new residential development in the UK, at least 10% of the site must be laid out as open space (DCLG, 2014). And provision should be made for private open space

taking into consideration the characteristics of the proposed development and the surrounding context (PSDOE, 2001, p. 23).

Kim and Kaplan (2004) submitted that in residential environments, natural features and open space are significant for a residential feeling of attachment towards the community and residents' interaction with one another. Street design has potential to encourage walking and provide opportunity for social contact (SDC, 2008).

In one study, Ellaway et al. (2005) used data collected in eight European countries and investigated the effect of greenery and litter on being physically active and obesity in people's area of residence. Their findings suggested that respondents whose residential environment contained a high level of greenery have a possibility of being three times physically active, and forty percent less overweight or obese than others with small greenery.

Also, Kuo et al. (1998) noted that trees and grass maintenance in the neighbourhood can lead to higher sense of safety in an inner-city neighbourhood, although they also reported that overgrown or unmanaged green open space increased people's anxiety caused by fear, impacting negatively on people's well-being. Green areas in residential environments can mitigate air pollution and the urban heat island effect (Whitford et al., 2001) and promotes greater amount of time spent outdoors.

Nilsson and Berglund (2006) suggest that green space in residential area with heavily trafficked road can reduce noise annoyance, and vegetation can conceal obnoxious structures (Smardon, 1988). The landscaping around buildings can help residents to have privacy and avoid feelings of crowding (Day, 2000). In another study, Kuo and Sullivan (2001b) reported that people living in buildings with nearby nature are less aggressive and have fewer reported crimes than those areas without greenery. But Donovan and Prestemon (2012) revealed that small trees on private lots were linked to increased crime rates perhaps because the trees hinder free opportunity to monitor criminal activity.

Likewise, residents in homes close to green areas reported lower mental fatigue, felt more hopeful and less helpless (Kuo and Sullivan, 2001a), and greenness of neighbourhood is associated with stress relief and reduction, reduced anger, fatigue, anxiety, sadness and increase feeling of energy, happiness, and self-discipline (White et al., 2013; Bell et al., 2008; Taylor et al., 2002). In addition, studies on pocket parks in residential areas suggested they are associated with human well-being through provision of space for socialising, rest and restitution, restoration, increase of physical activity and

mental well-being (Cohen et al., 2014; Nordh and Ostby, 2013; Peschardt et al., 2012; Nordh et al., 2009).

At another level, some of the studies examined the relationship between open space and well-being in different residential settings like social housing, care home and among specific population groups like old people or a particular landscape like wooded land within the residential environment, and found that open space contributes to residents' well-being (Ward Thompson et al., 2013; CABE, 2010; Jorgensen et al., 2007; Rappe et al., 2006; Rodiek, 2002). For example, in a Canadian study, residents in a nursing home who could view garden had lower systolic and diastolic blood pressure and lower heart rates than residents in the control room (Tang and Brown, 2006).

Also, Groenewegen et al. (2006) indicated a positive association between the amount of green space in the living environment with physical and mental health and longevity of residents. Takano et al. (2002) in their study revealed that the longevity of some senior citizens was noted to be positively influenced by their living in the area with walkable green spaces. Similarly, in another study, outdoors shared spaces provided interactional spaces which facilitate social interaction among residents and promote their well-being in a housing estate in Algeria (Farida, 2013) and a high-rise housing in Taiwan (Huang, 2006).

However, results from some recent research studies proved contrary (Dunstan et al., 2013; Mass et al., 2009b; Mass et al., 2008; Sugiyama et al., 2008; Thomas et al., 2007) and show mixed findings. For example, Sugiyama et al. (2008) investigated the association of perceived neighbourhood 'greenness' with perceived physical and mental health, and whether walking and social factors were responsible for the relationship in a study at Adelaide, Australia. Their study results indicated that perceived neighbourhood 'greenness' was more strongly associated with mental health than with physical health, and it was not clear if walking in the green space contributed to health.

Moreover, most studies credit the relationship between human health and well-being and open space to social contact and inclusion. But, Maas et al. (2009b) in their study to investigate whether social contact could explain the relationship between green spaces and health among residents in the Netherlands, discovered that the amount of green space in the living environment is positively related to people's feeling of loneliness and shortage of social supports, especially for the elderly, children, and low-income people. Likewise, Thomas et al. (2007) in a study on the relationship between mental health and quality of residential environment conducted in South Wales, UK, reported that there was no evidence of association between the residential

environmental quality or geographical accessibility of services and mental well-being. They suggested for mental well-being, the psychosocial environment would be more relevant than the physical environment.

Similarly, Van Herzele and De Vries (2012) explored the relationship between the greenness of the local environment and health and well-being of residents in two neighbourhoods that were akin in demographic and other environmental characteristics but differed objectively in green space. The results of their study signify that there was no significant difference between the two neighbourhoods for the health indicators, although there was a significant difference with regard to the overall well-being of the residents. In the same token, Dunstan et al. (2013) examined the impact of the physical environment on health and well-being in a study conducted in South Wales. The study employed objectively measured residential environment and self-reported health, and results of the study show that the measures of green space were not associated with self-reported health; however, physical incivilities, territorial functioning, and defensible space were reported related to green space.

Based on the available literature, the empirical submission on the relationship between well-being and open spaces in the residential environment is contradictory, making research lacking and our understanding inconclusive on the subject (Van Herzele and De Vries, 2012). However, there could be several constraints for the mixed findings. For example, some studies were carried out in a variety of settings, and it was assumed that exposure to nature or open spaces would be mostly similar irrespective of the physical configuration (Rohde and Kendle, 1994). Besides, some of the studies used a single measure of self-reported general health or well-being or indicator to represent health and well-being which is multi-dimensional in reality (Fayers and Sprangers, 2002; Dunstan et al., 2013).

Moreover, while some studies showed a positive relationship between well-being and open spaces, they argued that the amount of available green space correlates to health and well-being, and concluded that people living in greener areas are healthier than people living in less green area (for example, De Vries et al., 2003). These generalizations may be misleading because the assumption of homogeneity of the living environments does not exist in real life (Dunstan et al., 2013). Similarly, in the UK, for example, the residential environment in a neighbourhood consists of different dwelling types ranging from detached, semi-detached, terraced, flat, shared and unshared flats, high rise and low-rise flats (Orford and Radcliffe, 2007) and the opportunities offered by each to residents to engage with nature and open space cannot be the same. Each

home is characteristically different, and both the physical and social environment in a particular neighbourhood may not be homogenous (Dunstan et al., 2013) and encounter with its natural environment in many cases would involve physical interaction (Larsen and Harlan, 2006). Housing types and densities have been hinted to impact on residents' experiences (Evans et al., 2001).

Furthermore, the difference in the way the green space in the living environment is operationalised may be substantial and interfere with findings. For example, Maas et al. (2008) examined the relationship between the amount of green space in the living environment and people's health and well-being in the Netherlands. However, to operationalize the green spaces in the living environment, the study design exempted gardens and small-scale green spaces like roadside trees and grass verge that do not have a dominant position in the grid cell. The concern is that with this exclusion, these green spaces may have been underestimated in the study.

Gardens can be used to increase tree cover, and the coverage of trees within the residential area excluding other vegetation has been suggested to have implication for residents' health and well-being (Smith et al., 2008). Private gardens are important to residents and highly valued by many people (Bhatti and Church, 2004). In a survey in the UK, over 75% of residents preferred private gardens to shared communal spaces (CABE 2005). In Sheffield, 64% of households were reportedly located more than 300m from the nearest public green space and 72% more than 300m along the road from the closest municipal park (Barbosa et al., 2007). These may impact negatively on the opportunity to visit a park and encourage maximum private garden usage.

Garden planting and usage by residents have been suggested to contribute to their well-being, and the characteristics of these gardens or private spaces are also important for social and environmental benefits (Smith et al., 2008). Other studies assume the availability of front garden as greenery, but the reality is that front gardens are being lost and a quarter of them may have a paved surface (Alexander, 2006). Assumptions about garden size may also be flawed as modern houses built in England since 2000 have been observed to have little garden space (CABE 2005).

However, where objective measurements were used in the operationalization of residential physical environments, especially the open spaces, limitations still abound due to the peculiarity of residential environment. Several elements of the physical environment may not be adequately accounted for even in objective measurements that may impact findings. For example, residents with access to private open space around their homes can increase the opportunity for contact with nature, especially those in

low-density areas or detached buildings. So, private outdoor open spaces may be significantly affected by increasing density and other local conditions in a residential environment (Lachowycz and Jones, 2013). While tall boundaries may limit opportunity for interaction in private spaces, low boundaries can facilitate interaction (Thwaites, 2001) and increase social contact, although individual differences may apply as the feeling of being watched by others could limit the usage (Beer, 1983). All these may have implications for delivery of well-being benefits of open space in the residential environment.

Also, unlike other settings (e.g., parks), in the residential context, windows are readily available, and Kaplan, R. (2001) suggests that green view from home can provide restoration opportunities that could improve well-being. What can be seen from the windows of two similar homes in the same residential area may vary considerably and produce different results. In the same way, Van Herzele and De Vries (2012) suggest that a different mechanism from other environments or a combination of mechanisms or interrelated mechanisms may be applicable in the residential environment, and submit that because of the impact of green views, evaluation of open space in terms of surface area, physical distance from accessible green area and garden availability alone, may not be sufficient.

The current study would, therefore, combine different approaches to explore the contribution of open spaces to residents' well-being in the residential environment. It would investigate a particular type of dwelling, terraced housing, rather than all dwelling types in the study area. Similarly, the study would focus on the private and shared open spaces around the terraced buildings, as well as their relationship with other public open spaces in the residential environments of which they together form a network of open spaces.

2.7 Dominant Theories related to Open Spaces and Well-Being

Different theories, models, frameworks, and approaches, have been suggested to explain the relationship between the environment and human well-being across different disciplines and contexts. These include Kaplan's attention restoration theory, Ulrich's psychophysiological stress reduction theory, Biophilia, model of environmental effect on mental and physical health, psychosocial stress and health model, sense of place theory, therapeutic model, salutogenic model, preference theory, prospect-refuge theory,

and supportive environment theory (SET) or scope of meaning theory, and ecological theory (Warber et al., 2013; Grahn, 2005).

However, in the context of the residential settings, some dominant theoretical perspectives that have been used to explain the relationship between human well-being and nature or open spaces include biophilia theory (Grinde and Patil, 2009; Heerwagen, 2009), Ulrich's stress reduction theory, attention restoration theory and sense of place theory (Lachowycz and Jones,2013; Herzog and Strevey, 2008; Stigsdotter and Grahn, 2004; Stigsdotter and Grahn, 2002). A brief description of each of them is thus provided.

2.7.1 Ulrich's psycho-evolutionary theory

The psycho-evolutionary theory by Ulrich (Ulrich et al., 1991; Ulrich, 1983) combines the framework of aesthetic preferences, emotional and physiological arousal responses to natural content and recovery (Ulrich, 1983). Ulrich's stress reduction theory predicts that contact with nature should reduce stress reactions, enhance positive affect and reduce negative affect (Ulrich et al., 1991; Ulrich, 1983). Different everyday outdoor environments have been suggested to have different influences on stress recovery, and not necessarily unusual or extreme setting of the natural environment (Ulrich et al., 1991). Therefore, open spaces encountered daily in the residential settings may constitute environments that are essential to stress reduction and well-being.

2.7.2 The attention restoration theory

The attention restoration theory was developed by the Kaplans (Kaplan, 1995; Kaplan and Kaplan, 1989) and concerns directed attention. Directed attention is a type of attention that requires mental effort and can be fatigued from overuse (Herzog and Strevey, 2008), leading to inability to focus or plan, irritability, stress, anxiety and a tendency towards unsocial behaviour. The attention restoration theory proposes that certain settings, called restorative settings, could provide better concentration and recovery or restoration from attention fatigue and suggested such settings would have the following four properties: fascination; being away, meaning that setting is physically or conceptually different from the usual environment; extent and compatibility. The theory predicts that contact with nature should provide recovery from attention fatigue and improve any function related to directed attention, leading to positive personal well-being. Depending on the design, open spaces in the residential setting may have restorative properties that could impact well-being of users.

2.7.3 The biophilia theory

The biophilia theory was developed by Edward Wilson and describes the human's natural hereditary inclination towards the natural world or nature due to human evolutionary history (Grinde and Patil, 2009; Wilson and Kellert, 1993). Wilson (1984) defined biophilia as the 'innate tendency to focus on life and life-like processes' (p. 2). The theory proposes that human is characterized by predisposition to pay attention to, associate with or otherwise respond positively to nature, and the positive responsiveness is partly based on genetic reason (Ulrich, 1993). The theory explains further that humans have an evolutionary biological need for nature which is necessary for human physical and mental well-being development (Wilson, 1993, Wilson, 1984). Theoretically, residents should value open spaces around their houses as a type of natural environment in the residential environment and respond by affiliating with nature, and contribute to their sense of well-being (Heerwagen, 2009).

2.7.4 The sense of place theory

The sense of place theory relates to various aspects of the interaction between people and places, and the effects such places have on people (Hashemnezhad et al., 2013). Hashemnezhad et al. (2013) describe sense of place as 'the relationship between man, his image and environmental characteristics' (p.7). It is a concept that is based on the subjective experience of people and as well affected by objective and external influences of the environment, landscape, smell, and sound, resulting in the various connections between individuals and places (Hashemnezhad et al., 2013, p.7). Also, as a concept, it proposes a personal tie to the natural world and has other constructs related to it, such as place identity, place attachment, place dependence and place satisfaction (Warber et al., 2013; Deutsch et al., 2011). Theoretically, because of the possibility of transition of the open spaces around the home to a place, the resulting emotional attachment between residents and their open spaces may contribute to residents' well-being.

Generally, the understanding of these theoretical perspectives is important in the study, and helpful in the development of the research instrument, analysis, and interpretation of the findings from the study.

2.8 Summary and Conclusion of the literature

The chapter has provided a general review of concepts and meaning of well-being as well as that of the open spaces and current understanding of the relationship between well-being and open spaces. The review shows that well-being is a broad term and has been conceptualised and defined in many ways depending on context (Fletcher, 2016) Hurley and MacQueen, 2015), with no single standard definition (Dodge et al., 2012).

Generally, well-being encompasses a range of domains and dimensions and relates to one's quality of life in all the aspects of one's life (Gough and McGregor, 2007; Spence et al., 2011). It has both objective and subjective dimensions (Eurostat, 2008; Gough and McGregor, 2007) and assessed using either life satisfaction, happiness or quality of life conception (Gough and McGregor, 2007).

However, in this study, well-being is considered as a dynamic and positive physical, social and emotional state (multidimensional construct) (Steuer and Marks, 2008). It is a place related well-being (Burton et al., 2011) and covers the functional, social and emotional dimensions. It relates to how people feel and function in a place, at personal and interpersonal levels, and expressed by individual subjective happiness (Brown et al., 2012; Newton, 2007) or satisfaction in a particular domain (Muirhead, 2011; Fleuret and Alkinson, 2007).

Moreover, open space is regarded as an external environment, which is the space outside the building, that may be grey or green, and may be differentiated to private open space, semi-private open space or shared open space, and public open space or neighbourhood open space. In the context of the study, open spaces are the space outside the building that are physically closest to home and are either entirely for a household use, or shared with neighbours. The open space that is exclusively for the use of a household in a house, and not shared with neighbours is a private open space, while the one shared with neighbours is shared open space. Examples of such open spaces in and around the terraced housing include front garden or yard, back garden or yard, side garden or yard, alley way, parking space and common access. Also, neighbourhood open spaces are the public open spaces in the residential area that are in most cases physically further from home and accessible to the public. Examples include parks, pocket parks, public squares, playgrounds, playing fields, and streets.

Furthermore, from the review, it is clear that there had been research and advances to understanding the relationship between human well-being and open spaces. While there are established links between human well-being and open spaces in the public or non-residential environments, the understanding of the relationship in the

residential environment is limited, mixed and equivocal (Lachowycz and Jones, 2013; Hartig et al., 2014). Many of the existing research in the literature on the residential environment focused on the public open spaces or neighbourhood open spaces in residential areas with the exclusion of private open spaces and sometimes generalized for the dwellings type as if they are homogenous. Both the private and public open spaces in the living environment are valuable for people's well-being. While the study on the residential environment may be challenging, the fundamental unanswered question remains on how and why open space affects human well-being in the residential environment, especially private and shared open spaces. These issues demand better and improved understanding of the relationship of human well-being and open spaces in this vital environment.

The current study would investigate the contribution of open spaces in residential environments, mainly private and shared open spaces, to the well-being of the residents, using terraced housing as a case study. It attempts to gather empirical evidence from residents on their perceptions of how their open spaces impact their well-being. It uses quality of life and life satisfaction conceptions to study people's well-being (Meiselman, 2016, Selwyn, 2015, Gough and McGregor, 2007), investigating directly about the perceived impact of the immediate external environment residents' quality of life and their satisfaction with the external environment as a domain. It, therefore, employs the well-being declared by the residents (Rojas, 2007).

Similarly, the literature would be applied to develop the research instrument for the research study. Besides, at the analysis stage, the literature would inform the development of predetermined codes that would be initially applied for theme generation from the data and interpretation of the findings.

CHAPTER THREE RESEARCH METHODOLOGY

3.1 Introduction

The chapter provides the theoretical and practical issues of data collection for the research to answer the research questions. It begins with the aim and research questions of the study and explains the epistemological and theoretical stance adopted for the research and its interrelatedness to the data collection strategy. Also, it provides information about the research design, research location, ethical issues, and concludes with the limitations of the methodology.

3.2 Research Approach

The research approach is the general plan and procedures for conducting a research study including the philosophical assumptions being adopted by the researcher in the study. The choice of a research approach for a study is suggested by Creswell (2014) to be influenced by the nature of the research problem, the researcher's personal experiences and the audiences for the study. The research approach adopted for this study is influenced by the research aim and research questions being addressed. The overarching goal of the research as indicated earlier in chapter one is to improve our understanding of relationships between human well-being and residential open spaces with a focus on terraced housing in Sheffield, UK and through the residents' lens.

Therefore, the study seeks to explore residents' perceptions of the contribution of the open spaces in and around their terraced houses to their well-being. The research questions the study would attempt to provide answers for include:

1. What are the typologies of open spaces in the terraced housing of Walkley neighbourhood of Sheffield as typical of residential setting?
2. How do the residents of the terraced houses use the open spaces in their residential environment?
3. What factors determine or affect residents of the terraced houses on how they use the open spaces in their residential environment?
4. What are the benefits and problems derived or encountered by the residents of terraced housing from the uses of their open spaces?
5. How do these benefits or problems experienced by the residents of terraced housing from the uses of their open spaces relate to their well-being?
6. What is the relationship between the different types of the open spaces available to residents of terraced housing in the residential environment?

7. How can the open space system of the terraced housing be improved to support the delivery of well-being to residents of terraced housing in the residential environment?

3.3 Philosophical Worldview of the Study

Any form of inquiry is based on a particular approach that is known as the paradigm (Atieno, 2009) and different paradigms are applicable in research. A research paradigm, which is referred to as worldview by other scholars (Creswell, 2014), is a set of fundamental assumptions and beliefs as to how the world is understood, and forms a framework that guides a researcher's actions (Wahyuni, 2012). A paradigm is made up of ontology, epistemology, methodology and methods (Creswell, 2014). Ontology is the nature of reality while epistemology is how we gain knowledge of what we know (Bryman, 2012; Creswell and Clark, 2011). Each worldview or paradigm a researcher brings to a study is based on a particular philosophy that eventually influences the choice of a particular research approach (Creswell, 2014; Scotland, 2012). From the literature, the different identified research paradigms include positivism, post-positivism, interpretivism or constructivism, critical social theory or critical paradigm and pragmatism (Creswell, 2014; Bryman, 2012; Wahyuni, 2012; Scotland, 2012; Weaver and Olson, 2006).

The positivism worldview is also referred to as positivist or post-positivist research, and empirical science. The philosophical stance of post- positivism is based on causes that determine effects or outcome (Creswell, 2014) and the social world is studied or understood through the lens of the natural world (Creswell, 2014; Bryman, 2012; Scotland, 2012). While the ontological position of positivism or post-positivism is realism: an object having an existence independent of the knower (Scotland, 2012), the epistemology is objectivism. Therefore, the knowledge that comes from this worldview is based on only observable phenomena and measurement of the objective reality providing credible fact and generalizations of finding. The methodology associated with post-positivism is quantitative, and the discoverable knowledge is taken here to be absolute (Creswell, 2014; Scotland, 2012). However, post-positivism has been criticized that absolute truth is rare and unlike objects that humans construct their social world and knowledge (Weaver and Olson, 2006).

In constructivism or interpretivism, the nature of reality is socially constructed, subjective, multiple and may change (Bryman, 2012; Wahyuni, 2012). Hence, individuals develop personal meanings of their experiences that are varied and

numerous, leading to a complexity of views for the researcher to consider (Creswell, 2014). The interpretive approach provides insight and understanding of behaviour and explains actions from the perspective of the participants. The methodology associated with interpretivism or social constructivism is qualitative research (Creswell, 2014; Creswell and Clark, 2011). Interpretivism worldview has been criticized for lacking objectivity and associated with limited generalizability (Weaver and Olson, 2006). Further criticism has been linked with its potential to compromise participant's privacy, autonomy, and control due to needed interaction and dialogue with study participants (Scotland, 2012). Some examples of methods associated with interpretivism are interviews, focus groups, open-ended questionnaires or surveys and observation. Similarly, methods associated with positivism are experiments and surveys (Scotland, 2012; Creswell, 2014).

While the principal research question of the study explores the use of open spaces in the terraced housing by residents and the subjective, multiple meanings or interpretation of the contribution of the usage of the open spaces to their well-being, the interpretative perspective is favoured. However, other sub-research questions require a perspective beyond interpretivism alone to give a full picture. The endorsement of a single paradigm in the current study may, therefore, confine the inclusion and discoverability of valuable knowledge that a single chosen paradigm may be limited to uncover. Taking the positivist perspective alone in this study may elude for example some dimensions of well-being like spiritual aspects and relationships within ecological environments (Weaver and Olson, 2006; McLeroy et al., 1988), while the interpretivist approach alone would limit generalization and prediction which is valuable in the study.

Therefore, for the current study, a pragmatic approach is adopted. The pragmatic worldview is a philosophy based on applications, what works and solutions to a problem (Creswell, 2014). It permits the usage of many ways to collect and analyse data that best suits the research need and purpose (Creswell, 2014; Creswell and Clark, 2011).

3.4 Research Design

In line with the pragmatic worldview adopted for the study, and the reality of available resources to execute the research, a case study, and a combination of qualitative and quantitative approach was chosen. A case study research strategy "investigates a contemporary phenomenon within its real-life context, especially when boundaries

between phenomenon and context are not clearly evident" (Blaikie, 2010, p.189). It is a research strategy and not necessarily a methodology, and aligns with either experimental, qualitative, quantitative or mixed method research (Blaikie, 2010; Yin, 2013). As a strategy, it is "a choice of what is to be studied" (Stake, 2005, p. 443). The residential environment within which the subject of inquiry is located consists of mixed systems of housing, open space, and demographic composition. However, the terraced housing is selected as a unit against other housing types in the study area for the research study. The researcher contemplated that different dwelling types may produce different results, as a recent survey indicates a significant association between the dimension of well-being for older people and their house type and form (Burton et al., 2011).

The choice and interest in the terraced housing is informed by its relevance and popularity among housing stocks in the UK currently and possibly in the coming years. Studying all the terraced houses in the city would be ambitious. Hence the research is designed to explore a particular neighbourhood in Sheffield. The city is divided along administrative boundaries to Wards and neighbourhoods. However, Walkley neighbourhood is favoured, considering the availability of a vast number of Victorian terraced housing in the location. Therefore, the study is designed to focus on residents of terraced housing in Walkley neighbourhood in Sheffield, UK.

Three different approaches have been identified applicable in research studies (Creswell, 2014). These approaches are quantitative, qualitative and mixed methods. A qualitative approach is a method of exploring and understanding the meaning individuals attribute to a social or human problem (Creswell, 2014). A quantitative approach is a method to examine the relationship between variables and test a theory. The mixed methods approach is the combination of both approaches. The quantitative and qualitative approaches have been argued not to be regarded as stiff opposition and dichotomies but rather as being on 'different ends on a continuum' (Creswell, 2014, p. 3). A study has been suggested to incline to be more quantitative than qualitative or more qualitative than quantitative. So, mixed methods research lies between the middle of the continuum, the qualitative and quantitative (Creswell, 2014). The mixed methods form of inquiry, therefore, collects both quantitative and qualitative data and integrates them to give a complete picture of the research problem (Creswell, 2014; Leedy and Ormrod, 2014). "It combines methods, a philosophy and a research design orientation" (Creswell and Clark, 2011, p. 5).

Researchers in studying the relationship between human well-being and health and open spaces have utilized any of the approaches depending on their research questions and research design (Brown et al., 2011). While some authors applied a quantitative approach in their studies using objective or subjective measure of well-being and open spaces (See Bertram and Rehdanz, 2015; Burton et al., 2015; Ward Thompson et al., 2012; Gidlöf-Gunnarsson and Öhrström, 2007; Groenewegen et al., 2006; Fredrickson and Anderson, 1999), others used a qualitative approach (See Bieling et al., 2014; Burton et al., 2011; Sowman, 2013). However, some studies in recent times have applied a mixed methods approach, integrating the benefits of the two methods (See Lee et al., 2016; Peschardt et al., 2016; Carroll et al., 2013; O'Brien and Morris, 2013; Ward Thompson et al., 2013; Groenewegen et al., 2012).

McCormack et al. (2010) in their review of qualitative research studies on physical activity and open space concluded that both qualitative and quantitative methods are necessary and afford useful information in understanding different aspects of the relationship. Similarly, King et al. (2014) in their review of concept, dimensions, and methods of the subject matter advocated the combination of quantitative and qualitative approaches as an adequate and appropriate methodological approach for measuring human well-being in the socio-ecological context. The combination of two or more methods might complement for the weakness of using a single method (Brown et al., 2011).

The relationship between humans and open spaces is complex and occurs at multiple levels in a variety of contexts (Maller et al., 2009), and human well-being in this study is regarded as a dynamic and multi-dimensional state. Therefore, considering the nature of the study and the research questions, both qualitative and quantitative approaches are applied. Qualitative approach is appropriate in a study interested in understanding how people interpret their experiences, and the meanings they attribute to their experiences (Bryman, 2012; Blaikie, 2010; Merriam, 2009). This is relevant and useful in the study because the residents of terraced housing would have the opportunity to provide their subjective interpretations and perspectives of how the open spaces they experience daily in their settings contribute to their well-being, especially the private or the shared open spaces.

The study expects multiple perspectives and production of an emerging picture of a multi dimension of human well-being related to open spaces in terraced housing (Creswell, 2014). The quantitative approach is applied to research questions dealing

with the relationship between variables related to the open spaces and well-being of residents which may not be handled by qualitative approach but quantitative design.

Table 3.1 Matching research questions with research design used in the study.

	Research question (Rq)	Research Design
Aim	To improve understanding of relationships between human well-being and residential open spaces with a focus on terraced housing in Sheffield, UK.	Qualitative Quantitative
Rq1	What are the typologies of open spaces in the terraced housing of Walkley neighbourhood of Sheffield as typical of residential setting?	Qualitative
Rq2	How do the residents of the terraced houses use the open spaces in their residential environment?	Qualitative Quantitative
Rq3	What factors determine or affect residents of the terraced houses on how they use the open spaces in their residential environment?	Quantitative Qualitative
Rq4	What are the benefits and problems derived or encountered by the residents of terraced housing from the use of their open spaces?	Qualitative
Rq5	How do these benefits or problems experienced by the residents of terraced housing from the use of their open spaces relate to their well-being?	Qualitative
Rq6	What is the relationship between the different types of the open spaces available to residents of terraced housing in the residential environment?	Quantitative Qualitative
Rq7	How can the open space system of the terraced housing be improved to support the delivery of well-being to residents of terraced housing in the residential environment?	Qualitative

The current research utilized both the qualitative and quantitative methods (Table 3.1), and therefore, has potentials to "increase the interpretability, meaningfulness and validity constructs and inquiry results" by capitalizing and neutralizing the strength and biases of the two methods (Greene et al., 1989, p. 259). Where research takes place is also important for research design, and the context of the research is provided in the following section.

3.5 Research Location

3.5.1. Sheffield

The study was conducted in Walkley neighbourhood in Sheffield, United Kingdom (Figure 3.1). Sheffield is one of the traditional industrial cities of England (Figure 3.2) founded in the early 12th century and has today developed to be ranked the third largest metropolitan city with a population of about 563,749 in 2014 (SCC, 2015). Sheffield is

located in South Yorkshire and covers about 360 square kilometres, with residential and industrial zones more than 25% of the land area. It borders Barnsley, Derbyshire, and Rotherham to the North, South, and East respectively. Sheffield has a good green infrastructure and is noted to be Britain's greenest city with over 170 woodlands and 78 public parks (SCC, 2016).

Figure 3.1 Study area- Sheffield in the national setting (Source: Global City Map)

The population of Sheffield is ethnically diverse comprising a majority mixed white and about 19% of minority or black ethnics which includes among others from Pakistan, Caribbean, Indian, Chinese and Bangladeshi communities (SCC, 2016). Sheffield has about 238,000 households with about 33% being single person households (SCC, 2016). The housing sector is made up of social and private housing with the larger percentage of households in the private sector are homeowners. The housing stock by dwelling types comprises of 36% semi-detached, 27% of terraced housing, 14% of detached houses and 22% others including apartments, flats, and maisonettes (SCC, 2013b). Sheffield is ranked 60th most deprived local authority in England out of 326 in 2015 based on the measure of the Index of Multiple Deprivation, using the indices from the seven domains of income, employment, health and disability, education, housing and services barriers, crime and living environment (SCC, 2016). The life expectancy for men and women in Sheffield is 78.9 and 83.2 years respectively,

which is lower than the England average (Davis, 2016; NHS, 2012). The city has two universities and several educational and public facilities to support the city population. Sheffield is divided into 28 electoral wards and many neighbourhoods (Figure 3.3), of which Walkley neighbourhood is one (SCC, 2016).

Figure 3.2 Aerial view of Sheffield (Source: Licenced Shutterstock 475855927)

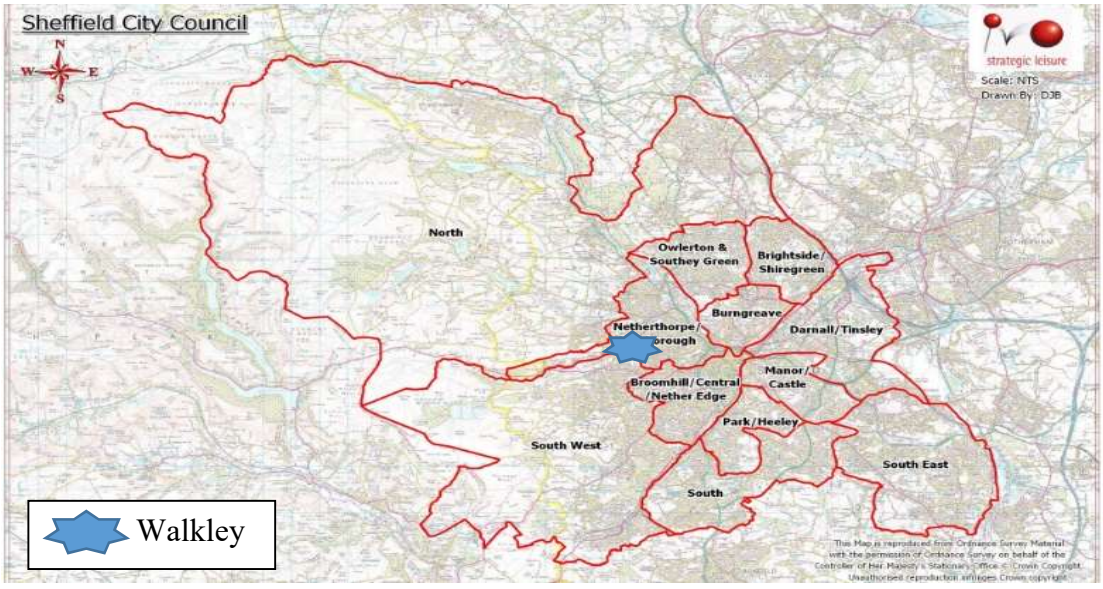


Figure 3.3 Map showing Walkley in Sheffield Area (Source: Sheffield City Council)

3.5.2 Walkley Neighbourhood

Walkley Neighbourhood is one of the many neighbourhoods in Sheffield (Figure 3.4). It is located North-West of the city centre and along a steep hillside. The neighbourhood is bounded by Crookes, Langsett, Birkendale and Walkley Bank neighbourhoods. Walkley neighbourhood and other five neighbourhoods constitute the Walkley ward. The wards and the neighbourhoods are administrative boundaries or delineated areas in the city.

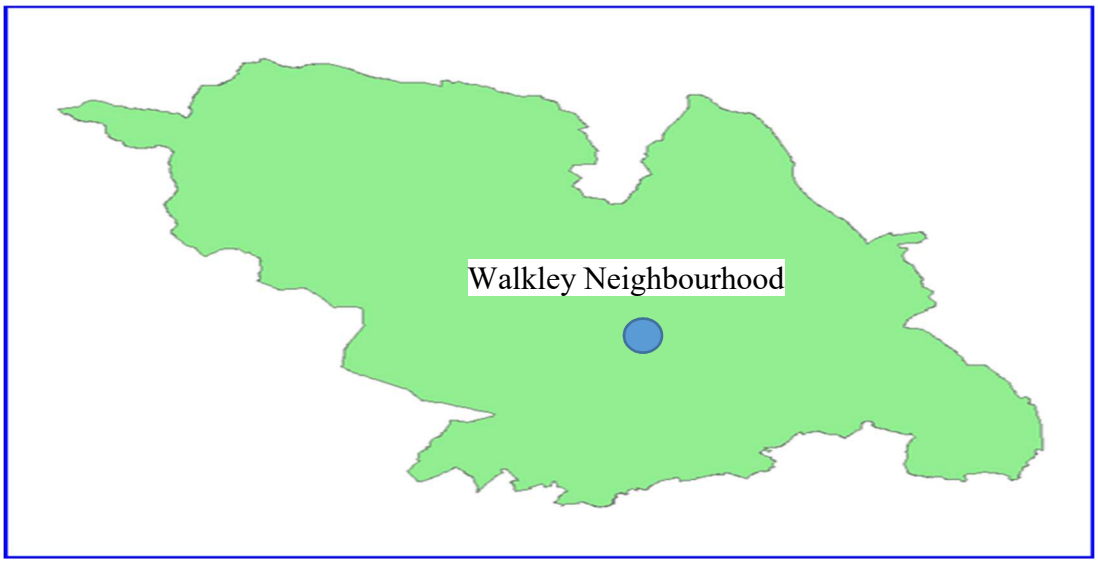


Figure 3.4 Walkley Neighbourhood in the Sheffield city setting

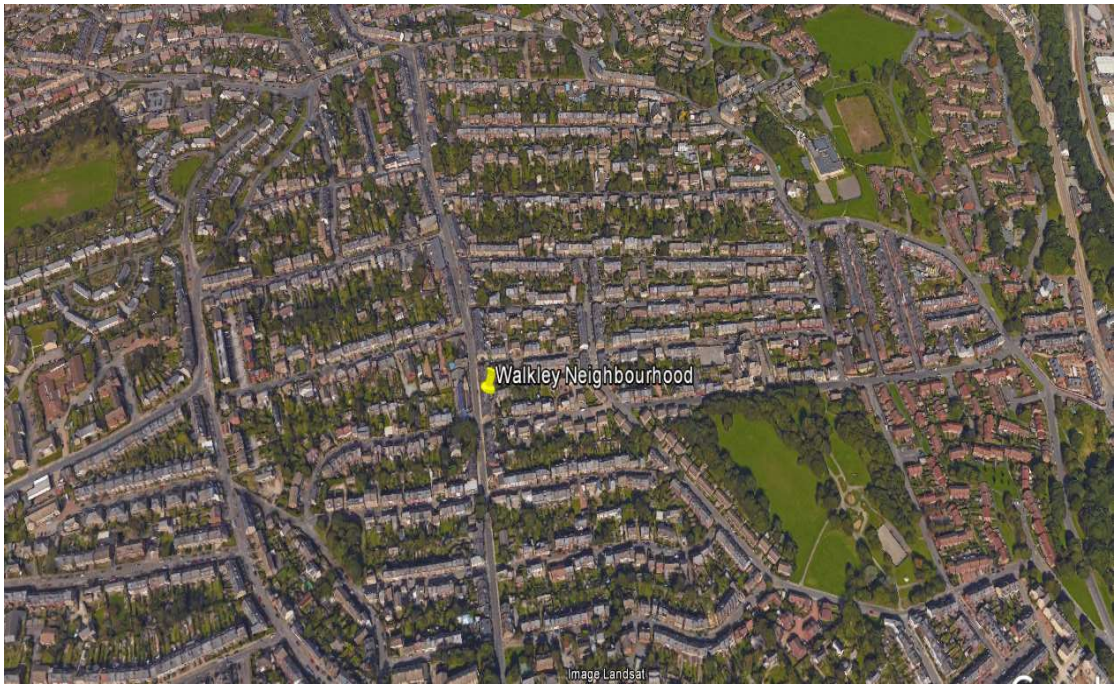


Figure 3.5 Aerial View of Walkley Neighbourhood (Source: Google Earth, 2016)

Walkley neighbourhood (Figure 3.5) is a densely-populated area with a total population of 5032, out of which 52% are male (SCC, 2013a). The neighbourhood has a larger proportion of young people compared with the older population: about 11.9% are 65years above, 11.5% below 15 years, 13.9% are 15-24 years while 25-64 years is 62.7%.

Figure 3.6 Walkley Library on South Road at Walkley neighbourhood (Source: BBC. CO. UK)

Figure 3.7 Carr road & Industry street at Walkley neighbourhood (Source: Author survey, 2015)

Based on the measure of the Index of Multiple Deprivation, Walkley neighbourhood lies in between the twenty-nine most deprived and ten least deprived neighbourhoods of Sheffield (Rae, 2011). In addition, the rate of anti-social behaviour and the crime rate are lower in Walkley neighbourhood than the average citywide. Single person, family and couple household types are available in Walkley neighbourhood with the number of single person households the highest.

Walkley neighbourhood consists of mixed housing types but dominated by Victorian terraced properties. Other house types include semi-detached, detached, flats and apartments. The terraced houses are distributed across different streets in the neighbourhood. While some of the terraced houses and other types of available homes have front gardens, and set back from the street, some have none.

The South road, where the majority of the public facilities like a library (Figure 3.6), cafes, shops, pocket park, pubs, health centre, mini bank and ASDA shop are located, constitutes the neighbourhood's major focus. Ruskin Park which is a public and large park is also located in the neighbourhood. In the Walkley ward, the median household income is £220, which is lower than the citywide average. About 56.8% of the households are car owners, and 27.5% of the children in the ward are at risk of living in poverty (SCC, 2013a; SCC, 2016b).

3.6 Research Method

3.6.1 Research Strategy

To answer the research questions and fulfil the aim of the study, both desk work and fieldwork are required. The former involves the review of the literature on human well-being and open spaces generally and then how it has been applied in the residential environment. This was contained in chapter two. The field work requires gathering data from residents of terraced houses in the study site. The literature revealed that two or three distinct types of open spaces are encountered in the residential setting: the public, semi-private or shared and private (Gieseking et al., 2014; Hall, 1987). One of the gaps identified from the literature review was the exclusion of the private and semi-private or shared open spaces by researchers when studying residential open spaces and well-being. The public open spaces in the form of neighbourhood and pockets parks have dominated studies on the residential environment (Burton et al., 2015). While the study examines the open spaces in the residential environment, private, semi-private and public, it concentrates on the immediate open spaces around houses. Of course, these

cannot be studied and understood in isolation but as part of the network with the neighbourhood open spaces to form the residential open spaces system that is related to residents' well-being.

Since the study is designed as a combination of both qualitative and quantitative approach, a decision was made on the data collection procedure and instrument. Quantitative design requires some sufficient number of the study population to be representative of the sample population to generalise the results of the study for the sample population, but the qualitative design is the opposite (Creswell, 2014; Bryman, 2012). The qualitative design suggests a purposive selection that can best help the researcher to understand the problem and answer the research questions, and a smaller number of participants than quantitative approach (Creswell, 2014; Bryman, 2012; Merriam, 2009).

So, in line with the chosen paradigm for the research, and considering the nature of the study, and the research design, survey and mapping methods were deemed most appropriate. Survey method is also known as cross-sectional design (Bryman, 2012), although it may be designed to be used in longitudinal study (Creswell, 2014). While data collection takes place only at one point in cross- sectional surveys, it occurs more than once over time in longitudinal research design (Creswell, 2014; Bryman, 2012).

In this study, the cross-sectional survey would provide some advantages and therefore be adopted. First, it offers the opportunity to examine more than one case, several terraced housings in the study area could be explored. Second, data of interest are collected at a single point in time offering an advantage for time and resources management. Third, it provides an opportunity to examine possible relationships or associations between variables which is part of the study intention. Besides it provides for replicability and high validity, especially when sample are randomly selected (Bryman, 2012; Salant and Dillman, 1994). More importantly, the survey design fits within both quantitative and qualitative research strategies (Bryman, 2012), which is the overarching research design for the study.

The second strategy involves mapping approach. Behavioural mapping method is described by Cosco et al. (2010) as "an objective method of observing behaviour and associated built environment components and attributes" (p 513). It permits a researcher to determine how participants use a designed space and users' behaviour associated with physical characteristics of outdoor areas (Bell et al., 2011; Cosco et al., 2010). Behavioural mapping strategy has been used in studies of outdoor area or human-made environment (Cosco et al., 2010; Nickerson, 1993).

In this study, the mapping strategy would be used by the researcher to identify and observe different types of open spaces available in the study area. Similarly, another form of mapping would be applied by participants to document physical characteristics of their private and shared outdoor areas and spatial relationships. The strategy provides an innovative approach to collecting spatially related data and representation of experienced environments (Bell et al., 2011; Golledge, 1999).

3.6.2 Research Technique

Several techniques could be used to collect data in survey design. These are categorized into two groups as interview and self-completion questionnaire (Bryman, 2012). The interview can be through telephone interview or face to face, personal interview or group administration (Creswell, 2014; Bryman, 2012). The interview itself has been classified into different types, and its application depends on research context and participants. Bryman (2012) identified the various types of interview to include structured, unstructured, semi- structured, in-depth, focused or focus group, life history or oral history.

Similarly, the questionnaire survey can be categorized into self-completion questionnaire, supervised completion questionnaire, postal or mail completion questionnaire or internet completion questionnaire and diaries (Creswell, 2014; Bryman, 2012). Both interview and questionnaire have their advantages and disadvantages as a technique for data collection in survey design. However, since interviewing a large number of participants would be more expensive and time-consuming, both face to face and telephone interview were not considered as a practical option for the study. Besides, it would be difficult to establish rapport with all the potential interviewees, which is one of the prerequisites of structured interviewing (Bryman, 2012).

A self-completion questionnaire is considered appropriate for the study (Creswell, 2014). First, it can collect both qualitative and quantitate data which the study proposed to answer the research questions. Second, the collection of qualitative data through interview especially on-site may necessitate having access to residents' private properties in the study area. However, gaining access to all residents' houses to discuss the subject of inquiry may be challenging. Hence the option of a self-completion questionnaire.

Third, the presence of an interviewer has been suggested could make residents exhibit bias or anxiety when collecting data from them through the interview, which is known as the interviewer-effect (Bryman, 2012). Therefore, the self-completion

questionnaire option offers an advantage of the absence of the interviewer effect even if the researcher had access to the private spaces. Fourth, the self-completion questionnaire option adopted is regarded to be more convenient for potential residents, as they could complete the questionnaire when they want (Salant and Dillman, 1994).

Nevertheless, the researcher is aware of the disadvantages and challenges with self-completion questionnaire survey. Some of these potential problems were taken care of during the questionnaire design and administration stages. Both postal and drop-off approaches to self-completion questionnaire administration are considered in the study. The postal method involves sending questionnaires to respondents and receiving them back through the mail. But for drop-off approach, questionnaires are delivered to respondents by the researcher or agent and collected back by same or mailed back. While the postal approach may be faster, it is costly, fixed and completely excludes possible personal contact with the respondents. The drop-off, on the other hand, is flexible and could be adapted to local circumstances (Salant and Dillman, 1994).

The study, therefore, adopted the drop-off strategy for the administration of self-completion questionnaire to take advantage of its low budget, flexibility, the possibility of contact between the researcher and respondents, and improved response rate (Salant and Dillman, 1994). Additional information on the distribution and collection of questionnaires are provided under questionnaire administration.

In addition, observation method whether participant or non-participant would require the presence of the researcher in the setting where the phenomenon of interest naturally takes place and presents first-hand encounter with the phenomenon (Merriam, 2009). This means in the context of this study, having access to private and shared open spaces of participants in their residential buildings and staying there for some periods to observe. However, accessibility to private and semi-private open spaces of participants to observe residents would be very difficult or in some cases impossible. Therefore, the choice of mapping of the private and semi-private open spaces by participants was favoured as a second research technique.

3.6.3 Research Instrument Design

1. **Questionnaire Design**

Gaining access to the research field is one of the fundamental issues a researcher would have to consider and influences research strategy. Many challenges have been acknowledged in conducting research on the built environment and health and well-being (Burton et al., 2011). The limitation of studies on private open spaces or even

exclusion in residential environmental studies may be associated with some of these challenges (Burton et al., 2011; Richards et al., 1984). Because gaining access to individual residential private open spaces may be highly challenging, the research method and research instrument were developed and designed to respond to the constraints and opportunity of the local circumstances. Hence the questionnaire was designed to collect quantitative and qualitative data in line with the chosen research paradigm.

The development of the questionnaire was guided by the literature review, the nature of the study, and the research questions. The questionnaire was developed to collect both qualitative and quantitative data to answer the research questions. The use of questionnaire to collect quantitative data is more common than qualitative data. The researcher therefore reviewed literature on the use of questionnaires to collect qualitative data and found that it has been used successfully by researchers, especially when complex people's views and detailed narratives are involved (Teychenne et al., 2012; Adamson et al., 2004). For example, Lundgren and Berg (2011) in their study to understand the concept of receiving care from the lens of the general public and nursing students, used questionnaires containing eight open-ended questions related to the research questions and subject to collect qualitative data from the respondents. The resulted data were analysed using content analysis to answer their research questions. Similarly, Frith and Gleeson (2004) used a qualitative questionnaire to collect data from 75 men selected through snowball sampling strategy in their study to explore the ways men's subjective feelings about their body influence their clothing practices. The data they obtained from their study were analysed using thematic analysis.

The process of developing the questionnaire for the current study began by evolving an initial working table which outlines possible variables, categories, questions and themes relevant to the subject of enquiry based on literature review, research questions and existing standard questionnaires that have been used by other researchers in similar studies. The items in the table were reviewed few times to produce the first draft of the questionnaire. The draft was also reviewed at different times and levels to improve and standardise the questionnaire. Friends, peers, and volunteers helped in providing helpful feedback to achieve that. The peers consist of some postgraduate researchers in the Department of Landscape and Architecture, and volunteers include some individuals composed of academic and non-academic members of the university and professionals. Moreover, the questionnaire was reviewed by the supervisory team and subjected to piloting, the detail of which is provided later.

The study questionnaire is divided into four parts and contains both open and closed questions. The open-ended questions are suitable for exploratory research (Leedy and Ormrod, 2014; Hoxley, 2009). It is appropriate to collect qualitative data from the respondents, providing an opportunity for narrative answers and description of experiences related to well-being and open spaces issues in residents' environment. The closed-end questions are used to collect some quantitative data. The first part of the questionnaire, part A, covers information about open spaces around respondent's terraced house, private open space and shared open space. This first part included among others questions on the types of open space around participant's house and accessibility to the available spaces. Furthermore, participants were asked what they use their private and shared open spaces for during warm and cold months. They were also asked for major factors that influence how they use the open spaces around their homes. The second part, part B, is about open spaces in the immediate neighbourhood of the respondent.

Table 3.2 Matching Research Questions with questions in the study questionnaire and map.

Research question and addressing questions in the questionnaire	
R1 Q	What are the typologies of open spaces in the terraced housing of Walkley neighbourhood of Sheffield as typical of residential setting? A1. What type of open spaces do you have around your house? A2. Which of the specific open spaces around your house is private or shared open space? A3. Which of the open spaces does your household have access to and use? B1. Apart from the open spaces around your house, what other open spaces does your household have access to in your neighbourhood?
R2 Q	How do the residents of the terraced houses use the open spaces in their residential environment? A4. What does your household use your PRIVATE open spaces around your house for during the warm months? A5. What does your household use your SHARED open spaces around your house for during the warm months? A6. What does your household use the open spaces around your house for during WET or COLD weather (Autumn/Winter)? B2. What does your household use the neighbourhood open spaces for?
R3 Q	What factors determine or affect residents of the terraced houses on how they use the open spaces in their residential environment? A7. What are the major factors that determine or influence how your household use your SHARED open spaces around your house? A8. What are the factors that prevent or discourage your household from using your SHARED open spaces around your house? B3. What major factors influence your household to use the public neighbourhood open spaces?

Table 3.2 Matching Research Questions with questions in the study questionnaire and map (continuation)

Research question and addressing questions in the questionnaire	
R4 Q	What are the benefits and problems derived or encountered by the residents of terraced housing from the use of their open spaces? A9. What are the benefits (physical, social, emotional, others) that your household get from using your private and shared open spaces around your house? A11. What does your household find unsatisfactory or as disadvantages about your private and shared open spaces around your house?
R5 Q	How do these benefits or problems experienced by the residents of terraced housing from the use of their open spaces relate to their well-being? A10. Briefly describe how these benefits in A9 above relate or contribute to the quality of life of your household. A12. Briefly describe how these disadvantages/limitations in A11 above affect or detract from the quality of life of your household. C1. Over all, how satisfied or happy are you with your open space in your residential area? Map/mapping E1. Circle areas that are very important to your household and you are happy with on the drawing of the layout of your open spaces. E2. Mark 'X' on areas that are not interesting or cause annoyance to your household on the drawing of the layout of your open spaces and suggest reasons.
R6 Q	What is the relationship between the different types of the open spaces available to residents of terraced housing in the residential environment? C2. Rank the open space types in your residential area in order of importance to you, awarding 1 to the most important and 3 to the least important. C3. Why is the open space you ranked highest in question C2 above the most important open space to you and your household?
R7 Q	How can the open space system of the terraced housing be improved to support the delivery of well-being to residents of terraced housing in the residential environment? A13. What do you think can be done to remove or address these disadvantages listed in question A11 above? A14. What would your household like to do in the open spaces around your house which you cannot do at the moment? A15. What do you think has to be done or change significantly to allow your household do what you like to do in the open spaces around your house?
	Respondents Characteristics and open space or spatial attributes D. Personal and Household Information E. A sketch layout of the open spaces around your house
KEY	R-research question, Q- corresponding question in the questionnaire, A, B, C, D and E are letters to differentiate specific section in the questionnaire

The third part, part C, deals with subjective evaluation of the open spaces in the respondent's residential settings. The fourth part, part D, contains questions related to demographic data of the respondents. The questions in the different sections of the questionnaire were derived from the literature review, researched questions and similar

past research studies (Villamagna and Giesecke, 2014; Whear et al., 2014; Schipperijnet al., 2010; Sugiyama et al., 2006; Smith et al., 2005; Tinsley et al., 2002; Hall, 1987). Table 3.2 shows the research questions with the corresponding questions used in the questionnaire to explore them. Well-being as revealed from the literature could be measured either in its life satisfaction or in its happiness or quality of life conceptions (Gough and McGregor, 2007; Galloway et al., 2006). The investigation approaches well-being measurement using quality of life and domain satisfaction conceptions.

Since well-being is subjective, Rojas (2007) suggested that it could be better studied by directly asking people rather than an academically defined agent (p.261). So, participants were requested in a qualitative approach to their well-being, using the concepts of quality of life and domain satisfaction as a proxy for well-being. Three questions in the survey investigate well-being. First, participants were asked what are the benefits that your household get from using your private and shared open spaces around your house? The outcome is used as indicator and proxy for well-being. Second, the participants were further asked a reflective question; briefly, describe how the benefits you previously mentioned you derived from using your private and shared open spaces relate or contribute to the quality of life of your household. Also, a similar question to explore the negative impact of the open space on the well-being of the participants was included. The third question concerning well-being asked about the overall satisfaction of the participants with the open spaces in their residential area, which is regarded as an external environment domain. The overall satisfaction is measured on ordinal scale of very dissatisfied, dissatisfied, neither satisfied nor dissatisfied, satisfied, very satisfied and not sure or not applicable. These questions and approaches to assess or measure well-being were derived from the literature review, research questions and questionnaires of previous similar studies (Tomao et al., 2016; Van Hecke et al., 2016; Burton et al., 2015; Bieling et al., 2014; Warber et al., 2013; Ward Thompson et al., 2013; Burton et al., 2011, Rojas 2007).

To be able to investigate the relationship between the different types of the open spaces encountered by participants in their residential environment, and how they perceive the different types of open spaces, the participants were asked to rank the open space types in order of importance to them. That is from the most important to the least important in relation to the contribution to their quality of life. They were further requested to suggest a reason for their perceptions. Similarly, to investigate how the open space system of the terraced housing could be improved to support the delivery of well-being to residents, the participants were asked about their perception on how the

current problem associated with the open spaces in their houses could be resolved if any. They were also asked about their present needs and future aspirations about the open spaces in and around their houses.

Many of the questions in the study questionnaire are cogitative, the question on the use of open spaces, its benefits and disadvantages, its effect on quality of life, and what to change in the open spaces to improve usage and benefits. Therefore, the investigation provides an opportunity to explore respondents' knowledge, experiences, ideas and values on the subject of inquiry properly. It anticipated to draw out thoughtful and personal responses about their use of their open spaces, recounting daily experiences and its contribution to their personal or household well-being.

Besides, the questionnaire has closed questions that are provided with some fixed answers from where respondents are to choose appropriate answers. In some cases, respondents were permitted to add other options that are perhaps peculiar to their circumstances that are not listed. This represents partially closed-end questions which provide a merit of not forcing respondents to any predefined option that does not express their case (Salant and Dillman, 1994). The range of choices provided for closed-ended questions was derived from the literature review and similar standard existing questionnaires.

Moreover, the questionnaire contains closed-end question with multiple-indicator or multiple-item measure called Likert scale (Bryman, 2012). Likert scale purpose is to measure the intensity of feelings about the issue being examined, and the respondents are required to show the level of their agreement on a particular point scale, moving from high level of intensity to low level of intensity with the middle position being neutrality on the issue (Bryman, 2012). Four of the variables measured used Likert scale. These variables include major factors determining the use of shared open spaces around respondent' house, important factors that influence the respondent's household to use neighbourhood open spaces, and how satisfied the respondents are with the type of open spaces in the residential area and the frequency of visiting neighbourhood open spaces for specific activity.

Since a well-designed and good questionnaire minimises respondent burden and measurement errors (Salant and Dillman, 1994), several measures were taken at the questionnaire design stage to achieve that. The questions were specific and not vague, with the use of simple words. Where terms that could have multiple interpretations were used, like private open space, they were defined for clarity. Biases were minimised by avoiding subjective tones, technical terms, some specific sensitive personal questions

like income, double-barrel questions and leading questions (Bryman, 2012; Salant and Dillman, 1994).

Furthermore, the attractiveness of a questionnaire is suggested to be critical and has potential to influence a respondent's response to a questionnaire (Salant and Dillman, 1994). Therefore, to motivate potential respondents, the questionnaire was well laid out and printed as a booklet in A4 size. The front cover was made attractive with a graphic design of open spaces around a house and contains the study title, University logo to show identity, a brief introduction of the project and detailed information on how to complete and return the questionnaire and map. The back page contains the map for the mapping exercise, having the respondent's house layout which was to be completed by the respondent. The first page contains the research participant consent form, which has to be completed by respondent to confirm approval in line with the ethical requirements. The next and rest pages contain the questions for the respondents. (See Appendix D for the questionnaire copy).

2. Mapping: graphic and behavioural

Before the mapping exercise, the researcher made several visits to the study area, Walkley neighbourhood, to become more familiar with the area and identify the study geographical boundaries. Further to this was the identification and mapping of the typology of open spaces available in the Walkley neighbourhood, guided by the literature review. The mapping exercise by the researcher was aided by the Ordnance survey map of the study area. The researcher locates and updates existing open spaces on the map to provide an overview of open spaces available in the study area. The outcome of the researcher's mapping is presented in the next chapter.

The second level of mapping involves the participants, and it is essential as it provides information about the participants' private and shared open spaces to which access is usually restricted or unavailable for outsiders, including researchers. The map was designed to collect information about the respondent's physical environment, the private and shared open spaces and their importance to the residents. Methods of obtaining information about or measurement of private open spaces have been challenging in built environment studies. The subjective measures involving residents' rating of their physical environment are subject to biases (Burton et al., 2011). Even where objective measures to capture open spaces have been used, private open spaces were excluded or not captured because of size, configuration, and access difficulty (Maas et al., 2009b).

The study, therefore, collects information about the respondents private and shared open spaces through mapping. The mapping concept adopted combines cognitive mapping and behavioural mapping. Golledge (1999) suggests that the most commonly used representational form to record both cognitive or external representation of experienced environment is the map. He argued that maps record what is known and remembered about the environment, and provide records of "the absolute and relative location of places, features and spatial relations among phenomena" (p.13). Cognitive maps are pragmatic approach to understanding human transactions with their environment. They provide subjective knowledge of the environment and insight into peoples' orientation in the environment as well as their engagement with it (Polic and Repovs, 2004, p.66).

In the study, the respondents were provided a map or sketch layout of the open spaces around their terraced house obtained from the Ordnance survey map and asked to locate features as accurately as they could on the drawing. They were after that required to mark areas that are important to their households and with which they are happy. Similarly, they were to mark areas that are not interesting or cause annoyance to their household and suggest reasons for that. They were to use symbols to represent the features on their private and shared open spaces and provide keys or meaning for the symbols. A similar method had been employed by Polic et al. (1991) and Jurkovic (2014) in research on perception, experience, and use of open space in the local community. Jurkovic (2014) suggested that the method provides nearly exact spatial locations for respondents' answers. In the case of this study, it provides a graphic or visual orientation of the respondents' spatial arrangement of their private and shared open spaces. Besides, it provides useful information about participant's behaviour, experience and subjective opinion of their private and shared open spaces. The map for the mapping exercise accompanied the questionnaire for distribution.

3.6.4 Piloting and Pre-testing questions

Conducting a pilot study or pre-testing a research instrument is important to determine the validity of the research instrument and to ensure it functions properly (Leedy and Ormrod, 2014; Bryman, 2012; Salant and Dillman, 1994). The questionnaire for the study was first tested among volunteers and peers. The peers here were some post-graduate researchers in the Department of Landscape, and the volunteers were some members of my local church in Sheffield comprising of men and women with various backgrounds and status. The intention is to ensure that the diversity of the population to

study is represented among those involved in the pre-testing stage. They were asked to fill the questionnaire and be critical of it for clarity of questions, the language of expression, grammar, bias, offensiveness, uncomfortable question, time needed for completion as well as provide general feedback. Subsequently, the questionnaire was revised taking into consideration the comments received. Besides, the feedback received from this stage was used to generate additional options for some of the fixed-choice answers for the study. Further amendments were made to address feedback from the supervisory team and the departmental ethical committee.

After obtaining ethical approval, a pilot study was conducted in a real field setting. The pilot study was carried out from February 1st to 22nd, 2016 at Walkley, Sheffield on a small set of respondents of the population from which the sample for the full study would be taken. The pilot testing was intended to test the research instrument and see if it functioned well as well as the response rate. The study lasted about three weeks against the two weeks earlier anticipated. The response rate was 27%, although 30% was predicted based on past survey in the town. To improve the response rate, during the conduct of the pilot study, the initial planned two maximum call-back times to retrieve the questionnaire was increased to three. Despite that, some participants (about 20%) were missed during all three call-back times offered. At each call-back, a prepared note to say the researcher called was dropped. 13% of the respondents stated that they were not interested in any survey, while the researcher could not have access to about 14% of the respondents, either dog was barking or the house was vacant. Another 13% said they were willing to take part in the survey and collected the questionnaires and arranged a time for the researcher to call back for collection, but until the date of concluding the pilot testing, they had not completed the survey. 13% of the respondents said they would prefer the soft copy of the survey and provided their emails to the researcher. However, only 7% of this category later responded and said the paper was found most appropriate because of the mapping that was required to be made on the map provided. 6% of the respondents stated that they would not be able to fill the survey as they were visitors and their hosts were not available or sick.

The observation made on those who filled the questionnaire revealed that some respondents' answers were not very legible, while some gave very brief answers. Also, some respondents requested a new questionnaire at the first call back claiming they did not receive the questionnaire that the researcher dropped at their houses. A further probe revealed that because the questionnaire was enveloped and addressed to them, a method to personify it to their household, the questionnaire package/envelope was mistaken for

the general commercial, promotional packages they usually receive and hence did not open the questionnaire package/envelope but bin them.

Moreover, the returned questionnaires were analysed to have a pre-test of the analysis stage. The feedback from the pilot stage informed a review of the questionnaire packaging and administration strategy. The white envelope proposed for the questionnaire was changed to transparent cellophane bag/envelope, and two call-back times were proposed as the three times offered at the pilot stage made no difference. The sample size was increased from the initial proposal of 500 to 750, to improve the response rate. The questionnaire was decided to be in booklet form to reduce the total number of pages because of the separate information sheets and research consent sheet and follow-up letters. Besides, a participant whose questionnaire could not be retrieved after two call-back times was decided to be provided with a follow-up letter and a new questionnaire and pre-paid postal return option. The final questionnaire was made and produced in required quantity for the study.

3.7 Sampling Strategy

The particular population of interest is the terraced housing households in Walkley neighbourhood, Sheffield. The terraced housing is the predominant housing type in the neighbourhood. The early work of the researcher was to identify terraced houses in the Walkley neighbourhood. The Ordnance survey map was very useful in this respect. From the initial reconnaissance survey and analysis of the Ordnance survey of the neighbourhood, about 1554 terraced housing units were identified within the study area. These target housing units are not completely homogenous as there are variations at least in household characteristics and their physical environment. There would, therefore, be the need for a sampling strategy for the study.

Generally, in a large population, it may not be economical to study the entire population, but to select a small part of the population called sample to represent the total population. The method of selection of this sample is referred to as the sampling strategy. There is a range of sampling methods available in research work, and the choice is guided by research design or research method, population size and variation, precision requirement and research situations (Salant and Dillman, 1994). The sampling methods include simple random, systematic random, stratified and cluster. These are all probability sampling, a sample that is selected by random or chance (Bryman, 2012; Blaikie, 2010).

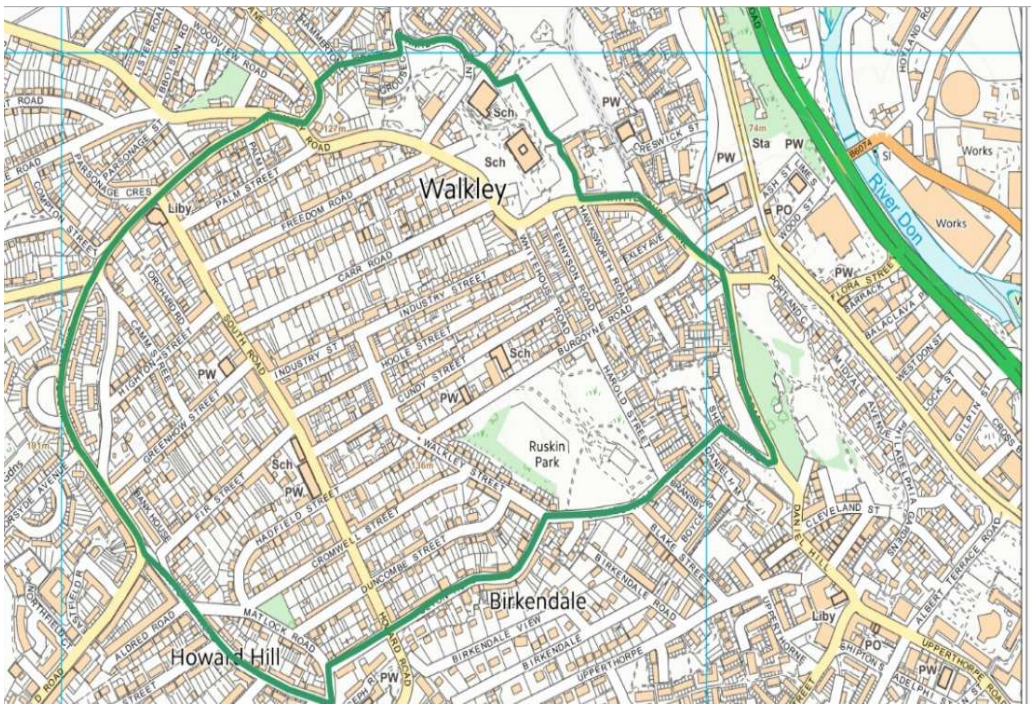


Figure 3.8 Map showing the block layout of Walkley Neighbourhood (Source: Ordnance Survey, 2016 –Digimap Licence)

Figure 3.9 Map showing local streets with terraced housing (building view) in Walkley neighbourhood (Source: Ordnance Survey, 2016 –Digimap Licence)

The other types are non-probability and include convenience or accidental, quota, purposive or judgmental, snowball, and theoretical sampling (Blaikie, 2010). In probability sampling, it is important that the chosen sample is representative of the source population (Jacobsen, 2012), and for a sample to be regarded as representative, it must reflect the population of origin precisely (Bryman, 2012).

It is impractical to cover the whole population, considering the limited time and resources for this study. Therefore, systematic sampling was applied to choose research participants through their housing units. A systematic random sampling involves the

selection of participants based on a predetermined sequence, with the first element selected by chance (Leedy and Ormrod, 2014). This sampling approach was chosen because of the advantage of ensuring a representative sample it offers with a heterogeneous source population. For example, some terraced houses have a front garden while some are not in the target population.

To apply the sampling strategy, the study area, Walkley neighbourhood (See figure 3.8), is divided by streets (See figure 3.9) into 'blocks of houses' (See figure 3.10) and from each of the block of houses, the first terraced house is picked at random and then the third, fifth, and so on in that other. The particular individual postal address of the selected houses was identified through Digimap and Royal Mail websites. The layout of these houses with their respective open spaces was established through the Ordnance Survey (Digimap).

Figure 3.10 Map showing division of housing into blocks by streets in Walkley neighbourhood

Along with the issue of the sampling strategy is the decision on appropriate or absolute sample size for a chosen research strategy. To determine the proper sample size in a study, certain factors are usually considered. These include the target population size, especially if it is a small population, heterogeneity of the target population, the smallest

subgroup within the sample population, the acceptable sampling error, constraint of time and fund (Bryman, 2012; Salant and Dillman, 1994).

However, Creswell (2014) revealed that in determining sample size, researchers often based it on a similar past study, a percentage of the target population, personal discretion or the margin of error that is proposed to be tolerated. He explained that these approaches have been criticized as misguiding and that sample size should be related to the analysis plan for the study. Therefore, he recommended using a statistically generated table usually available in many survey books after a researcher has determined three things: first, the confidence interval for the study (the margin of error to be tolerated which relates the accuracy of research results based on sample to the entire population), second, the confidence level for the margin of error and third, the population characteristic split (chance that the sample contains the characteristic of study interest). The characteristic population split could be '50/50 split' or '80/20 split'. While an '80/20 split' means that most people in the target population have a particular characteristic, and a few do not, the '50/50 split' shows that the characteristics are relatively varied (Salant and Dillman, 1994). It is recommended that a 50/50 split be assumed if the split is unknown ahead of the study (Creswell, 2014; Fowler, 2013; Salant and Dillman, 1994). So, the determination of the absolute sample size for the study is based on these recommendations and the researcher's constraints of cost and time. However, considering the response rate from the pilot study and other past similar survey in Sheffield, the size to be covered was increased to 750.

3.8 Questionnaire Administration

Since drop-off and collect back approach with an offer of at least two collection times to optimize return rate was adopted for the study, a systematic approach for delivery and collection of questionnaire becomes necessary, especially when the researcher alone would be involved without any assistant. The study area was therefore divided into two zones, Zone 1 and Zone 2 (Fig. 3.11) for easy, systematic and efficient administration and collection of the questionnaires by the researcher, and the administration was planned on the zone basis. After the production of the questionnaires and the generation of selected participants' addresses, each participant's questionnaire packet was prepared.

Figure 3.11 Map showing the division of study area, Walkley neighbourhood into two zones.

The questionnaire packet consisted of an addressed transparent cellophane bag/envelope containing a covering letter (Appendix A), research participant information sheet explaining the research in detail and what is required from the participant (Appendix B) and the questionnaire containing the research participant consent form (Appendix C). The questionnaires for zone 1 were distributed on Tuesday 15th and Wednesday 16th March 2016 while the zone 2 were delivered to respondents' homes on Thursday 17th and Friday 18th March 2016.

For easy identification and personal safety, the researcher wore a jacket and a cap with a bold inscription of University of Sheffield ID badge. The questionnaire packet was to be delivered through the front door letter boxes of all the selected households, but because most of them use the back door, and some had their letter boxes at the back door or specifically requested that their letters should be delivered to the back door, the researcher had to enter their properties through the alleyway and give the questionnaire. Where residents were at home, this provided an opportunity to deliver directly to them with an explanation about the research project. These also had a consequence on the proposed time for delivery or distribution, accounting for spending two days in each zone.

One challenge identified with the drop-off technique by Salant and Dillman (1994) was the inability of the respondent of paying attention to returning the questionnaire. So, to overcome this problem, the researcher offered respondents the option to put the completed questionnaire in the polyethylene bag/envelope and drop it outside of their front door to be picked on the specified dates on the questionnaire,

especially if they would not be around. The questionnaires were collected back from respondent's houses from Zone1and Zone 2 for the first call back on Wednesday, 23rd March 2016, 0900 to1730 and Thursday, 24th March 2016, 0900 to 1730 respectively. Some respondents who completed the questionnaire put them outside as required and others promised to complete before the second call back. The participants that were not around during this first call back were notified of researcher's visit and the next call back time and date through a notification and reminder note (Appendix E) dropped at their door letter boxes.

The researcher attempted to retrieve the remaining questionnaires and made a second call back to the concerned respondents' houses at Zone 1 and Zone 2 on Sunday, 27th March 2016, 0900-1900 and Monday, 28th March 2016, 0900-1930 respectively. Many of the respondents put the completed questionnaires at their front doors as requested, while some put a notice that the researcher should come in to collect when around.

However, it is important to note here that some of the respondents, about five in number, invited the researcher to their private open spaces when collecting back the questionnaires to have some form of interviews with the researcher about the subject of inquiry, elaborating further on their experiences and submissions.

During the last day of collection from each of the areas, respondents who had not completed the questionnaires but indicated interest and promised to finish the questionnaire in the next five days were provided with stamped addressed envelope to return the questionnaires to the Department of Landscape. Also, a follow-up visit was made to houses where the researcher had sighted the questionnaires on the respondent' tables during the second call-back time or where respondents who promised to participate but were not available during the designated time of collection. These set of respondents were provided with stamped addressed envelope and another copy of the questionnaire in case they misplaced the initial one with a follow-up letter (Appendix F). The researcher later received some of these questionnaires through the post. Also, few respondents sent an email to the researcher to say that they were not available during the collection periods and arranged another collection time with the investigator. Others sent in their questionnaires through personal postage or dropped it at the department. The collection period lasts to the end of April 2016.

3.9 Methods of Analysis

The choice of methods of analysis applied in the study is informed by the nature of the inquiry, research questions and research design for the collection of data. The study collects both quantitative and qualitative data that were meant to answer the research questions. Both types of data were obtained with the aid of a questionnaire and mapping. Preceding the analysis was editing and coding of the data. The purpose of editing according to Salant and Dillman (1994) was to 'clean' the questionnaires. This provides an opportunity to get rid of outliers and check for errors and consistency in the data (Pallant, 2013; Salant and Dillman, 1994). Coding of the questionnaire involves expressing all responses or variables that would be analysed in numerical form. Examples of the questionnaire coding are provided in the box below:

Private open space:	Yes =1 , No= 0	Full time employment=1	
Shared open space:	Yes =1 , No= 0	Part time employment=2	
Gender:	Male=1,	Student	=3
	Female= 2	Unemployed	=4

3.9.1 Analysis of Quantitative data

1. <u>Questionnaire analysis</u>

The answers provided to the closed-open question, open-ended questions, and partially closed-ended questions were coded accordingly. The resulting data were also coded. All the coded data were entered into the computer and analysed using the IBM Statistical Package for the Social Science (SPSS) version 23. The analysis involved the use of descriptive and comparative or inferential statistics (Pallant, 2013). The descriptive statistics were used to summarize the research data and analysed the characteristics of the study population to identify patterns and relationship in the data. These characteristics include gender, age, current employment status, tenancy status, ethnicity, types of open space around the house and types of neighbourhood open space.
Mean, median, mode, percentage values, frequency, and Chi-Square were the specific descriptive statistics applied. Because most of the variables in the data set were measured on a nominal scale, the exploration of the relationship between the variables was done using Chi-Square and Cramer's V test (Pallant, 2013; Bryman, 2012). Chi-Square test was used to explore the association between demographic variables and benefits or disadvantages of using the open spaces in the residential environment as well

as the relationship between different types of open spaces in the residential environment (See Appendix U for an example). Similarly, to determine the relationship between satisfaction or happiness with open spaces and some variables, correlation test was used, as satisfaction with open space were measured on ordinal scale (Field, 2013; Pallant, 2013) (See Appendix O for an example).

2. Mapping analysis

The maps produced by the participants as the outcome of the mapping of the open spaces around their houses provide visual information about the settings of the private and shared open spaces, important activities carried out in the open spaces, and users' behaviours and experiences. In addition, it documents information about subjective evaluation of the open spaces by users in relation to areas that are important to them and with which they are happy as well as those that are uninteresting and cause annoyance to them. Examples of the participants' mappings that were used for the visual analysis are shown in Appendix G.

One of the widely applied approaches of analysing visual images including maps is content analysis (Silverman, 2014; Hsieh and Shannon, 2005). Content analysis is an approach that quantifies content based on predetermined categories in a systematic and replicable way (Field, 2013; Bryman, 2012, p. 289). The approach was used to analyse the visual and text data produced from the mapping. The maps show the availability, location, features, spatial attributes, usage and user's perception of the private and shared open spaces. Some of the features of the open spaces include trees, shrubs, bins, lawn, children play area, water feature, barbecue, storage, sitting area, and wall. The information was categorised to generate characteristics or environmental variables of the private and shared open spaces of the participants. For example, the availability of sitting area, trees, water features, playing area and dividing wall between neighbours. Greenery within open space is measured by availability of trees, shrubs and lawn. The measure or count of the occurrence of these defined categories and visual materials generated quantitative data that was used in the study. The resulting data were also coded, entered into the computer and analysed using the IBM Statistical Package for the Social Science (SPSS) version 23.

3.9.2 Analysis of Qualitative data

The qualitative data were obtained from the mapping and open-ended questions in the questionnaire, designed to collect narrative answers for the primary research questions which include the perception of respondents on how the open spaces around their terraced houses affect their well-being. Qualitative methods depend on text and image data generated to make sense out of them through analysis (Creswell, 2014; Silverman, 2014; Silverman, 2013).

In the study, text data were generated from the mapping apart from producing virtual qualitative data, and the records of the narrative answers which are in text form already. The text data generated in qualitative research are usually dense and rich, and the researcher may have to 'winnow' the data (Creswell, 2014). The intention of the winnowing process is to "aggregate data into a small number of themes, something like five to seven themes" (Creswell, 2014, p. 195). The central operation in qualitative data analysis is a special coding (Saldana, 2016; Bryman, 2012; Blaikie, 2010).

There are different ways to analyse qualitative data, and some of them include content analysis, narrative analysis, discourse analysis and thematic analysis (Saldana, 2016; Silverman, 2014; Smith and Firth, 2011; Aronson, 1995). For analysing the qualitative data in the study, thematic analysis was employed considering the research questions, research design and focus. Thematic analysis is a "method of identifying, analysing and reporting patterns (themes) within data" (Braun and Clarke, 2006, p.79). Thematic analysis is a descriptive qualitative approach to data analysis and locates themes in qualitative data (Silverman, 2014). The approach begins with coding, which is a process of selecting, separating and sorting data into meaningful group (Saldana, 2016; Silverman, 2014; Braun and Clarke, 2006). The initial coding breaks down data into parts and compares them for similarities and differences (Saldana, 2016; Braun and Clarke, 2006). The codes are further analysed and put into different categories and the categories are reviewed and combined (Silverman, 2014; Braun and Clarke, 2006) to identify themes which according to Creswell (2014) should cover multiple perspectives from individuals which are supported by evidence (p. 200).

Harding (2013) suggested that there are two different types of coding commonly used in thematic analysis. These are apriori codes and empirical codes. The apriori type of coding uses predetermine codes from literature review or existing theory or prior research while the empirical type develops codes only from the emerging information from the data (Creswell, 2014; Harding, 2013; Braun and Clarke, 2006). The coding approach adopted in the study is the combination of apriori and empirical

coding. The apriori codes were identified from the literature review and well-being indicators and scales. Within the thematic analysis, key terms derived from Warwick-Edinburgh Mental Well-being Scale (WEMWBS) and WHO (Five) Well-Being Index like "feeling useful, relaxed, feeling interested in other people, thinking clearly, feeling good about myself, feeling close to other people, feeling confident, feeling loved, cheerful, in good spirits, feeling calm and relaxed, active and vigorous, feeling fresh and rested, things that interest me" were recognised and applied to show positive well-being.

Braun and Clarke (2006) suggest that coding can be done by hand or through a software programme. Since hand coding for data from a few respondents is a burdensome and time-consuming process, the use of a software programme by the researcher was critical considering the number of respondents to be analysed. A computer data analysis programme, NVivo 11 was used to assist in analysing the data. The computer programme has the advantage of storing and locating qualitative data in an excellent and efficient means (Creswell, 2014).

All the respondents' answers were typed and uploaded into NVivo. The typing and reading over and over of the data leads to repetitive and multiple readings of the data that made the researcher more engaged and familiar with the data. This is the first step in the qualitative thematic analysis (Braun and Clarke, 2006; Aronson, 1995). The next step was the development of initial codes through nodes. Both a-priori and in-vivo coding were applied for the generation of the initial and subsequent codes. In-vivo or verbatim coding uses the participant's own language found in the qualitative data for codes (Saldana, 2016). The codes were reviewed and put into categories. Moreover, connections between categories were explored. Next was the forming of themes and sub-themes from the codes that have been put into different categories (Aronson, 1995).

Thus, NVivo was used to create categories and index the data to assist with identifying key themes and subsequently reviewing themes and generating precise definition and names of the theme (Vaismoradi et al., 2013). For example, the analysing and coding of the research question on benefits that household gets from using their private and shared open spaces around their house begins with reading carefully the responses of the participants to the question, which some wrote at length while others wrote little. The text relevant to initial codes developed from the literature, a-priori codes, were identified and those dealing with the same issue were put together, including new codes through in-vivo or verbatim coding. For example, text expressing social contact, improve relationship, friendliness, and improve family relationship were

put in different categories. From the categories was the development of theme, and social benefits emerged as a theme for the whole categories. Similarly, sub-theme of family social benefit emerges from codes on family bond improvement, and family having opportunity to have more time together from the use of private open space. The data were reviewed to ensure each group of the text supports the category or theme generated. The provisional categories and themes were systematically examined and merged to produce the final themes.

Similarly, the NVivo was applied to explore the relationship between the emerging themes. To achieve this, the NVivo compares the nodes to see what they share and what is unique to each other. Meanwhile, the results of the analysis are provided in the subsequent chapter.

3.10 Research Ethical Issues

In any research study, a researcher has ethical responsibilities towards the research participants (Salant and Dillman, 1994), and these were classified by Leedy and Ormrod (2014) into four categories. These include protection from harm, voluntary and informed participation, a right to privacy, and honesty with professional colleagues. These were considered in the design and execution of the research study. The participants of any research should not be exposed to any unnecessary physical or psychological harm (Leedy and Ormrod, 2014; Bryman, 2012). Hence the researcher should be mindful of any potential harm to the participants.

In this study, there was no foreseeable physical or psychological harm to participants beyond giving up their time to provide answers to the questionnaire. The researcher ensured that the content, wording, and line of questioning in the questionnaire were not highly sensitive to cause intrusion to participant's privacy. Questions asked cover the usage of open spaces in the residential environment by terraced residents and their perception of the impact of these on their well-being. Nonetheless, in case some participants might find offensive or uncomfortable revealing the perception of aspects of their well-being with the usage of their open spaces, especially the private or shared (semi-private) open spaces, the option to stop filling the questionnaire was provided in the instruction.

Also, voluntary and informed consent for participating in any research is part of the ethical responsibility of the researcher. An investigator must disclose the purpose of the study and ensures participants are not pressurized or coerced to give consent for the

study (Creswell, 2014; Leedy and Ormrod, 2014). In this study, participants were provided with a research information sheet that explained the purpose and nature of the research and expectations from participants to make an informed decision. In addition, a consent form was provided to collect consent from each participant and research was emphasized to be strictly voluntary.

Moreover, another important ethical issue is respect for participant's right to privacy. Here, the participant's interest must be protected (Creswell, 2014) and confidentiality of data collected must not be compromised (Blaikie, 2010). The study was designed so that participants would not need to provide detectable personal information. Personal information in the questionnaire was associated with a pseudo name or arbitrary number, and research data were rendered anonymous, and data provided were secured by the researcher. As part of ethics, the research was conducted with integrity. The privacy of participants was respected when visited at their respective houses to distribute and collect back the questionnaires.

The study was conducted off the university premises at the Walkely neighbourhood, Sheffield, and involved the researcher moving from house to house to distribute questionnaires to potential participants' post boxes in their residences. This raised concern on personal safety of the researcher as another ethical issue. The researcher therefore wore a jacket with the University of Sheffield boldly printed on it and his student identification badge for easy identification by residents during all the visits. Residents were friendly and welcomed researcher to their houses in most cases. And above all, both the research proposal and the questionnaire for the study received approval from the Department of Landscape's Ethics Committee before implementation.

3.11 Limitations of the Research Methodology

The research strategy was fruitful and increased opportunity for both discovery and generalizability, although there are often limitations with any method. With the use of the survey to investigate human behaviour and experience, there may be some problems or challenges (Bryman, 2012).

The limitation may arise due to the problem of meaning, as some respondents may vary in their understanding and interpretation of some key terms in the question. Besides, some may have the problem of memory. Respondents were asked reflective questions and expected to recollect their use and experiences of their open spaces

around their terraced housing and in their neighbourhood. There is the possibility of some respondents providing wrong information unintentionally as they could not remember some aspect of their past experiences accurately.

Moreover, some members may have provided information in a way thought to be favourable for others, what is known as a social desirability effect (Creswell, 2014; Bryman, 2012).

CHAPTER FOUR DATA ANALYSIS AND RESULTS

4.1 Introduction

This chapter provides the results of the analysis of the data collected from the field survey at the Walkley neighbourhood, Sheffield. The results include the analysis of both the quantitative and qualitative data collected for the study. The chapter is divided into three parts for clarity of presentation of the results.

The first part of the presentation gives the analysis of the demographic characteristics of the respondents. The second part comprises the results of analysis of the quantitative data based on the research questions, as well as the spatial attributes of the private and shared open spaces of the respondents, and followed by the third part which covers the qualitative data analysis and results. The analysis was done using the IBM Statistical Package for the Social Science (SPSS) version 23 and NVivo 11 for the quantitative and qualitative data respectively.

PART 1: ANALYSIS OF THE DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

4.2 Response rate and Demographic Characteristics of the respondents

Out of the 750 questionnaires distributed by systematic randomly sampling strategy, 240 were retrieved (about 32%), but 40 of them were not completed with one excuse provided or none. This represents about 27% response rate for valid ones.

4.2.1 Gender and Age Distribution of the respondents

In the sample for the study population, there were more women (61.8%) than men (37.2%), and two respondents did not disclose their gender, (n= 200) (Figure 4.1).

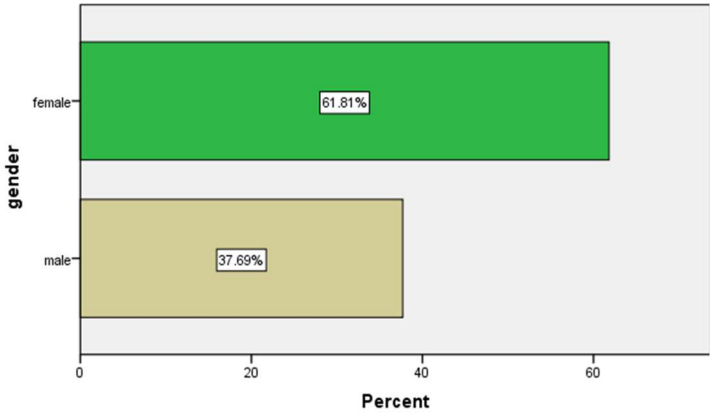


Figure 4.1 Bar Chart showing the gender of the respondents.

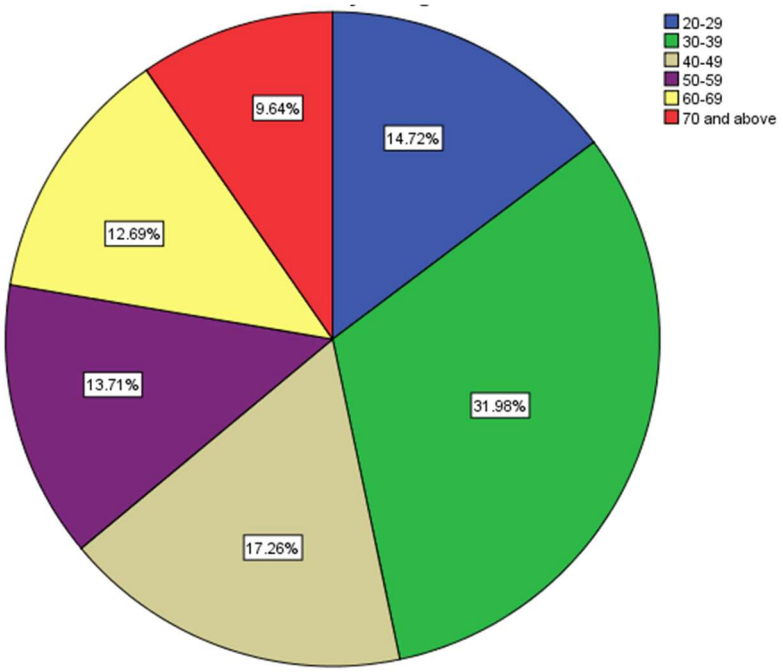


Figure 4.2 Bar Chart showing the age distribution of the respondents.

The largest age group among the respondents was age ranges of 30-39 years (32%), although other age groups were relatively well represented. For example, 60 years and above were about 23% while 40-49 were 17.3% of the study population (Figure 4.2). Three respondents did not provide their age bracket, therefore n=197.

Table 4.1 Distribution of the respondents by age and gender combined.

		Your age bracket						
		20-29	30-39	40-49	50-59	60-69	70 and above	Total
Gender	male	9 (31%)	21 (33%)	15 (44%)	9 (33%)	11 (46%)	10 (53%)	75 (38%)
	female	20 (69%)	41 (65%)	19 (56%)	18 (67%)	13 (54%)	9 (47%)	120 (61%)
	undisclosed	0 (0%)	1 (2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)
Total		29	63	34	27	24	19	196

Source: SPSS output

The majority of the respondents were female irrespective of their age groups except the elderly, 70 years and above, where we have more male than female. However, this difference was not significant (X^2 =6.285, df =10, p=0.791, n=196).

4.2.2 Employment Status of the respondents

The majority of the respondents (73%) were in various types of employment, about 48% were in full-time jobs, about 17% in part-time employment, while 8% were self-employed. 18% of the respondents were retired, 3% looking after the family, and 6% were students (Figure 4.2).

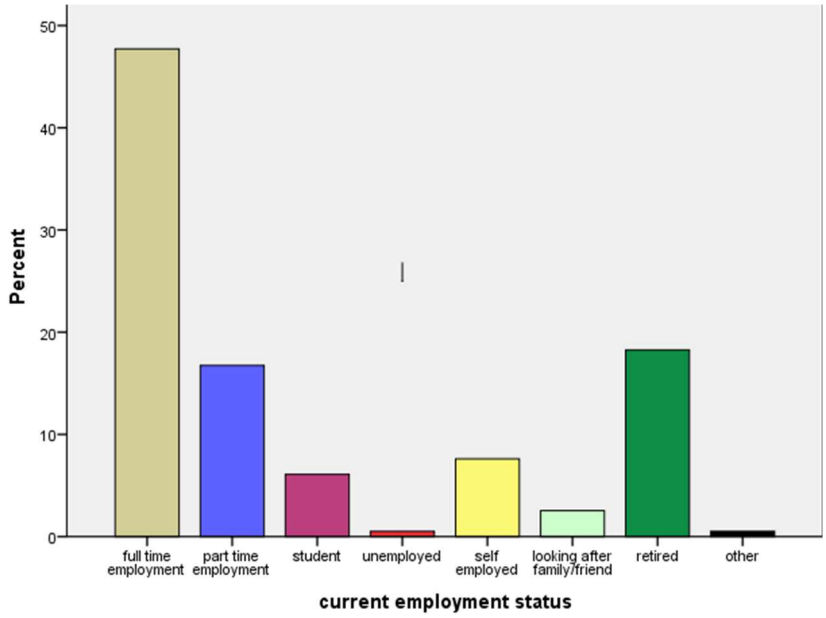


Figure 4.3 Bar Chart showing the employment status distribution of the respondents

4.2.3 Tenancy Status of the respondents

From the analysis, the majority of the interviewees (64.5%) were homeowners or landlords, while 31% were tenants. Shared ownership and rent-free tenancy accounted for 1% and 3% respectively, and 5 respondents did not declare their status.

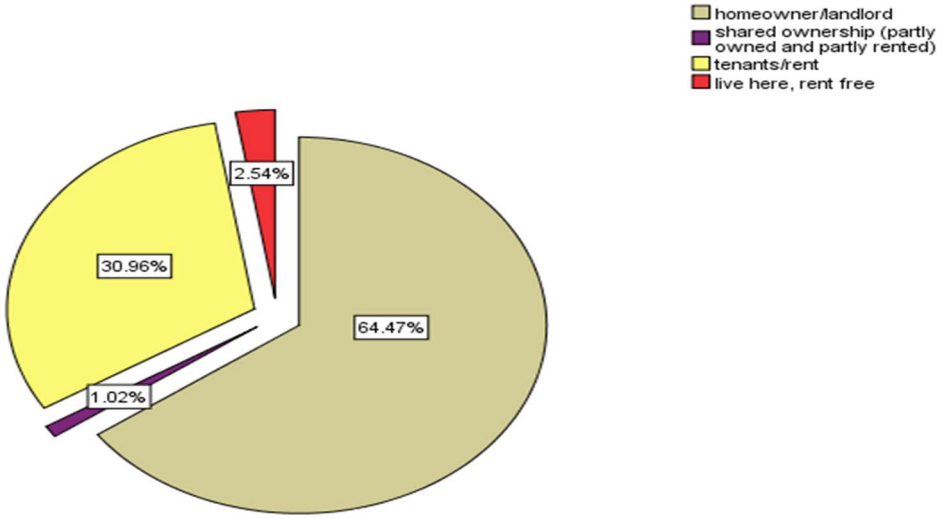


Figure 4.4 Pie Chart (explode slice) showing the tenancy status of the respondents.

4.2.4 Ethnicity group of the respondents

Majority of the respondents were white (88.8%), while the rest were 7.7% Black or British Black, 1.5% Asian or Asian British, 1.5% Mixed and 0.5% Chinese (Figure 4.5)

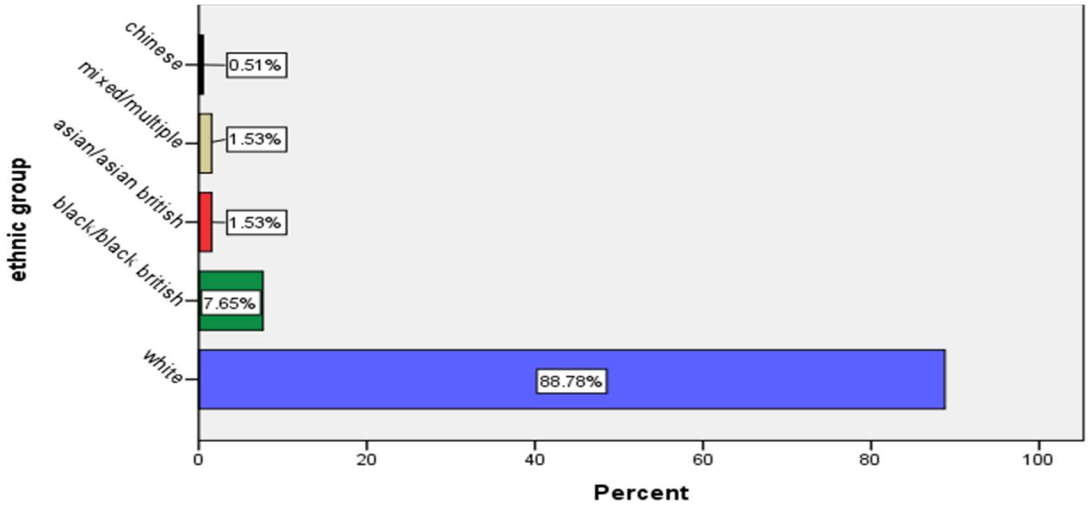


Figure 4.5 Bar Chart showing the ethnic origin of the respondents.

4.2.5 Duration in the terraced housing by the respondents

The average length of years that the respondents have lived in the terraced housing was 12.57 (Figure 4.6). The highest and lowest duration among respondents were 75 and 0.2 years (Table 4.2). However, to present a better picture of the duration of the interviewees in the terraced housing, the continuous variable of length of time stayed in the terraced housing was collapsed. The analysis showed that 49% of the respondents have lived in their terraced houses in Walkley neighbourhood for more than 5.1 years, 25% have lived between 1.68 years and 5years, and 26% have lived less than 1. 67 years (Figure 4.7).

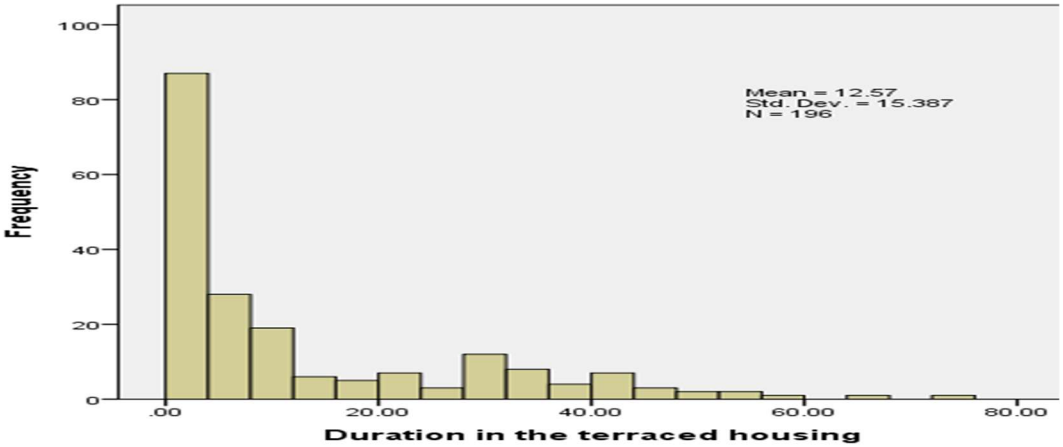


Figure 4.6 Histogram showing the distribution of the respondents by duration in the terraced housing.

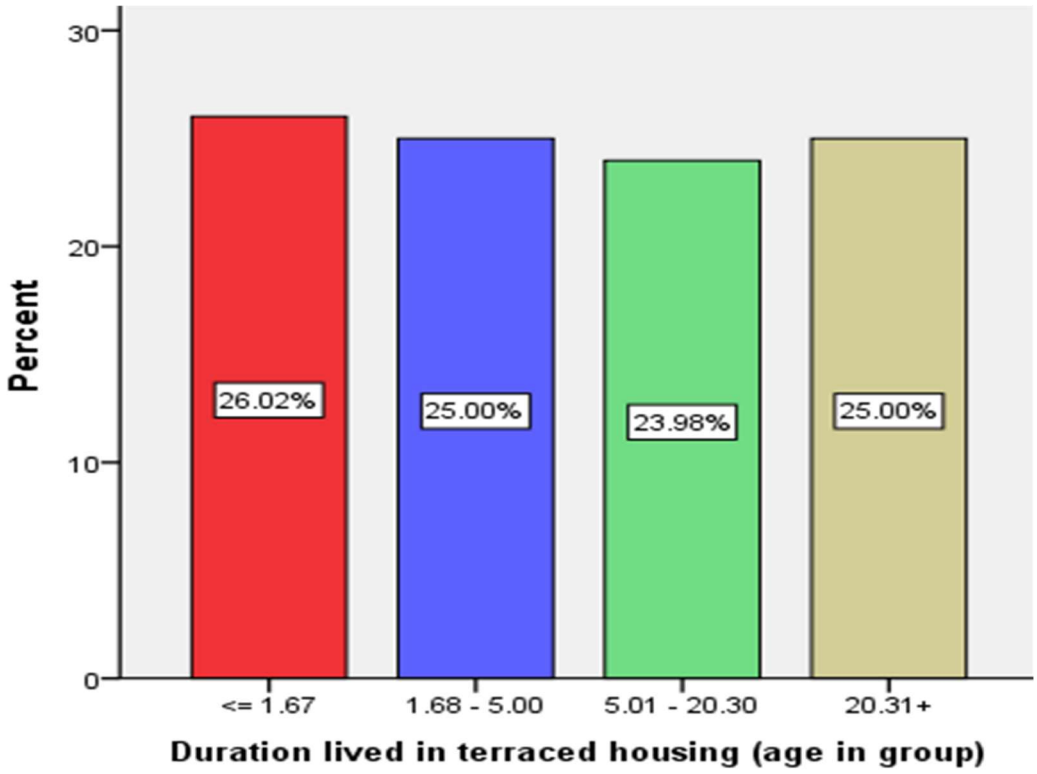


Figure 4.7 Bar Chart showing duration lived in the terraced housing by the respondents.

4.2.6 Adult number (over 18 years) in the household of the respondents

The majority of the respondents (63%) have two adults in their household residing in the terraced housing (Table 4.2), while 28% were single adult household. 7% and 2% of the respondents have three adults and four adults over 18 years respectively in their homes living in the terraced housing (Figure 4.8).

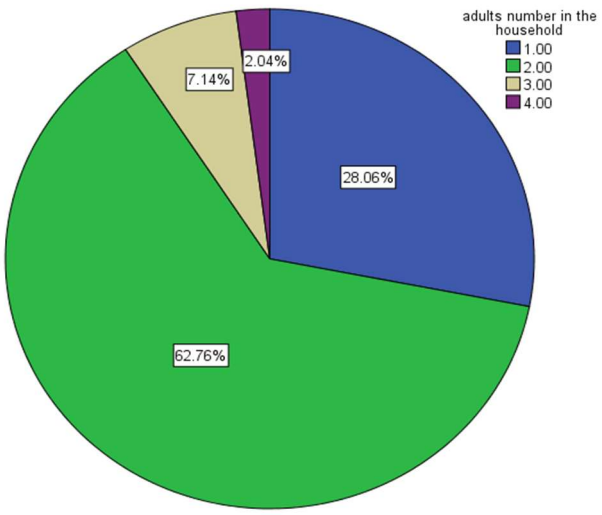


Figure 4.8 Pie Chart showing Adult number (over 18 years) in the household of respondents.

4.2.7 Number of children/young people in the respondent's household

The majority of the respondents (67%) have no children or young people living in their terraced housing with them. However, out of the 33% that had children living with them, 18% have kids that are under five years, 9% have children that are 6-11 years and 12% have young people that are 12-18 years in their households. See Table 4.3 for the full percentage breakdown. The summary of the demographics of the respondents is provided in Table 4.4.

Table 4.2 Descriptive Statistics for Duration in the house and Adult number in the household.

Measurement ➡ / Variable ⬇	N	Mean	Min	Max	Range	Mode	SD	SK	KT
Duration in terraced housing	196	12.6 years	0.2	75.0	74.84	*	15.38	1.485	1.606
Adults over 18 years in the household	196	1.8	1	4	3	2.0	0.64	0.64	1.44

Source: SPSS output Note: *multiple mode exists, SD- Standard Deviation, SK- Skewness, KT- Kurtosis

Table 4.3 Distribution of number of children by age in the households.

Number of Children ➡ / Age bracket ⬇	None f (%)	1 f (%)	2 f (%)	3 f (%)	Total f (%)
5 years under	164 (82%)	23 (11.5%)	10 (5.0%)	3 (1.5%)	36 (18%)
6-11 years	182 (91%)	11 (5.5%)	6 (3.0%)	1 (0.5%)	18 (9%)
12-18 years	188 (94%)	8 (4%)	4 (2%)	0 (0%)	12 (6%)
Total N=200	134 (67%)	42 (21%)	20 (10%)	4 (2%)	66 (33%)

Source: SPSS output

Table 4.4 Summary of characteristics of the respondents in the sample.

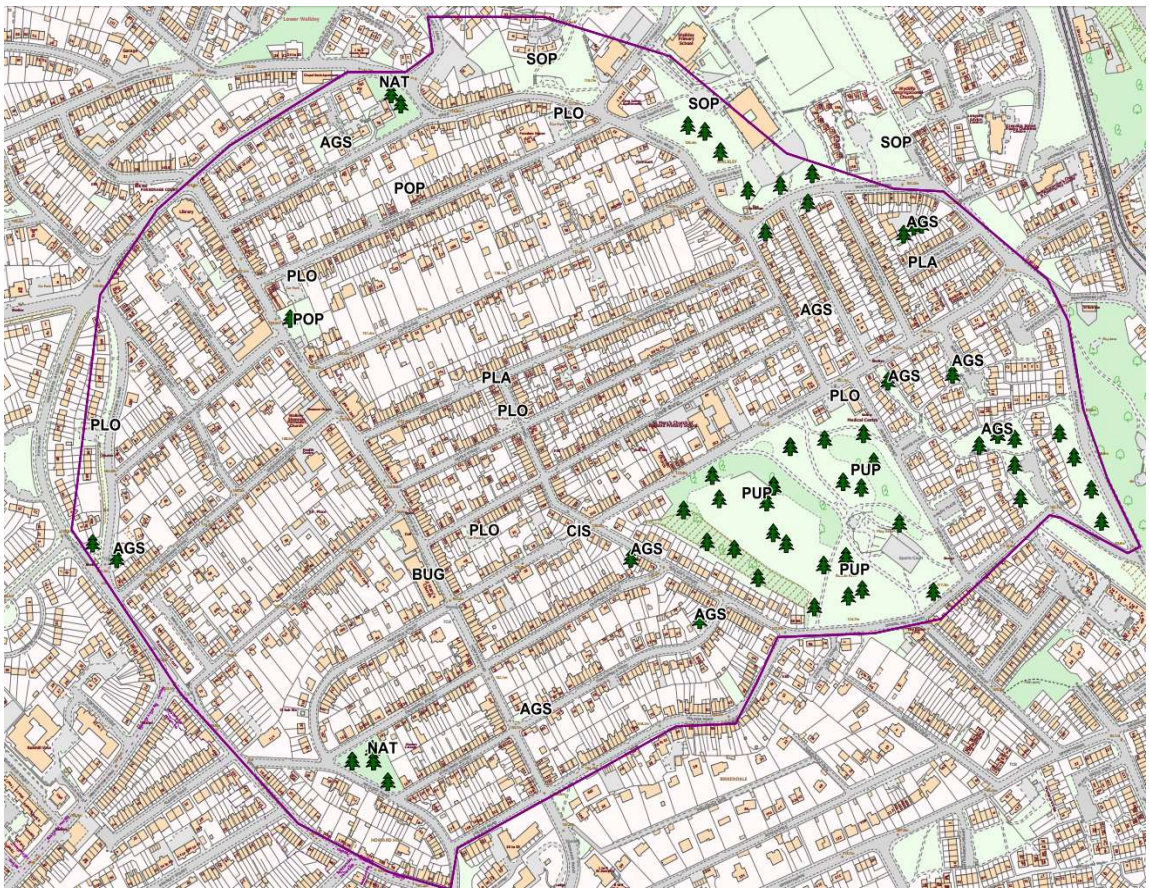
Variables			% or means	(n)
Gender	Male		62.1	
Female	37.9	(197)		
Age Group: years	20-29		14.7	
30-39	32.0			
40-49	17.3			
50-59	13.7			
60-69	12.7			
70 and above	9.6	(197)		
Employment Status	Full time		47.7	
Part time	16.8			
Student	6.1			
Unemployed	0.5			
Self-employed	7.6			
Looking after family/friend	2.5			
Retired	18.3			
Other	0.5	(197)		
Tenure	Homeowner/landlord		65	
	Shared ownership		1	
	Tenant		31	
	Rent free		3	(195)
Duration in current house: years			*12.6	
	Less than 1.6		26	
	1.7 - 5.0		25	
	5.1 - 20.3		24	
	20.31+		25	(196)
Adults in the household			*1.8	
	1		28.1	
	2		62.8	
	3		7.1	
	4		2.0	(196)
Children in the household	None (0)		67	
	1		21	
	2		10	
	3		2	
Age group of Children/young people in the household		5 years or under	18	
		6-11 years	9	
		12-18 years	6	(200)
Ethnic origin	White		88.8	
	Black/Black British		7.7	
	Asian/Asian British		1.5	
	Mixed/Multiple		1.5	
	Chinese		0.5	
		White	89	
		Non-White	11	(196)

Source: SPSS Output *- mean

4.3 The typologies of open spaces around terraced housing

The researcher through site visits and observation, identified and documented different types of open spaces at Walkley neighbourhood, Sheffield to explore the research question on the typologies of open spaces in the terraced housing of Walkley neighbourhood of Sheffield as typical of residential setting. Table 4.6 provides the summary of types of open spaces found in the neighbourhood. Some of these open spaces are public in nature, while others are semi-private and some exclusively private. The identified open spaces include Neighbourhood Park, pocket parks, amenity green space, play area for children, sports areas, Semi-natural green spaces, burial grounds and car parks. The results of the researcher's mapping of the different types of open spaces in Walkley neighbourhood are indicated in Figure 4.9.

Residents have access to different form of neighbourhood open spaces in Walkley neighbourhood, apart from their private and shared open spaces in their houses.



Keys: PUP- Ruskin Park, POP- Pocket Park, AGS- Amenity greenspace, PLA-Playing space, SOP-Sport area, NAT-Natural/Semi natural green space, CIS- Civic space, BUG- Church yard, PLO-Parking lots/Car park

Figure 4.9 Map showing the location of different types of open spaces in Walkley Neighbourhood, Sheffield.
(Source: Author's field Survey, 2016)

Table 4.5 Typologies of available open spaces in Walkley neighbourhood of Sheffield.

	Type	Description	Availability	Location
1.	Public parks and gardens	Areas of land used and maintained as a public park. Examples include urban parks, pocket parks and formal gardens.	Yes	Ruskin park (PUP) Pocket parks at South road and Freedom road (POP)
2.	Private gardens or open spaces	Areas of land linked with a house or institution and reserved for private use.	Yes	Most of the houses and Schools in the neighbourhood
3.	Amenity greenspace	Landscaped areas providing visual amenity or separating different buildings	Yes	Walkley road and other streets in the neighbourhood (AGS)
4.	Play space for children and teenagers	Areas that are safe and accessible for children's play, usually linked to housing areas.	Yes	Some of the houses (PLA)
5.	Sports areas	Large and generally flat areas of grassland or designed surfaces that are used primarily for specific sports	Yes	Whitehouse Lane Walkley road (SOP)
6.	Natural/semi-natural greenspaces	Areas that is not developed or formerly developed land with residual natural habitats e.g woodland and wetland areas.	Yes	Palm street/Walkley road (NAT)
8.	Allotments & community growing spaces	Areas of land for growing fruit, vegetables and other plants	No Although one is very close	Available at Lower Walkley neighbourhood
9.	Civic space	Squares, streets and waterfront promenades, predominantly of hard landscaping	Yes	Some local spaces available (CIS)
10.	Burial grounds	Includes churchyards and cemeteries.	Yes	Churches along South road (BUG)
11.	Other functional open space space	May be one or more types as required by local circumstances or priorities. Car parks	Yes	Car parks at Freedom road, Hoole street, Cundy street (PLO)

Figure 4.10 Aerial view of Ruskin Park, Walkley, Sheffield.
(Source: Google Map data, 2016)

Walkley neighbourhood has a large neighbourhood park, Ruskin Park (Figure 4.10), which is bounded by Walkley Street, Daniel Hill Street, Harold Street and Burgoyne Road. It provides recreational facilities for residents and has playing ground and other facilities (Figure 4.11). It is a public park and accessible to residents of the neighbourhood (Figure 4.12). Ruskin park has a special space area for children with unique playing facilities (Figure 4.13) and gives a good view to adjacent streets and residents (Fig 4.14).

Apart from the neighbourhood park, there are some pocket parks located in the neighbourhood. The pocket parks are located at South road (Figure 4.15) and Freedom road (Figure 4.16). Many of the shops are also located along the South road, and therefore, the pocket park at the South Road has potential to serve people beyond the adjacent houses and streets. Other types of open spaces in the neighbourhood include a semi-natural or woodland area at Palm Street (Fig. 4.17) and Matlock Road (Fig. 4.18). Parking lots are available at Freedom Road, Hoole Street, Cundy Street, Burgoyne Road, Duncombe Street and Heavygate Road (See fig 4.19).

Apart from these public open spaces in the neighbourhood, there are open spaces around the terraced housing. The open spaces around the terraced houses are classified as private and semi-private or shared open spaces depending on whether space is entirely for a household use or shared with a neighbour or neighbours.

Figure 4.11 Ruskin Park at Walkley Neighbourhood, Sheffield. (Author's Field Survey, 2016)

Figure 4.12 Ruskin Park accessible to residents of Walkley Neighbourhood, Sheffield. (Author's Field Survey, 2016)

Figure 4.13 Ruskin Park Playing Area for Children with facilities at Walkley, Sheffield. (Author's Field Survey, 2016)

Figure 4.14 Ruskin Park constitutes a good view to adjacent streets and homes at Walkley Neighbourhood, Sheffield. (Author's Field Survey, 2016)

Figure 4.15 Pocket park at South road, Walkley, Sheffield. (Author's Field Survey, 2015)

Figure 4.16 Pocket park at Freedom road, Walkley Neighbourhood, Sheffield. (Author's Field Survey, 2016)

Figure 4.17 Semi natural or woodland area at Palm Street, Walkley, Sheffield. (Author's Field Survey, 2016)

Figure 4.18 Semi natural or woodland area at Matlock road, Walkley Neighbourhood, Sheffield. (Author's Field Survey, 2016)

Figure 4.19 Parking lots or car park open space in the Walkley Neighbourhood, Sheffield. (Author's Field Survey, 2016)

The private open space is exclusively for the household use. These open spaces around the house include front yard or front garden, back yard or garden, side yard or garden, alley way, parking space and common access or shared access. While some of the terraced housing have front gardens, others do not. In addition, there is variation in the sizes of the front and back open spaces in the terraced housings. The size ranges from small to large. Figure 4.20 shows the layout plan of some terraced housing on Industry Street, Walkley neighbourhood, Sheffield. The layout plan reveals variation in the front and back yard open spaces. X shows no front garden. a, c, e, g, and I are front gardens with different sizes or area. In addition, b, d, f, h, j and l are back gardens with varying sizes.

Similarly, Figure 4.21 and 4.22 show different types of front gardens associated with terraced housing in Walkley neighbourhood.

Key: a, c, e, g, and i are front gardens with different sizes or area. X means no front garden, and b, b1, d, f, h, j and l are back gardens with varying sizes or area. b1 is a shared back garden and b are private gardens.

Figure 4.20 Layout plan of some terraced housing on Industry Street, Walkley neighbourhood, Sheffield. (Source: Ordnance Survey, 2016-Digimap Licence)

Some of the terraced housing without front yard or garden, have front doors opening directly into the street or public right of way. Majority of these residents do not use the entrance doors but the back doors to access their houses (See Figure 4.23 of examples of Terraced houses without front garden).

Another type of open space in the terraced housing is the alley way. Most of the time, it is shared by households to have access to each household buildings, especially if the front door is closed and the back door is the active access route to the house (Figure 4.27). However, alley way may be absent in some terraced housing, especially the short row terraced housing.

To find out the types of open spaces respondents have around their houses, they were requested to classify the open spaces around their terraced housing to whether it was private or shared with their neighbours. The definitions of private and shared open spaces were provided to the participants on the questionnaire to avoid ambiguity. The

results (Table 4.7) indicate that 81% of the respondents have private open spaces around their terraced housing, while the remaining 18.5% did not have personal open spaces for their household use. Similarly, the results revealed further that 69% of the respondents have open spaces they shared with their neighbours in their terraced housing while 31% do not share their open spaces around their houses.

The specific open spaces around the respondents' houses were further requested to be classified to private and semi-private or shared open space. The results (Table 4.8) showed that majority of the respondents (61%) have front yards or front garden around their terraced houses, although the front garden or yard are of different types (see Fig. 4.21 & 4.22). 54% and 7% of these front gardens or yards were reported to be private and shared open space types respectively. 38.5% did not have front garden (see Fig. 4.23). Almost all the respondents (98%) have back garden or back yards, and these are of various types (see Fig. 4.24 and 4.25). Some respondents differentiated their back garden from back yard, and claimed to have private back garden and shared back yard (among the 1.5% of others indicted in Table 4.8). Besides, some few number of the respondents indicated that they have both front or back private and shared open spaces (0.5% and 1.5% respectively). The case here is that at the back of the house, the open space is delineated to private garden meant for private use and the other part of the back yard is shared.

Table 4.6 Types of open spaces available around respondents terraced houses.

Type	Category of answer	% of respondents (f)
Private open space	Yes	81.5 (163)
	No	18.5 (37)
Shared open space	Yes	69.0 (138)
	No	31.0 (62)

Source: SPSS output

Table 4.7 Classification of specific open spaces available to respondents around their houses on the basis of privacy or shared status.

Specific open space	Private %	Shared or Semi private%	Both Private & Shared	Not Available
Front yard/garden	54.0	7.0	0.5	38.5
Back yard/garden	76.0	20.5	1.5	2.0
Slide yard/garden	11.5	3.5	0.5	84.5
Alley way	7.5	58.5	0	34.0
Parking space	12.5	21.0	0	66.5
Common access	5.0	45.5	0	49.5
Others*	0	1.5	0	98.5

Source: SPSS output *Community garden.

Figure 4.21 Different types of front garden or yards associated with terraced housing in Walkley Neighbourhood, Sheffield. (Source: Author's field Survey, 2016)

Figure 4.22 Additional types of front garden or yards associated with terraced housing in Walkley Neighbourhood, Sheffield. (Source: Author's field Survey, 2016)

Figure 4.23 Terraced housing without front garden or yard in Walkley Neighbourhood, Sheffield. (Source: Author's field Survey, 2016)

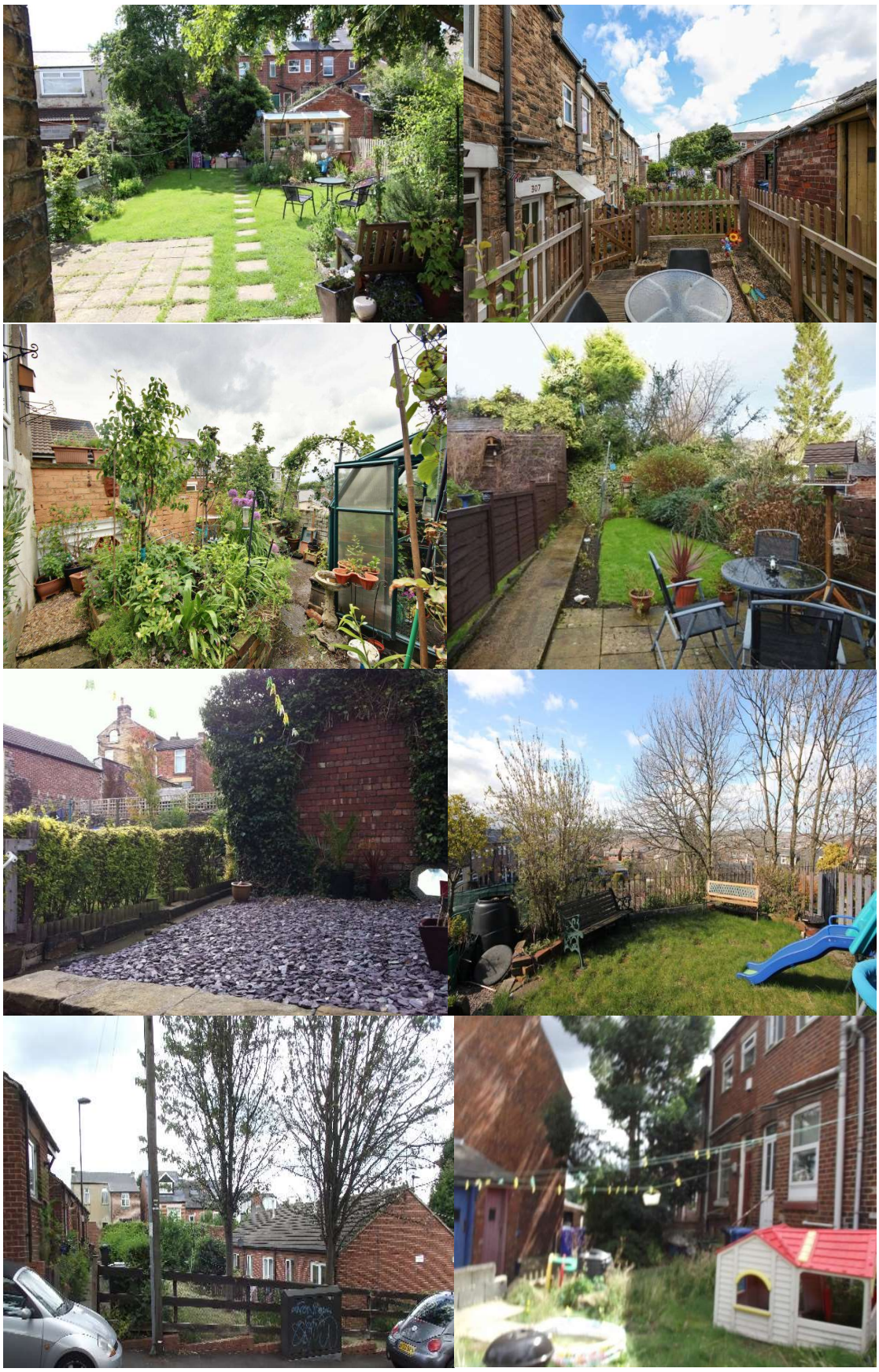


Figure 4.24 Different types of back gardens or yards associated with terraced housing in Walkley Neighbourhood, Sheffield. (Sources: Author's field Survey, 2016; Prime location.co.uk and Zoopla.co.uk)

Figure 4.25 Additional different types of back gardens or yards associated with terraced housing in Walkley Neighbourhood, Sheffield. (Sources: overstreet.co.uk, open rent.co.uk and Zoopla.co.uk)

Figure 4.26 Different types of side gardens or yards associated with terraced housing in Walkley Neighbourhood, Sheffield. (Source: Author's field Survey, 2016)

Moreover, some of the respondents (15%) indicated that they have side yards or side located gardens (see Fig. 4.26). About 11.5% of these side yards or gardens are private while 3.5% are shared.

Alley way was available in 66% of the respondents' terraced housing and shared by the majority of them (58.5%), while is exclusively used as a private open space by 7.5% of the respondents (see Fig. 2.27). The results indicated that 34% of the respondents did not have alley way in their terraced housing.

Parking spaces as a form of open space around a terraced housing are available to 33.5% of the respondents, and 21% of the respondents have them as shared parking spaces. Moreover, in terraced housing, especially the long row type, residents have the right of way over neighbour's passageway or yard to access their own properties or houses. The access way therefore becomes a common access. Similarly, a form of open space may be provided primarily as access route to properties which may be shared or common. About half of the respondents (50. 5%) had common access as a form of open space in their terraced housing. 45.5% of the respondents have shared common access while 5% have private common access (Table 4.8).

Figure 4.27 Some alley ways in terraced housing in Walkley Neighbourhood, Sheffield. (Source: Author's field Survey, 2016)

Since availability of the open spaces around the terraced housing of the respondents is not the same with accessibility and usage, one of the questions asked which of the type of open spaces the respondents' household have access to and use. The results (Table 4.9) showed that majority of the respondents (60%) have access and use both private and shared open spaces in their respective terraced housing. But, 26% of the respondents use private open spaces only, while 14% have access and use shared open spaces only.

Table 4.8 Accessibility and usage of different types of open spaces by respondents' households.

Response	Use private open spaces only	Use shared open spaces only	Use both private and shared open spaces
Yes (%)	26	14	60
No (%)	74	86	40

Source: SPSS output

Table 4.9 Type of open spaces respondents' households have access to in the neighbourhood apart from the private and shared open spaces in their houses.

Type of open space	Yes (%)	No (%)
Public park/ garden	86.0	14.0
Pocket /mini park	62.5	37.5
Public square	9.0	91.0
Public water-fronts/ river bank	14.0	86.0
Woodland area	34.5	65.5
Allotments/Community growing space	22.3	77.7
*Others	5.1	94.9

Source: SPSS output. *Others include Lakes in Hillsborough Park, Western Park.

Since the open spaces encountered in the residential environment include also the neighbourhood or public open spaces apart from the private or semi-private open spaces around the house, the survey asked about the type of open spaces the respondents' households have access to at the neighbourhood level. The results indicated (Table 4.10) that majority of the respondents (86%) access the public park, and more than half visit the pocket parks in the neighbourhood apart from the private open and shared spaces they encountered at the household level in the terraced housing

4.4 The uses of open spaces around terraced housing

4.4.1 Uses of the Private and Shared open spaces by the respondents

Respondents were asked in the survey to specify what their households use their private and shared open spaces around their houses for during the warm months and the wet or cold weather. To reduce bias, open-end questions form was applied. The answers to these questions consisted of different activities which the researcher collated and analysed. The results showed (Table 4.11) that majority of the respondents used their private open spaces for growing flowers and gardening (58%), family sit out and relaxation (42.5%), drying clothes (27.5%), outdoor cooking or barbecue (27.5%), playing with children (19%) and talking to neighbours and friends (14.5%).

For the shared open spaces, majority of the respondents used them for access route to their properties or rear of their properties (47%) and sun bathing (47%). Other uses include storage (10%), compos ting (7%), talking to neighbours and friends (6.5%), and family sit out and relaxation (6.5%). Recall that 14% of the participants have access to only shared open spaces.

Table 4.10 Uses of the Private and Shared open spaces in terraced housing by the respondents.

Activity	Use of **Private** open spaces during **warm months**	Use of **Shared** open spaces during **warm months**	Use of open spaces during **wet or cold weather**
	% of the respondents		
Keeping pets	11.5	1.5	2.0
Exercising	2.0	2.0	1.5
Opportunity to be outdoor	2.0	1.5	0
Play with children	19.0	4.0	7.5 (Snowman)
Minor repair activities	2.5	0.5	0
Washing	13.5	1.5	0
Drying (clothes)	27.5	4.5	1.0
Growing flowers/gardening	58.0	5.0	29.0
Entertaining visitors	5.5	0	0
Siting and relaxing /family sit out	42.5	6.5	0
Growing your own food	7.5	1.5	0
Watch birds/Enjoying wildlife	7.5	0.5	10.0
Eating Outdoors	19.5	5.0	0
Talking to neighbours, friends	14.5	6.5	1.5
Sun bathing	8.0	47.0	1.0
DIY activities (do it yourself)	3.0	1.0	1.0
Reading/meditating	13.0	0	0
Doing yoga	0.5	0	0
Composting	2.5	7.0	1.0
Cooking/Barbecue	27.5	0	0
Listening to music	0.5	0	0
Storage	6.5	10	13.0
Access route	0	47.0	12.0
Smoking	0.5	2.0	2.0
Parking (car)	2.5	2.0	2.0
Others	3.0	2.0	0
List of others	Fish pond, home work for kids, picnic.	Walking dog, access to garage.	Harvesting fruits, walking dog, feeding birds.

Source: SPSS output

4.4.2 Uses of the neighbourhood (public) open spaces by the respondents

The respondents were also asked what they use their neighbourhood open spaces for. They were provided with list of activities obtained from the literature about uses of public open spaces. Since respondents may have to leave their houses to access the neighbourhood open spaces, they were further asked how often their households use these neighbourhood open spaces. The results (Table 4. 12) indicated that the major

uses of the neighbourhood open spaces by the respondents include going for walk or run (76.7%), opportunity to be outdoors (76.1%), relaxing in the natural setting (63.5%), getting away from day to day routine (63%), enjoying wildlife (59.8%), having time out with friends or relatives (59.4%), using as access route (55.8%), and socializing or talking with neighbours (54.4%).

A Mother playing with her child in the back garden of terraced housing

A Family having a barbecue party in their back garden

Washing drying in terraced back yard

A Family Celebrating Birthday in the back garden

Figure 4.28 Illustration of the uses of the private and shared open spaces in terraced housing. (Source: Licenced images from 123rf.com)
(Note: Images were not from residents of Walkley neighbourhood due to ethical reasons, but licenced images from 123rf.com)

Table 4. 11 Uses of the neighbourhood open spaces by the respondents.

Activity	% of respondents using the neighbourhood open space for various activities at different time frame						
	Daily or most day	At least once a week	At least once a month	Once in two months	Never	Not applicable	Total of users at all times * D %
Walk dog/pets	17.1	3.0	1.5	1.0	10.6	66.8	22.6
Go for walk/run	23.9	30.5	13.7	8.6	9.6	13.7	76.7
Get away from day to day routine	13.2	24.9	13.7	11.2	12.2	24.9	63
Have opportunity to be outdoors	28.9	25.9	13.2	8.1	9.6	14.2	76.1
Meet new people	8.6	8.1	6.6	10.7	33.0	33.0	34
Use for education purpose	2.5	2.5	5.6	3.6	28.6	47.2	14.2
Have bike ride /cycling	4.6	8.1	8.6	7.1	27.9	43.7	28.4
Play with my children	5.6	15.2	5.6	1.0	13.7	58.9	27.4
Use as access route	27.9	14.2	8.6	5.1	16.2	27.9	55.8
Relax in natural setting	10.7	19.3	14.7	18.8	13.2	23.4	63.5
Socialize/ talk to neighbours	14.7	17.8	11.7	10.2	24.9	20.8	54.4
Enjoy wildlife	21.8	14.7	14.2	9.1	16.2	23.9	59.8
Have time with friends/ relatives	3.0	16.8	23.4	16.2	17.8	22.3	59.4
Social events	3.1	3.6	8.7	24.5	28.6	31.6	39.9
Use available recreational facilities	4.1	9.6	12.7	17.3	22.3	34.0	43.7
Grow your own food (allotment/community garden)	2.5	4.1	3.0	2.5	34.5	53.3	12.1
Others	1.0	1.0					
List of others	Sight-seeing or visual enjoyment						

Source: SPSS output * D= Total percentage of users irrespective of the time or duration of visits.

On daily basis, some of the respondents use the neighbourhood open spaces for opportunity to be outdoors (28.9%), access route (27.9) and going for walk or run (23.4%). For at least once a week, the respondents use the neighbourhood open spaces for walking or running (30.5%), opportunity to be outdoors (25.9%) and to get away from day to day routine (24.9%). At least once a month, some of the respondents use the neighbourhood open spaces to meet with friends and relatives (23.4%). Also, at least once in two months, some of the respondents use the open spaces for social events (24.5%). However, majority of the respondents indicated that they did not use or have never used their neighbourhood open spaces for walking dog/pets (77.4%), for education purpose (85.8%), bike riding /cycling (71.6%), playing with my children (72.6%) and allotment/community garden (87.9%).

A young man and woman going for walk in the neighbourhood park
(Source: Licenced images from Shutterstock.com)

Ruskin Park used as an access route to other places, footpath from Ruskin Park to Daniel Hill Street, Walkley, Sheffield (Source: geograph.org.uk).
Figure 4.29 Uses of the neighbourhood open spaces in Walkley, Sheffield.

4.5 Factors that determine or affect residents of terraced houses on how they use the open spaces in the residential environment

To explore the research question on factors that determine or affect residents on how they use their open spaces in the residential environment, respondents were provided possible options obtained from the literature that could influence how people use their open spaces and on a 5-point Likert scale, requested to rank how important these factors were to them. The results for the shared open spaces and neighbourhood open spaces were provided in Table 4.13 and Table 4.14 respectively.

Table 4.12 Factors that determine how respondents' households use their shared open spaces around their houses.

Factor	How important is this determining factor?							
	NVI %	NIM %	IMP %	VIM %	NOA %	Mdn	IQR	TSC
Neighbours' behaviour	6.2	8.0	26.5	30.9	28.4	3.0	4.0	365
Weather	7.4	10.5	25.3	29.0	27.8	3.0	4.0	357
Degree of privacy	5.6	7.5	29.2	21.7	36.0	3.0	3.0	316
Available time	9.9	11.7	19.8	22.8	35.8	2.0	3.0	290
Open space design	12.3	9.3	23.5	17.9	37.0	2.0	3.0	280
*Others	0	0.6	0	5.0	94.3	0	0	34
Source: SPSS output NVI= Not very important, NIM= Not important, IMP= Important, VIM=Very important, NOA= No opinion or not applicable, Mdn= Median, IQR= Interquartile range, TSC= Total score, Assigned numerical scores to the respondents' rating: 1=NVI, 2=NIM, 3=IMP, 4=VIM, 0=NOA. *other factors added include size of the shared open space, functionality, access to the shared open space, neighbour's dog and parking space.								

The highest number of the respondents, over 40% indicated that all the five factors were either important or very important determinants for how they use the shared open spaces. However, the neighbour's behaviour (Mdn=3, IQR=4, TSC=365), weather condition (Mdn=3, IQR=4, TSC=357) and privacy (Mdn=2, IQR=3, TSC=316) were the three rated highest factors influencing the use of the shared open spaces. 31% of the respondents believed that the behaviour of one's neighbour is a very important factor that could influence or determine how the shared open spaces are used.

In the case of the neighbourhood open spaces, the state or condition of the public neighbourhood open space (85.7%, TSC=586), the distance or proximity to household's house (78.6%, TSC=562), and the weather condition (73.4%, TSC=559) were the three rated highest factors that influenced the households to use the neighbourhood open spaces.

Table 4.13 Factors that determine how respondents' households use the neighbourhood open spaces in the residential environment.

Factor	How important is this factor?							
	NVI %	NIM %	IMP %	VIM %	NOA %	Mdn	IQR	TSC
State or condition of the public open space or facility	1.0	2.6	50.0	35.7	10.7	3.0	1.0	586
The distance or proximity to my house	3.6	8.7	48.5	30.1	9.2	3.0	1.0	562
Weather condition	5.6	11.2	36.7	36.7	9.7	3.0	2.0	559
Available time	2.6	10.7	36.7	34.7	15.3	3.0	2.0	535
Security condition or safety	3.6	7.7	45.9	26.5	16.3	3.0	2.0	515
Open space design	8.7	8.7	39.8	23.0	19.9	3.0	2.0	465
Availability of amenities e.g. seating, children's play equipment	8.2	16.8	31.6	23.5	19.9	3.0	2.0	452
Satisfaction level with private or shared open space at my house	8.2	20.4	32.1	15.8	23.5	2.0	2.0	409
Need to socialize with others in the neighbourhood	20.9	29.1	19.9	5.1	25.0	2.0	2.5	312
*Others	0	0	0.5	2.5	97.0	0	0	23

Source: SPSS output
NVI= Not very important, NIM= Not important, IMP= Important, VIM=Very important, NOA= No opinion or not applicable, Mdn=Median, IQR=Interquartile range, TSC= Total score, Assigned numerical scores to the respondents' rating: 1=NVI, 2=NIM, 3=IMP, 4=VIM, 0=NOA. *other factors added include accessibility, availability of football game facility, dog poo bins, lighting in the evening, provision of seating and accessibility, especially for potential users with limited mobility.

4.6 The benefits and problems derived or encountered by the residents of terraced housing from the use of their open spaces (Part 1)

To explore the research question, what are the benefits and problems derived or encountered by the residents of terraced housing from the use of the open spaces, respondents were asked to provide range of benefits that they get from using their private and shared open spaces around their houses. The questions were open-ended to reduce bias and allow respondents to provide their opinions and perceptions.

Similarly, respondents were asked further to provide information about the various problems they have encountered from the use of their private and shared open spaces in their houses. The responses to the open-ended question on benefits were classified into categories and the results were provided in Table 4.15, while the qualitative aspect was given in the qualitative analysis section.

Table 4.14 Benefits derived by respondents' households from using private and shared open spaces in and around their houses.

Benefits/profits	% of respondents	Nature of benefit	% of respondents
Relaxation/pleasure/restoration	16.0	Psychological benefits	30.5
Reading in the Sunlight	2.0		
Obtain vitamin D from the sunlight	12.5		
Socializing	41.0	Social benefits	47.5
Promotion of family bonding	4.5		
Increase community connection	2.0		
Promotion of physical activities	36.5	Physical activity	36.5
Space for domestic and DIY activities	16.0	Self-development and actualization	16.0
Connection with nature including birds and animals.	9.0	Nature connection	9.0
Others	0.8	Other benefits	0.8

Source: SPSS output. Note: DIY means Do It Yourself activities.

From the quantitative analysis of the benefits provided by the respondents, socializing was the most listed benefits (47.5%) of private and shared open spaces in and around the terraced housing. Additionally, other forms of benefits associated with socializing were the promotion of family bonding (4.5%) and community connection (2%). Also, 36.5% of the respondents derived various benefits that were associated with the promotion of physical activities.

Similarly, other advantages of the private and shared open spaces mentioned were related to relaxation and restoration (16%), and exposure to sunlight to obtain vitamin D (12.5%). Besides, about 16% of the respondents derived some form of self-development and self-actualization benefits through the do-it- yourself activities in the private and shared open spaces. About 9% of the participants obtained the advantage of connection to nature at their home level through access to their private and shared open

spaces. Further analysis of the perceptions of users on the benefits of the private and shared open spaces was presented under qualitative analysis results in the next section.

4.7 Spatial attributes of the private and shared open spaces of the respondents in terraced housing

From the maps obtained from the mapping exercise of the respondents, a content analysis was performed on the visual data collected to generate the spatial attributes or characteristics of the private and shared open spaces in the respondents' terraced housing. Content analysis is a systematic and replicable technique of reducing many text or visual data into fewer content categories through a coding process (Stemler, 2001, p.1). It is a descriptive qualitative approach to data analysis (Braun and Clarke, 2006).

The resulting data from the coding process were fed into SPSS programme for further analysis. The analysis considers the availability or non-availability of typical residential outdoor features in the private and shared open spaces of the respondents, and those they considered important to their households. The summary of the characteristics of the private and shared open spaces in terraced housing of the respondents obtained from the analysis is indicated in table 4.5 below. For availability of trees within the private and shared open spaces, the number is ranked into none, one tree only and more than one tree. Similar ranking is made for the shrubs; none, few and many. The rest features were categorised as yes for availability and no for otherwise.

In addition, the analysis of the features in the private and shared open spaces the respondents considered important and with which they are happy or otherwise is provided in APPENDIX U.

The results showed that majority of the respondents (73.5%) have sitting areas in their private and shared open spaces. However, only 28.5% considered seating area in their open spaces as important. Similarly, 48%, 59.5% and 54.5% of the respondents reported the availability of trees, shrubs and lawn respectively in their private open and shared open spaces. The presence of these green features is regarded as greenery within the open space in the study. In addition, 8.5% of the respondents have ponds or water features within their private open spaces.

Moreover, 10% of the respondents reported having children playing areas within their open spaces, although 33% had children in their households. It means 23% of the

households with children lack satisfactory children play areas within their private or shared open spaces.

More than half of the respondents (57.5%) have wall or fence dividing the open spaces, especially the back yard or garden, between neighbours to provide private open spaces.

Table 4.15 Summary of the characteristics or spatial attributes of private and shared open spaces in respondents' terraced housing.

Variable or question	category/description	% of participants
General features		
Availability of sitting area	Yes	73.5
	No	26.5
Greenery within the open space		
Availability of trees	None	52.0
	Available but one only	24.5
	Available and more than one	23.5
Availability of shrubs	None	40.5
	Available but few	17.5
	Available and many	42.0
Availability of lawn	Yes	54.5
	No	45.5
Other features		
Availability of pond or water feature	Yes	8.5
	No	91.5
Availability of children playing area	Yes	10.0
	No	90.0
Availability of wall or fence dividing open spaces among neighbours	Yes	57.5
	No	42.5
Availability of barbecue	Yes	17.0
	No	83.0
Availability of bin	Yes	60.5
	No	39.5

Source: SPSS Output

4.8 The relationship between the different types of the open spaces around terraced housing (Part 1)

To explore the research question about the relationship between the different types of open spaces available to residents of terraced housing in the residential environment, respondents were asked to rank the open spaces in order of importance to them and explain the reason for the disposition towards the type of open space ranked highest. The result of the ranking was provided in Table 4.16 while the analysis of the explanations provided for the ranking was presented in the qualitative analysis results section.

Also, to determine if there were a significant association between different variables of interest, Pearson Chi-Square tests were applied. The application of this test was connected with its compatibility with the nature of variables of interest (Pallant, 2013). Similarly, the determination of possible relationships between variables, since most of the responses were nominal and ordinal, non-parametric, Spearman correlation tests were applied (Bryman, 2012).

Table 4.16 Respondents' ranking of open spaces types in the order of importance.

Type of open space	Most Important	Important	Least Important
	% of respondents		
Private open space around the house	74	14	12
Neighbourhood open space	20.5	51	28.5
Shared open space around the house	5.5	35	59.5

Source: SPSS output

The private open space was the most important open space to the majority of the respondents (74%). However, 20.5% and 5.5 % of the respondents rated neighbourhood open space and shared open space respectively as most important open space to them. About 51% of the respondents rated neighbourhood open space as important and majority rated shared open space as least important.

4.9 Satisfaction with the open spaces around terraced housing by the respondents and tests of association with study variables

To explore and capture the perception of the residents of the terraced housing about the open spaces in their residential environment, respondents were provided on a Likert

scale to rank the level of their overall satisfaction with the open spaces in their residential environment. The results of the ranking were provided in Table 4.17.

Table 4.17 Overall satisfaction with open spaces in the residential area by the respondents.

	Level of overall satisfaction with your open space								
Type of open space	VDI %	DIS %	NSD %	SAT %	VSA %	NOA	Mdn	IQR	TSC
Private open space	3.1	8.7	10.7	37.8	28.6	11.2	3.895	2.0	679
Shared open space	2.5	8.6	25.4	27.4	12.2	23.9	3.087	3.0	525
Neighbourhood OS	2.5	3.0	16.8	44.2	25.9	7.6	3.933	2.0	719
VDI=Very dissatisfied, DIS=Dissatisfied, NSD=Neither satisfied nor dissatisfied, SAT=Satisfied, VSA=Very satisfied, NOA=No opinion or not applicable, Mdn=Median, IQR=Interquartile range, TSC=Total score, assigned numerical scores to the respondents' rating: 1=VDI, 2=DIS, 3=NSD, 4=SAT, 5=VSA, 0=NOA. Source: SPSS output									

The majority of the respondents (66.4%) were satisfied or very satisfied with their private open spaces. However, not all the respondents have private open spaces in their terraced housing. As reported earlier, some have both private and shared open spaces while others have either private open space only or shared open space only. Among all who have access to private open spaces, 75.1% (Appendix H) were satisfied with their private open spaces. Moreover, among those who use private open spaces only, 85.8% of them were satisfied with their private open spaces (Appendix I).

A Chi-Square test of independence at 0.05 significant level showed significant association between satisfaction with private open spaces and using private open spaces only, X^2 (5, n=196) = 14.305, p = 0.014, Cramer's V =0.270 (Appendix J).

For users of shared open spaces, 39.6% were satisfied with the shared open spaces while 25.4% were neither satisfied nor dissatisfied (Table 4.16). However, within those who use shared open spaces only, 57.2% (Appendix K) were satisfied with their shared open spaces, but a Chi-Square test for independence indicated no significant association between satisfaction with shared open spaces and using shared open spaces only, X^2 (5, n=197) = 7.835, p = 0.166 (Appendix L).

Comparing within the users of both private and shared open spaces, 41.7% (Appendix M) of them were satisfied with their shared open spaces, and a Chi-Square test for independence indicated significant association between satisfaction with shared

open spaces and using both private and shared open spaces, X^2 (5, n=197) = 28.876, p = 0.000, Cramer's V =0.383 (Appendix N).

At the neighbourhood level, majority of the respondents (70.1%) were satisfied with their neighbourhood open spaces while 5.5 % were dissatisfied or very dissatisfied (Table 4.16).

Also, comparing between the three types of open spaces, more respondents were satisfied with the neighbourhood open spaces (70.1%, TSC=719), than the number satisfied with private open spaces (66.4%, TSC=679) and shared open spaces (39.6%, TSC=526). Likewise, more respondents were satisfied with their private open space (66.4%, TSC=679) than the shared open spaces (39.6%, TSC=526).

Moreover, exploring the interrelationships among these variables further, a Spearman correlation tests were performed. The results of the relationship between satisfaction with private open spaces and using private open spaces indicated a positive correlation (0.241) between the two variables. There was however, no correlation between satisfaction with private open spaces and using both private and shared open spaces (Appendix O). Similarly, there was no correlation between respondents' satisfaction with shared open spaces and using shared open spaces only. However, there was a weak, positive correlation (0.205) between respondents' satisfaction with shared open spaces and using both private and shared open spaces (Appendix O).

Furthermore, correlation tests between respondents' satisfaction with private open spaces and specific open spaces around their terraced housing were made. The results of the Spearman correlation tests showed a weak, positive correlation between respondents' satisfaction with private open spaces and their front yard/garden (0.205), and side yard/garden (0.197) (Appendix O). However, there was a strong, positive correlation between respondents' satisfaction with private open spaces and their back yard/garden (0.401) (Appendix O). In contrast, there was a weak, negative correlation between respondents' satisfaction with shared open spaces and front yard/ garden, and a weak, positive correlation with the common access (0.145).

In addition, result indicated a weak correlation between respondents' satisfaction with shared open spaces and satisfaction with neighbourhood open spaces (0.268) (Appendix O). However, the strength of the relationship was stronger for respondents with shared open space (0.268) than private open space (0.149). This suggests that respondents that are satisfied with their private or shared open space, especially shared open spaces are likely to use and be satisfied with the neighbourhood open spaces (Appendix O).

The relationship between shared open spaces and factors influencing the usage was investigated further using Spearman product-moment correlation coefficient. The results indicated weak, positive correlation between satisfaction with shared open spaces and weather condition (0.225), neighbour's behaviour (0.249), available time (0.225), and degree of privacy (0.194) (APPENDIX P). Comparatively, the relationship is strongest for neighbour's behaviour. This may suggest that the neighbour's behaviour is the strongest factor determining or influencing the usage of shared open spaces by households in terraced housing.

To determine the effect of the respondents' characteristics on the usage of the different types of open spaces and level of satisfaction with these open spaces, the spearman Chi-Square tests were performed. The results (APPENDIX Q) indicated that there were significant differences between the age group, duration of household in the terraced housing and number of children in the household (6-11years) and use of private open space only. Similarly, there were significant differences between tenancy status and duration in the terraced housing and the use of shared open space only. There was no significant difference found for the other characteristics.

Likewise, there was no significant difference between any of the respondents' characteristics and use of both private and shared open spaces (APPENDIX R). Nonetheless, there was a significant difference between the use of neighbourhood open spaces and the age group of respondents and number of young people (6-11years) in the household (APPENDIX R).

The results of Chi-Square tests between respondents' characteristics and satisfaction with the open spaces showed a significant difference for age group, employment status, and number of children in the household for satisfaction with private open spaces, and employment status and duration in the terraced housing for satisfaction with the shared open spaces only (APPENDIX S). In contrast, for satisfaction with the both private and shared open spaces, only employment status and tenancy showed significant differences among respondents' characteristics, whereas, satisfaction with the neighbourhood open spaces showed significant differences for age group, employment, duration in the terraced house, ethnicity, and children in the household, especially those above 5 years (APPENDIX S). These implicated characteristics may be associated with satisfaction of respondents with their open spaces.

Moreover, to investigate the association between respondents' satisfaction with their open spaces and other variables of interest further, Spearman correlation test was

used at 0.05 significant level to test for the strength of relationship between satisfaction with open spaces (private and shared) and open space benefits, available features in the respondents' open spaces and important features to the households in their open spaces.

For benefits of open spaces, results of the tests revealed weak, positive correlation between satisfaction with the private open space only and promotion of family bonding (0.195), and promotion of physical activities (0.215) (APPENDIX T). There was no correlation with the rest of the benefits. Surprisingly, there was no correlation between any of the benefits of the opens spaces and satisfaction with the shared open spaces (APPENDIX T). This may suggest that having shared open space only may be less importance for benefits of open spaces than private open space only and both private and shared open spaces.

For the available features in the private or shared open spaces in the terraced housing, results indicated correlation between satisfaction with private open spaces and availability of trees (0.259), lawn (0.205), shrubs (0.149) and children play area (0.157) (APPENDIX T). These may suggest the importance of greenery, children play area and perception of safety or security in the private open spaces for satisfaction with the open space. In contrast, there was a weak, negative correlation between satisfaction of shared open spaces and availability of shrubs (-0.171) (APPENDIX T).

For the features that respondents were happy with and considered very important to their household in their private and shared open spaces, the results showed there was a small, positive correlation (0.166) between satisfaction with private open spaces and children play area for respondents that regarded it as very important. However, there was no correlation with any of the features respondents considered very important and satisfied with, for shared open spaces only (APPENDIX T). Nevertheless, the result of the Chi-Square test indicated a significant association between trees and shrubs as features of the private and shared open spaces that were important to respondents and benefits of open spaces (APPENDIX U).

Furthermore, the Chi-Square test was performed to test for association between benefits derived by respondents from open space and the type of open spaces they have access to and use. The result shows there is a significant association between the use of private open spaces only and both private and shared open spaces and benefits of open spaces. There was no significant association between the utilization of the shared open spaces only and benefits of open space (APPENDIX V). The effect of the association is small for private open space only and medium for both private and shared open spaces

applying Cohen' s criteria of 0.1 for small, 0.3 for medium and 0.5 for large (For independence using Yates Continuity Correction) (Pallant, 2013; Cohen, 1988).

For the neighbourhood open spaces, correlation tests were made between satisfaction with neighbourhood open spaces and uses of the neighbourhood open spaces by respondents' household. The results indicated positive correlation (indicated relationship strength is put in bracket) between satisfaction of neighbourhood open spaces and use for 'get away from day today routine' (0.283), 'time with relatives/friends' (0.273), 'go for walk/run' (0.238), 'relax in natural setting' (0.271), 'have opportunity to be outdoors' (0.243), 'enjoy wildlife' (0.196), 'meet new people' (0.178), 'enjoy wildlife' (0.196), 'social events' (0.179), and 'socialize or talk to neighbour' (0.153) (Appendix W).

In the same way, the correlation tests were applied to determine the relationship between satisfaction of respondents with the neighbourhood open spaces and major factors influencing respondents' households to use their neighbourhood open spaces. The results indicated that all the nine factors were positively correlated with the satisfaction of respondents with their neighbourhood open spaces (Appendix X). Nevertheless, the most five major factors are available time for the respondents (0.342), open space design of the neighbourhood open spaces (0.303), security condition/safety of the neighbourhood open spaces (0.283), state or condition of the neighbourhood open spaces (0.264), and respondents' satisfaction level with their private or shared open spaces at their houses (0.253) (Appendix X).

PART 111: ANALYSIS OF THE QUALITATIVE DATA

This part gives the results of the analysis of the qualitative data generated from the study survey. The analysis of the qualitative data was based on the research questions that required qualitative approach.

4.10 Barriers to the use of shared open spaces by residents of terraced housing

The respondents were asked to report factors that prevented or discouraged their households from using the shared open spaces around their houses to explore the research question on the barriers to the usage of shared open spaces by residents of terraced housing. From the analysis, five main themes or issues were found to be perceived to discourage or prevent the households from using their shared open spaces.

These factors were categorised as neighbour's attitude and related issues, open space design issues, lack of perceived privacy, weather condition and personal factor.

4.10.1 Neighbour's attitude and related issues

Since terraced housing usually has attached buildings, households normally have other next families as neighbours. Majority of the respondents reported the attitude or behaviour of their neighbours as one of the significant barriers to usage of their shared open spaces. One of the respondents revealed her perception about the neighbour's attitude or behaviour and shared open spaces, and wrote, "…*with good neighbour, there is not really any issue. Bad neighbours, absolutely ruin it."* The poor relationship between neighbours was found to constitute a barrier. For example, a man remarked, *"We didn't like our neighbours, they were offensive in some way, and they used the shared space a lot then we would use it less, but this has been rare."* Another one remarked that they could not use the shared open space because "*especially with my partner as we have not always got on well with the neighbours...".* Besides, others raised the issue of *"complicated neighbour*" or *"neighbour's disturbance*" and *"neighbour's reaction*". Some respondents mentioned the problem of incompatible neighbours or neighbour's behaviour that may not be conducive. For example, one of the respondents revealed that she had asthma and therefore had to quit the shared open space once her neighbours were there to smoke or have a fire. Other issues related to the neighbours include noise from neighbours or neighbours' kids, shared open space management problem among neighbours, and differences in preference or tension on use of the shared open space. One respondent explained that her neighbour would prefer to park a car in the shared open space, whereas she preferred something else to be done there. Another respondent captured the attitude of her neighbours that discouraged her from using the shared open space this way *"Being overlooked, having comment from neighbours... just having a shared access is quite invasive and uncomfortable."* Similarly, another woman described her experience this way "...*our neighbour's dog and my dog didn't like each other so I could never use it when he was out with his dog…".*

4.10.2 Open space design related issues

While some of the respondents would have loved to use their shared open spaces, they reported a range of factors that were associated with the design of the shared open

spaces as a perceived barrier. Some of these design-related factors include location, size, quality, materiality, and condition of the shared open spaces. One of the respondents not well pleased with her shared open space described it as *"... not well kept and no place to do anything in it. It is more of a small empty space than a usable area*". On the problem of size, one of the respondents submitted that *"it was too small to share"* and regarded herself as having no shared open space. Another respondent explained the barrier as" ... *the condition of space, the amount of space*." Similarly, another woman, commented: … "*poor space design, space not big enough*" as her limitation to usage. One of the respondents explained his perception of the barrier due to design this way "… *open space design may not be favourable to some various kind of age group".* Other respondents reported the lack of lighting or poor lighting that resulted from poor design and location of the shared open space. For example, one woman revealed "…*No good lighting so mostly doesn't use in the dark"* and another expressed her disappointment with all her shared open spaces and hinted "…*Not big enough, not enough sunlight in the backyard… poor design*". The design factor was a limiting factor to even some with private open spaces. One of the respondents reported this thus "*...the size of my private open space is too small, with tiered levels but prefer flat.*

4.10.3 Lack of perceived privacy

Although the subject for consideration is shared open space, yet respondents reported that they expected some level of privacy to be able to use the shared open spaces, and where that was perceived to be absent, it was reported as a barrier to usage. For example, one respondent expressed her inability to use her shared open space due to "*presence of neighbours"* or *"lack of privacy*". Another respondent complained of "*Being overlooked"* while another respondent explained that "*sometimes I would prefer privacy to be able to relax uninterrupted"* and one woman explained the problem as... *"there is zero privacy... no enough privacy for the front lawn"*.

4.10.4 Weather condition

Some of the respondents attributed weather condition as one of the perceived barriers to the use of shared open spaces around their terraced housing. They reported inclement weather condition discouraged them from maximizing the use of their shared open spaces. For example, one woman wrote, *"my children stop playing due to weather;*

Barbeque stops because of weather." Other respondents mentioned "*…mainly the weather," "… bad weather", "… weather" and another mentioned "cold wind".* However, many respondents use their shared open spaces during warm weather.

4.10.5 Personal factor

Apart from the themes mentioned above that emerged as perceived barriers to the use of shared open spaces, another factor was the self-made barrier attributed to a personal factor or individual value/choice. Based on subjective perception of respondents about themselves or a particular, peculiar consideration to their neighbours, some of the respondents do not use their shared open spaces. For example, one respondent explained his personal opinion about the perceived barrier this way: *"I feel that I am encroaching on them [neighbour], and vice versa,"* and another respondent remarked, *"Encroaching on privacy and disturbing others and don't feel comfortable.*" Likewise, one woman reported, *"I feel like invading the private life of my neighbour, so I try to limit use…".* Another respondent perceived the non-use of shared open space as *"avoiding disturbance to other users of the shared spaces".* Besides, few respondents gave a personal reason like *"time constraint" or "lack of time"* as a limiting factor.

4.11 The benefits and problems derived or encountered by the residents from the use of the open spaces in and around terraced housing (Part 11)

This section 4.11 provides the results of the qualitative analysis of the benefits and problems associated with the use of the private and shared open spaces around the terraced housing. The quantitative component was provided in section 4.6. as part 1, and was somehow limited as detailed information could not be provided. The benefits aspect and the problem encountered would be presented separately under this section.

4.11.1 Benefits derived by the residents from the use of the private and shared open spaces around terraced housing

Numerous benefits were derived by residents of terraced housing from the use of their private and shared open spaces. From the analysis of these benefits, nine different themes emerged. These include social relation, physical health or activity, nature and wildlife connection, personal emotion or emotional health, additional functional

domestic spaces, production of fruits and vegetables, natural laundry alternative, secure children play area and access.

1. **Social relations**

Majority of the respondents reported that their private and shared open spaces had afforded them the development of positive social relationship at family and neighbourhood level. Some sub-themes emerged under social relation, and these include promotion of family bonding, community connection or sense of community, and friendship or neighbour's friendliness development. The private open spaces provide the opportunity for family interaction and play. Some respondents explained this thus: *"it promotes family bonding and building..."*, "*gives pleasure and encourage strong family socialization"*, "*barbecue act, room for all the family"* and *"opportunity for family enjoyment"*. Some respondents also invite friends to their private open spaces which increase social interaction beyond family members. Some reported the benefits these ways: *"we enjoy socialising with family and friends in our garden", "it encourages social relations as friends are happy to come around", "we enjoy gardening, we use our garden to have family get together", "being able to share these things with friends"* and *"nice to get out in the summer, good space to invite lots of people round as terraced housing is small"*.

However, for the shared open spaces, one of the respondents describe the perceived benefits this way, *"It facilitates Neighbourhood cohesion, promotes a balanced lifestyle and healthy living, ...and room for letting off steams, serve as chatting and socialising spac*es." Another adult woman wrote: *"I do get into conversations with my neighbour in the shared space. This has led to me helping a local boy with home works and his brother getting his passport documents filled in correctly (English is not their first language). I have also become friendly with the people..."* Another woman reports the perceived benefits of shared open spaces as, *"it builds community and neighbourhood connection"*. Similarly, a male adult among the respondents explained the benefit this way, *"shared open space is good for community spirit and cohesion enhancement for social improvement and development to a certain extent."* Many respondents considered shared open spaces around the terraced housing as a social space that provides an opportunity to residents of all ages to interact and develop a positive social relationship. One of the respondents perceived the open space as *"space to socialise"* while another respondent reported *"our children play together, socialise with neighbours"* and others

reported thus: *"Nice to sit outside when weather is nice, and chat with neighbours", "Keeping in contact with neighbours"* and *"provides opportunity to build relationships with neighbours".* Another woman explained the opportunity created by shared open spaces to them this way, *"Talking to the adjacent neighbour about his garden and helping each other"* and creating *"sense of community with immediate"* neighbours.

2. <u>Physical health or activity</u>

Promotion of physical activities or physical health was another category of benefit derived by residents of terraced housing from the use of their private and shared open spaces. One of the respondents who is a home owner revealed that the private open space "facilitate physical activities and health" and another woman explained "… *mowing the lawn gives me physical exercise and vitamin from sunlight".* A retired woman observed that "…*gardening and playing with my grandchild provide exercise*". The open space is perceived by some respondents as *"space available for exercise", "playing ground", "exercise outdoor play"* and where "*…the kids play and exercise-physically*…". While the open spaces are relative small compared to other types of dwelling, respondents affirmed it benefited them by *"facilitating physical activities and health"*, and providing *"gentle exercise*". Similarly, some respondents linked physical exercise with gardening. One of the respondents disclosed that he did "e*xercise with garden…. physically working hard to maintain the garden" and another reported, "we benefit from the exercise of doing the gardening".*

3. <u>Nature and wildlife connection</u>

Another category of benefit derived by residents was contact with nature and wildlife. Respondents reported the benefits of being in fresh air, sun, and in touch with nature right at their doorsteps through the opportunity of the private and shared open spaces. One of the respondents captured the opportunity this way, "*The benefit of being close to nature and tending flora in own's garden along with the satisfaction of owning ones".* Other respondents reported having a garden to connect to nature. One of the residents commented "*I do gardening, I often watch birds and insect activity in the garden…*" and another household revealed what they do in their private open space: *"we teach our son about birds, insect, plant, trees, fruits, gardening, and cultivating/ growing".* Other mentioned having the benefit of *"nature watching", "Enjoyment of the trees, shrubs and flowers and the birds they attract"*, sunshine enjoying, watching the garden and the wildlife. So, respondents expressed "*Feeling closer to nature", "feeding wildlife" and*

"Enjoying private space to sit outside, listening to sound of nature and visit of cats who are friendly". One respondent remarked "*It's nice to be in the sun, fresh air, hear nice environmental sound…I can sit and listen to the birds and …contact with nature".*

At another level under nature connection, having opportunity to grow fruits and vegetables was important to some respondents as a significant benefit from the private and shared open spaces. A household clarified this and wrote *"We grow our own food, mostly lettuce/leaf green and tomatoes",* and a female homeowner reported, "*I get to enjoy the sun and grow plants for the house"*. Some of the household considered fruits and vegetables essential for *"…good diet" and produce "…lots of fresh vegetables and fruits all year".*

4. <u>Psychological and emotional health</u>

The respondents reported a range of benefits associated with their emotion or emotional health. One of the respondents narrated *"Gardening is a good exercise, good for mental health. Relaxing is good for mental and emotional health. Having good feeling or experience of a space is also good for mental and emotional health".* Another woman reported the benefit of her experience in her private open space as thus "*Reduces stress, have enjoyment and fun, and improves mood"*. Others described their feelings in their private open space as "*…soothing, calming, healing", "sunlight makes you feel good", "relaxing, reading in the sun, and getting vitamin D", "peace and sanctuary", "comfort and added value".* Likewise, a household reported, *"one of us suffer from the seasonal affecting disorder, so getting out in sunshine really help".* And another resident pointed out that she derives *"emotional benefit -as I enjoy the sunshine to read and relax outside, and… a nice way to reflect and gather one's thoughts".* Some households disclosed, *"we love the green- it's beneficial in every way, our children need the outdoor space, and it is vital for them". One respondent also reported, "Access to a garden even a small one can provide relief...*".

5. <u>Additional functional domestic spaces</u>

Some households considered the private or shared open space as an additional useful area to complement their small internal spaces. A male homeowner among the respondents stated that the private open space *"is an extra space in which one can enjoy the outdoors activities"*. Another respondent reported that *"It is an additional space for household tasks",* while one respondent explained that private open space gives *"some practical benefit, for example, additional space to do DIY".* Similarly, another male

homeowner noted about the private open space and wrote that *"... Sometimes it helps to keep the extra dirt and water outside".* Other respondents acknowledged the benefit of *"having additional space to store items"* and have *"do-it-yourself (DIY) activities".* Similarly, one respondent expressed the benefit as *"... a space for my hobbies".* Others reported the advantage it provides thus, "*being able to store items outside the home", "it provides storage space"* and *"*room for storage of bicycles*".*

6. <u>Natural laundry alternative</u>

The common thing is to have a laundry with washing and drying machines in the UK. However, some of the respondents reported the benefits of having their private open space and shared open space for alternative drying for their households and attendant perceived satisfaction. One of the respondents asserted the benefit this way, *"it provides laundry that dries free of charge and smells nice"*. A woman homeowner revealed, "*for me I like being in the garden, washing outside*". Another respondent pointed out "*Having a space to dry washing takes some stress out of my life*". One respondent explained, "*I like drying my laundry outside -it means my clothes smell better, again good for my well-being".* Another man homeowner shared his experience and noted "*Air dried clothes are much more pleasant*" and similarly, a tenant respondent affirmed the benefit and wrote, *"We have a room to dry our clothes*" referring to the private open space.

7. <u>Secure children play area</u>

A few of the respondents suggested that having secure children playing area was a perceived benefit of private and shared open spaces to their households in terraced housing. For example, some households reported about their shared open spaces that *"My kids utilise the area by playing there"* and "*children like to play there*". Some of the residents regarded the space as "… *a safe space to play"* or important space for "… *our children to play", "...games with children*". Another respondent reported how dissatisfied he was in the private open space available to his household, but acknowledged that it was useful to their neighbour's son. He reported thus "… *not hugely -it is a bit of wasted space. Our neighbour's son spends more time in our half of the garden than we do*". Besides, some respondents claimed that the private open space offers them an opportunity space to play with their pets. One of the respondents reported, *"it is an important space to play with dogs"* while another respondent wrote, "*it is a secure safe space for my elderly dog who loves the outdoor".*

8. **Access to property**

One of the perceived benefits of private and shared open spaces acknowledged by the respondents was the access route to properties and gardens. Many respondents did not access their properties through the front doors but through the alleyway or common access, and in some cases through the private and shared open spaces of the neighbour, having the right of way. One responded commented on the benefit thus: "*we are able to have access to our back garden using the shared open space"*. Another respondent reported that it provided "*Easy of access...*". Another respondent explained the significance of shared open spaces for access, and noted, "*There is always the potential for problems with shared alleyways or access across your property to other houses, but we have no such problems...".*

4.11.2 Problems encountered by the residents from the use of the private and shared open spaces around terraced housing

The study apart from investigating the benefits derived by residents from the use of their private and shared open spaces also examined the problems encountered due to the provision and usage of the open spaces in the terraced housing. Therefore, respondents were requested to provide information on what their households found unsatisfactory or as disadvantages about the private and shared open spaces around their houses. The results indicated that while some respondents were well satisfied with their private and shared open spaces and reported no problem, others were satisfied but have few things unsatisfactory that may affect their sense of well-being.

Besides, results showed another category of respondents that was very dissatisfied with their private or shared open space, and the cause was not only associated with the use of open spaces but perceived availability or lack of appropriate private and shared open spaces.

The thematic analysis of the responses of what respondents find unsatisfactory about their private and shared open spaces resulted into four themes. The themes include lack of privacy and intrusion, neighbours' disposition, design-related challenges and management related problems.

1. **Lack of privacy and intrusion**

Many respondents reported lack of privacy and encroachment into their personal open spaces as one of the disappointing experiences they encountered with the use of their private open spaces. For example, one of the residents noted, *"Many neighbours can*

watch our activities in our garden. Potential lack of privacy", and another respondent expressed this and wrote, *"...strangers having access through yard/ garden"*. One of the female homeowners shared her feeling thus: *"Don't like the neighbours having the right of way across my yard, I feel is an invasion of privacy even though we get on well".* Others reported the problem of noise pollution limiting their use and benefits of both the private and shared open spaces. One woman reported the challenge thus: *"A noisy neighbour, the conversation can also be overheard",* and another respondent explained *"...If neighbours are also in their private open space, conversations or music can be overheard".*

The table 4.18 below provides a range of sub-theme for forms of intrusion and lack of privacy experienced by respondents in their private open spaces.

Table 4.18 Forms of intrusion and lack of privacy experienced by the respondents.

Form of intrusion	Representative quote
Animal	*"There are cats that can access the back garden and destroy some herbs/ planting, we love cats but they do damage our plants"* *"Sometimes we are disturbed, the dogs have ruined the neighbour's lawn"*
Sound	*"Noisy children playing in the yard, sometime loud music late at night", "The neighbour's dogs often bark which is a disadvantage and is disturbing and often very noisy", "The only small issue would be that during summer it can get a bit of noisy with children playing outside, Neighbour playing music, etc. This can be a bit frustrating whilst trying to relax in the garden and read a book"*
Visual	*"Our private space could be more private in terms of visibility"* *"The space is overlooked by many people. This is good for security but I would not feel comfortable, e g exercising in my garden"*
Smell	*"sometimes a bad smell from our neighbours' dog and also the neighbours' smoke", "We have a neighbour that smokes cannabis so in the warm weather we get annoyed when our children can't play in our garden due to the smell"*

2. <u>Design-related challenges</u>

Some of the problems or disadvantages raised by the respondents on their private or shared open spaces were related to the design of the open spaces. Some of these challenges are associated with lack of a particular perceived facility in the open space or quality and attributes of the private and shared open space. The design-related theme is classified into six sub-themes. The table 4.19 gives the new sub-themes.

Table 4.19 Design related factors perceived by respondents to be associated with unsatisfactory experience of their private and shared open spaces.

Design Issue	
Lack of front garden	*"No front garden means that passers-by can and do knock on windows and pull on the front of the house".*
Lack of parking	*"Could do with better access and parking" "No garage, difficulty parking outside our house", "Lack of dedicated residents parking spaces near the bottom of…street is a problem… I have sporadic health problems and sometimes have difficulty unloading e.g. supermarket shopping because I've been forced to park a distance from my house".*
Lack of greenery	*"Not really very green", "…no shrubs or trees", "Garden almost entirely lawn-would like to have better range of trees and shrubs to increase…".*
Lack of sunlight	*"north facing-little sun", "It is tiny, … and no light or shared access", "Because of other buildings around, there is no sun on much of the yard", "Back garden gets almost no direct sunlight".*
Lack of adequate size	*"Not enough private space", "Size of garden is quite limiting" "Private space too small, …", "… it's a very limited space for activities", "The size of the share open space is not sufficient for doing something else than drying clothes", "The space is fairly small…".*
Lack of relative flat surface and soil quality	*"Garden is small, with a stepped path from back gate to back door…", "Garden is slanted, hardly usable…", "No soil, less opportunity to grow flowers", "the quality of the soil is terrible…".*
Lack of appropriate design elements	*"No enough bench to sit", "My space is small…No space for a seat bench or larger/more flowerbeds", "Not properly fenced off", "Our neighbour has not put up their side of the fence, so we can't have our …".*

3. Management-related challenges

The management of the open spaces, particularly the shared open space is another source of disquieting experiences narrated by the respondents. The sub-theme captures evidence associated with poor management, lack of management and conflict on management. For example, one respondent recalled and reported, *"our neighbour's garden looked so cluttered and messy, and it's kind of depressing. We feel it cheapens the look of our back garden. Some of the share pathways are in disrepair …".* Some households reported the non-cooperating attitudes of other households or conflict to maintenance and management and pointed these out thus: *"other houses didn't contribute to maintenance, e.g., cutting grass", "lack of control over the general appearance of the shared open space"* and *"others don't keep their private open spaces tidy".* Other respondents put the problem as *"Lack of upkeep, overgrowing", "Landlord*

doesn't keep it well" and *"shrubs were overgrown, bins sometimes overflow, and the wind blows rubbish over the fence".* The management of the property including the private and shared open spaces sometimes is put under the control of the house owner which few of the tenants reported sometimes frustrating. One resident noted, *"The quality of the yard is low and in need of upkeep which is a low priority for the landlord".* In another dimension, some tenants and homeowner may find maintenance challenging, and one respondent revealed that *"it may be difficult to find time to keep the garden under control".*

4. **Neighbours' disposition**

Another category of undesirable experiences reported by respondents was associated with the neighbours. Neighbours that are contradictory may have conflicting ideas and may clash with other neighbours. One respondent expressed this thus *"The fact that it is not private and we don't have anything in common with the people we share the garden with can make it difficult to use the garden at times".* Another respondent explained that *"It can be difficult to own a dog if your neighbour is not pet-friendly, and this has caused problems in the past regarding the right of way in shared areas".* Other respondents wrote about the unacceptable disposition of their neighbours and described them thus*: "The unpleasantness and strange attitudes of certain neighbours…", "Neighbours' interference" and "…abusive use of shared open space by the neighbours".*

4. 12 Residents' perception of the positive contribution of the private and shared open spaces to their well-being in terraced housing

The study explored the question of the benefits of the private and shared open space further to understand the perception of respondents on the impact of the private and shared open spaces on the well-being of their households. Respondents were therefore asked to describe how the benefits they claimed to have derived from the usage of their private and shared open spaces relate or contribute to the quality of life of their households. The analysis of the respondents' submission indicates a perception of positive contribution to the well-being of the households of the respondents. For example, one of the respondents wrote and suggested about the private and shared open spaces thus, *"they contribute to my well-being hundred percent".* Another male respondent submitted that, *"In my experience, this has been very positive. This is hard to quantify, but I believe that having a good relationship with your neighbour would*

improve the quality of life of one's household. You can borrow tools/feed cats/lookout with a feeling of being secure". Similarly, a homeowner among the respondents wrote about his perception thus, *"It improves well-being and happiness. Enables a wider range of activities to take place".* Majority of the respondents were of the opinion that their private and shared open spaces were significant to their households and contributed to their well-being. One of the residents, a retired woman, and homeowner, wrote about the private open space, *"It has a direct influence on my family's well-being and comfort".*

From the thematic analysis of the responses, five themes of dimensions of well-being emerged as different areas the residents perceived the private and shared open space contribute to their well-being. These were categorised as emotional well-being, social well-being, physical well-being, nature contact and connection, and economic well-being.

1. Emotional Well-Being

Majority of the respondents, across ages, gender, and tenure status reported various benefits from the use of their private and shared open spaces that have positive effects on their feelings, mood and emotion generally. For example, one-woman respondent submitted*, "The private space at the bottom of the garden is critical to our physical and emotional well-being. During the summer, it plays a major part in helping to de-stress on days off or after work. We have tried to create a haven for wildlife and get a lot of satisfaction in seeing various species taking advantage of it; Birds, butterflies, bees, ...".* Another woman explained the impact on her well-being, *"Life away from work is greatly improved, fresh air, green space, flowers, etc. help clear the mind. Cats are healthier and mentally stimulated".* Some respondents suggested having *"better health and clarity of mind", "mental health improvement"* and *"... feel healthier and less stressed".* Respondents claimed *"having space outdoors to 'escape' to even if only briefly, can be a great release…".* A man explained the benefit of his private garden thus*, "It gives me a feeling of satisfaction, sense of well-being, good for my mental health".* Besides, other respondents mentioned *"Emotional-calm peaceful", "... the warm feeling of satisfaction…", "fresh air and vitamin D -improvement in mood", "lift mood when doing gardening", "feel more encouraged to do things around the home", "I love looking out at a green space. I think this is very good for my mental wellbeing"* and *"reduce stress, have enjoyment and fun, improve mood".*

Moreover, some respondents suggested emotional benefits from the viewing of their gardens when the opportunity to be in the garden is restricted due to inclement weather. For example, one respondent reported the benefits as, *"relaxing, fresh air, …a good garden, is pleasant to look at, even in a bad weather…" "…feeling happy when watching" and "seeing green grass and colourful flowers every day makes me feel good".* In like manner, a self-employed woman of ages 50-59 observed and pointed out to the benefits of her private open space thus, *"I feel more equipped and able to attend to the necessities, feel healthier, more balanced, less stressed".* Another aged respondent was more concerned about the benefits of the parking shared open space and wrote, *"I have less stress as the car is safe on the drive no need to carry things far. …all stress relieving".* Likewise, a family expressed that, *"Being able to enjoy the sunshine outside and mess around in the garden makes our family happier".* Another respondent wrote, *"sitting peacefully in the garden reading/birdwatching is a huge pleasure and benefits my mental well-being."*

The emotional well-being had the highest number of references among the five themes that emerged in the analysis as indicated by NVivo. Similarly, the emotional well-being was perceived to be more attributed to private open spaces.

2. <u>Social Well-Being</u>

Another theme with high references by respondents next to emotional well-being among the five themes was social well-being. Majority of the respondents reported several social benefits they derive from private and shared open spaces in their terraced housing and the resulting contribution to their social well-being at all levels. Respondents perceived private and shared open spaces as a resource that *"provides a sociable place to entertain and relax".*

One of the respondents describe the contribution to their social well-being thus: *"Having previously lived in a place that could be described as a deprived area in a flat without a garden, being able to live here in Walkley and enjoy the nature and have healthy relationship with all our neighbours is a privilege and has, since we moved here, had a huge positive effect on our quality of life".*

Specifically, on private open space, one woman disclosed, *"…our private garden contributes extremely to our quality of life and wellbeing. It provides an opportunity for our family to enjoy the outside together…".* Majority of the respondents identified the contribution of the private open spaces to social well-being at the household level, and some reported *"sharing quality time with partners either working*

or relaxing in our space", "promotion of positive relationship with family", and "socialising with friends and relatives. Everything was good for health and wellbeing". Another female respondent pointed out that it *"facilitates the quality of family times spent together ...".* One of the respondents reported that private open space *"promotes family bonding and building, builds community and neighbourhood connection".* Other respondents hinted, *"Being able to be outside to enjoy the sunshine and mess around in the garden makes our family happier" and "it gives pleasure and encourages active family socialisation".*

Beyond family level, respondents perceived the shared open spaces contribute to social well-being at the neighbourhood level. One of the respondents reported that *"the shared open spaces afforded opportunities for social gathering, interaction and sharing".* Another respondent explained further that *"the social interaction has led to knowing each other better, helping one another, resolving conflict, and creating a sense of community, safer environment and safety."* Some of the respondents mentioned, *"sense of belonging", "social integration", "togetherness", "social cohesion", "acceptance"* and *"better relationship"* to capture their experiences in the shared open spaces.

Also, some of the respondents suggested the shared open spaces promote happiness. One of the respondents reported, *"Everyone is happier when you know your neighbours can rely on them".* Another respondent wrote that shared open spaces produce *"Neighbourly atmosphere, knowing others names, feeling safe and accepted".* One respondent reported that the use of the shared open spaces makes them *"happier, healthier and more engaged in the local community".* Another respondent disclosed that *"We are happy to meet, spend time with our neighbour, as it makes our little community feel friendly and safe".* Also, other respondents pointed out that shared open space, *"Increases contact with neighbours in adjoining gardens- opportunities for conversation are more frequent than if I only encountered them in the street", "helps to integrate us into the neighbourhood and other families and societies"* and *"Benefit of being openly friendly with neighbours- created a collective community that shares stories and information and is able to solve many problems to the benefit of all".* Similarly, another woman attributes the impact of the shared open space to *"community spirit, helping others. One neighbour took me to the hospital and saved my life! This happens more due to the shared space I think".*

3. Physical Well-Being

A large percentage of the respondents perceived that physical exercise had a positive impact on their household's well-being. One of the respondents wrote, *"exercises improve our wellbeing*". Another respondent remarked, "…*greatly it is a space to relax in, spill over to it if we have guests, it's physically stimulating, and exercises when gardening' its therapeutics to tends plants. It's a safe space for our son to play in its quiet and peaceful, so relaxing…".* Both the private open space and shared open space provide opportunity for exercises. They provide secure playing area for the children, animals and owners, young people, and adults. Some of the respondents remarked, "the private open space facilitates physical activities", *"Good exercise for kids",* and *"The activities of garden keep me fit".* Other respondents reported the contribution this way, *"Physical benefit from exercise during activities in the garden…", "Exercise provides improvement to physical health"*

4. Nature Contact and Connection

Nature connection is another way the benefits of using the private and shared open spaces contribute to the well-being of the residents. Some respondents suggested the importance of viewing nature, hearing birds, and walking dogs to their well-being. For example, one respondent stated, *"I feel happy when watching the garden".* Another respondent explained that *"It is very important to have some connection to nature and direct sunshine. I feel healthier and less stressed…".* One woman revealed, *"my garden gives me such a positive sense of well-being especially if I'm eating food I've grown myself"* Other respondents emphasized the need for "…*fresh air and ability to grow flowers/ vegetable in the garden…", "hear the birds" or "sound of nature", "Feel closer to nature" or "feed wildlife" and "A warm feeling of satisfaction when plants are growing".*

5. Economic Well-Being

A few of the respondents reported that the benefits of private and shared open spaces contribute to their economic well-being. For example, one respondent explained, *"We also grow our vegetables which saves money...".* Residents use their private open spaces for gardening, growing fruits and vegetables as well as raising animals. Some respondents beyond the monetary aspect reported satisfaction and fulfilment as part of the contribution to their well-being. For example, one of the respondents revealed, *"Eating our own grown produce is healthy, sense of achievement, and well-being, …".*

Other respondents expressed the contribution thus, *"Nice fresh home-grown food"* and *"healthy eating of our own produce".* Apart from the supply of food and money, some respondents reported economic well-being due to air-dried clothes which reduce bills and save energy. One of the respondents reported, *"laundry that dries free of charge* and *smells nice".*

6. <u>Relationships between themes and dimensions of well-being</u>

While the respondents perceived and related the benefits of their private and shared open spaces to specific different dimensions of well-being, some of the dimensions overlap and are interdependent. For example, one of the respondents reported, *"gardening produces exercise, relieves stress, calming, and relaxing".* Another woman revealed, *"garden is very important to physical health and emotional wellbeing of our household- very good for distressing".* One male respondent explained the impact as, *"Relaxing environment, gentle exercise [gardening], connection with neighbours, fresh air, contact with nature, and nutritious food/fruit/vegetables".* Some other respondents put the impact thus, "*social activities in the open space increase social interaction and improve emotional well-being" and "it is beneficial physically and emotionally to spend time outside, and we do this by gardening in our private open space*".

The results of the analysis of the relationship between the themes from the NVivo show some level of relationship between the themes. The relationship between emotional well-being and social well-being has the highest number of references, followed by emotional well-being and physical well-being, physical well-being and social well-being, then emotional well-being and connection to nature, as well as physical well-being and nature.

Thus, there is a relationship between the dimension of physical well-being, social well-being, emotional well-being and nature contact.

4.13 Residents' perception of the negative effect of the private and shared open spaces on their well-being in terraced housing

Apart from the perceived positive contribution of the use of private and shared open spaces to the well-being of the residents of terraced housing, the study also investigates the perceived negative impact on the well-being of the households. Thus, respondents were asked to describe how the disadvantages or limitations they have experienced or associated with their private and shared open spaces detract or affect the quality of life

of their households. From the analysis of the respondents' responses, many of the respondents suggested that the unsatisfactory nature of their private and shared open spaces do not detract from the quality of life of their households. Some of the respondents wrote that "*I don't see any disadvantages, while it is always possible to want a bigger /nicer space", "…they don't detract from our quality of life though we do plan to work on making our garden more private".* Another respondent pointed out "*we don't allow it to spoil our enjoyment. It is important to have a good neighbour in open space".* However, few of the respondents reported that some aspects of the private and shared open spaces impact negatively on their household's well-being.

From the thematic analysis of the responses, four themes or categories emerged as adverse effects of demerits or disadvantages associated with private and shared open spaces in the terraced buildings. These categories include emotional disturbance or negative emotional well-being, frustration and unmet desire about one's open space, inconveniences and lack, conflict and anti-social behaviour.

Most of the reported negative impacts of the private or shared open spaces on the well-being of the households were not necessarily due to the availability of private or shared open spaces but management problem, design problem or human factor like the neighbour's attitude.

1. **<u>Physical or emotional disturbance</u>**

The forms of physical or emotional disturbances reported by the respondents due to noise, dog mess, barking of dogs, disagreement and dispute on use and management of shared open spaces include disturbed sleep, stress, minor irritation, annoyance, and discomfort. For example, one of the respondents reported, "…*we have to clean up regularly and keep an eye on our kids when playing outside. It is also just annoying to find dog mess everywhere…".* Another respondent noted, *"The neighbour's dogs often bark which is a disadvantage and is disturbing and often very noisy. It's disruptive and affects the beneficial calming effects of being in the garden".* One of the respondents, a retired homeowner woman, reported about their shared open space the problems of *"dog mess, drug users and drunkers"* which affect her sense of well-being as she *"sometimes feels very unsafe if walking alone".*

2. **<u>Dissatisfaction and frustration</u>**

Frustration and unmet desires of residents' expectations about their private or shared open spaces were reported as a negative impact on respondent's well-being. Some of the

unmet desires and frustrations are associated with open space design, size, limitation, and blocked sunlight. For example, a respondent submitted *"we also have to be selective about what we grow. We would grow more vegetables if we had a large garden. We can't really grow any trees".* Another respondent reported, *"A general uneasy with shared access ...".* Similarly, some respondents expressed their frustrations, "*…we were so desperate for a garden when living in a flat, but it just isn't ideal and is very disappointing after waiting so long for one…"* and *"slightly disappointing that you're almost never in the sunshine when you 're out back. And it limits the plant you can grow".*

3. **Inconvenience and personal stress**

The shortage or lack of privacy, parking space, greenery, and sunlight in the private and shared open spaces constitute detraction from some household's well-being. For example, a respondent reported thus "*Lack of privacy means I spend less time in my garden than I like and I don't always feel comfortable outside. Lack of sunlight means I might seek at sunnier areas away from my house, but distance means I don't go as often. Lack of space means I can't-do some of the things I like in my garden".* Other respondents narrated their experiences thus, *"Hard to say but I reckon it would be great if I had a quiet, private garden that didn't look horrible, so that I could sit out and read a book in summer", "I hardly use this garden because it is not completely private, I miss spending so much time outside",* "Share space is an inconvenience", *"Shared open space can be busy, too small, and too much shade, therefore decreases time spent outdoor"* and *"My private garden is directly away from my house and it is not comfortable".*

4. **Conflict and socialization problem**

Some respondents reported some open space management issues, and poor neighbour's attitude or anti-social behaviour in the shared open spaces that had a negative impact on the well-being of their household. One of the respondents reported her experience: "*Because it is a shared garden, my partner will not use the garden, because of a disagreement about the garden" Another* respondent wrote, "*With the smell of cannabis I feel my children miss out on enjoying their garden. With our car being damaged, it leaves us out of pocket, and in a bad place"* Another respondent pointed out her concern, *"The neighbour's garden is an eyesore, making it slightly less difficult to enjoy*

our garden when we are outside. The pathways are a safety hazard; we have to be extra cautious when we use them".

Moreover, some respondents reported their experiences about their shared open spaces thus, *"We bolt the gate at our yard but neighbour could dispute this as a right of way issue and that would make our garden vulnerable to theft", "Shared broken fence has proved to be a contentious subject" and "I have had problems with my neighbours and their use of our shared access/open space-domestic incidents outside my home".*

4.14 The relationship between the different types of the open spaces around terraced housing (Part 11): Reason for disposition for a particular type of open space by the residents

To explore the research question about the relationship between the different types of the open spaces in and around terraced housing in the residential environment, respondents were asked to rank the open spaces in order of importance to them and the results had already been presented in the quantitative analysis results section.

In this second part, the qualitative analysis of the responses to the reason for the disposition towards a particular type of open space ranked highest by respondents was presented. Majority of the respondents ranked private open space more important to them than the other two types of open spaces applicable to residents of terraced housing, while a small category of the respondents preferred the neighbourhood open space to the private and shared open spaces in their terraced housing. However, few respondents had a contrary opinion and ranked the shared open spaces as more important to them than the private and neighbourhood open spaces. Consequently, the study presents results for each of the three types of open spaces.

1. Factors for preference of Private open space to other types of open spaces by residents of terraced housing

Majority of the respondents who preferred private open space gave several reasons, and from the analysis, eight themes emerged. These were classified as nearness and easiest access, privacy, personal control and choice, attachment or familiarity, personal value, perceived safety, the perception of significance to family well-being, and production and personal satisfaction. Respondents considered private open space in their terraced housing as the nearest and most easily accessible and therefore perceived it to be most important. This view cut across both tenants and homeowners, as well as between men

and women. Table 4.20 presents the factors with some revealing quotes attesting to the category or theme.

Table 4.20 Factors for preference of private open space to other types of open spaces by residents of terraced housing.

Factor	Representative quotes
Nearest and readily accessibility opens	*"Because its most accessible...", "It's used every day, literally on doorstep", "Using private open space means no need to go to the park, very convenient", "Need to enter the outdoor, commune with nature regularly and easily, without dressing up for it…", "it is the most immediate open space", "It is most readily accessible straight out the back door and contribute to our quality of life each day" and "just being able to sit out without having to travel far."*
Privacy (personal space)	*"It's space that is ours-the privacy of the garden and the quiet atmosphere are important", "Because it's private and belong to our household", "Because it's my space that I have paid for and own", "As it allows both privacy or the option to socialise if you wish", "I like being private and not having someone use in my garden".*
Personal control and choice	*"Because it belongs to me, I am free to use it in multiple ways and invite people to use it, so it offers me control over users, design and use", "Most private- I have most control over this space, and it is least affected by the behaviour and attitude of others", "…have more control over what I can do with it...", "It is ours and to do what we like to do or grow in the garden".*
Attachment or familiarity	*"I can see it every day from my windows. I feel it's important to keep it looking nice", "I have become used to having a private garden and so value it highly", "Because I see it every day…", "It is my hobby and sanctuary".*
Personal value	*"My private open space is more important to me", "Use it on a frequent basis, helps with my mood, leisure my spare time. The neighbourhood space is poorly designed, I never used it", "This space impacts mainly on everyday life","…private garden and so value it highly".*
Perceived safety	*"For security and social private life rights, its personal", "Less likely to be intruded on from others not known…", "It's safe for my children to play", "Private open space is also safer for my cat…".*
Perception of significance to family well-being	*"It is the place where we enjoy doing the things that are most important to our well-being: relaxation,", "Private garden behind our home is essential to our happiness", "It has direct influence on my family's well- being and comfort".*
Production and personal satisfaction	*"…gives me the most opportunity to use it for the reasons I enjoy-e.g. growing vegetable and I enjoy having …", "It's a large garden, very productive, and often see…", "It is easier to grow own vegetable here…".*

2. Factors for preference of Shared open space to other types of open spaces by residents of terraced housing

The percentage of respondents that ranked shared open spaces as most important and preferred it to the other types of open spaces was the lowest. Similarly, most of these respondents did not have private open space in their terraced housing. The two emerging themes that were the reasons for shared open space preference over other open spaces were relative privacy and closeness of shared open space to the respondents. For some respondents, the shared open space is the closest type of space, hence preferred it to any distant type of open space. For example, one respondent reported, "*It is close to me, and it is satisfactory*". Another respondent explained the preference thus, "… *it is used every day to enter our house down the side alley".*
The second category perceived the shared open spaces as more private than neighbourhood open space. Since they did not have any independent private open spaces for their households in their terraced housing, they, therefore, preferred the shared open space on relative privacy it provided to neighbourhood space. One of the respondents reported the reason as "*Because it is private to my house*". Another respondent wrote about the shared open space and affirmed: "*I prefer private and secure space*".

3. Factors for preference of Neighbourhood open space to other types of open spaces by residents of terraced housing

From the ranking results, a majority of the respondents ranked neighbourhood open space second, after the private open space. However, from the analysis of those who ranked neighbourhood open space as most important and preferred, five themes emerged as responsible factors. These themes include wider social contact, larger open space for different activities, nearness to the house, space for multiple activities and make-up for deficiency of private or shared open space at respondent's terraced housing. Some of the respondents preferred the neighbourhood open space because of the need for wider social contact that the private and shared open space could not afford. Some respondents were not satisfied with the private and shared open spaces at their houses, hence has to supplement with the neighbourhood open space as an alternative. Table 4.21 gives the factors with some selected key quotes to explicate the themes or factors.

Table 4.21 Factors for preference of neighbourhood open space to other types of open spaces by residents of terraced housing.

Factor	Representative quotes
Wider social contact	*"…the chance of meeting new people is there", "I enjoy sitting in my garden, but I prefer to get out and walk and meet people"* and *"Socialising with others in the neighbourhood".*
Larger natural open space for different activities	*"These houses only have small gardens and can't accommodate children's toys or exercise equipment for adults. Neighbourhood parks will always be a better option", "Love taking the dog to somewhere different and there is so much to choose around the neighbourhood. Spend most time outdoors in open space", "Largest space best for recreation", "It is the most natural- Bole hill park, and …woods-largest-allow long walks/space/time away from routine".*
Space for multiple activities	*"The potential for different activities is high", "More events for the community there", "Larger and better amenities in the neighbourhood space. - good for young children to run and ride"* and *"Because we can do more things in it than private or shared open spaces, for example meet other dogs for our dog to play, use the children play equipment...".*
Nearness to the house	*"… the Bole hill parks is close by and there are spaces..."*
Make- up for deficiency of private or shared open spaces at the house	*"we go for a walk instead or to others friends with privacy in their private open space", "…it is in better condition, larger and more pleasant than my home shared open space", "… neighbourhood open space is generally more well-kept with better amenities and more…", "I go to the gym to exercise instead, I have to remove cat poo, which is not very pleasant"* and *"I can't sit in the garden when there is smoke"*

4.15 How can the open space system of the terraced housing be improved to promote the delivery of well-being benefits to residents of terraced housing in the residential environment

To explore how to improve the open space system of the terraced housing and identify components of terraced housing amenable to design decision-making that could likely promote the well-being of residents, the study asked respondents what they think could be done to solve specific problems they identified to be associated with their private and shared open spaces. Besides, the respondents were asked what they would like to do in the open spaces around their houses that they could not do at the moment. The intention was to determine the respondents' open space needs. Furthermore, the respondents were asked what they think has to be done or change significantly to allow their household do what they would like to do in the open spaces around their houses. The qualitative

responses to these questions were analysed, and the results were presented in the section below.

4.15.1 Residents' perception on what could be done to remove the current disadvantages or problems associated with their private and shared open spaces

From the qualitative analysis of the responses on what respondents think could be done to remove or address the various problems they identified were associated with their private and shared open spaces, three themes emerged. The themes were classified as solving associated design and planning problems of the open spaces, attitude change by neighbours, and a balance between privacy and sharing of shared open spaces. Majority of the respondents identified that some challenges of their private and shared open spaces were design related and could only be solved by appropriate design and planning of the open spaces. Some of the design and planning related problems were connected with open space size, surface level, location, arrangement of permanent features, configuration, lighting, and accessibility.

Similarly, some of the respondents submitted that a change of attitude by neighbours is one of the ways to address the problems associated with the use and satisfaction of private and shared open spaces in terraced housing. One of the respondents wrote, *"Better education on cultural differences",* another respondent suggested *"... discuss issues with neighbours" or "By having better communication".*

Many of the respondents considered privacy as very important to them and suggested that they require some degree of privacy to be able to use the shared open spaces in their terraced housing. The suggestions pointed out to a balance between privacy and sharing of the shared open spaces as a potential solution to the shared open space problem. One of the respondents hinted, *"I would say privacy, but then again it's important to have more relationship with neighbours".* Another respondent expressed his perception about the dilemma of sharing and privacy, *"...unless sharing all gardens with neighbour but I like some privacy".*

4.15.2 Residents perception of open space needs in terraced housing

From the analysis of the responses to the question on what respondents would like to do in the open spaces around their houses that they could not do at the moment, seven categories or themes of open space needs by the respondents emerged. These were classified as contact with nature, social space, growing or gardening space, parking

space, physical activities or playing space, Do it yourself space, and personal or individual specification.

Majority of the respondents reported the need for contact with nature in their terraced housing. These include connection to plants, animals, wildlife, air, and sunshine. One of the respondents expressed that he needed open space to *"cultivate more plants-flowers to encourage bees and butterflies, and vegetable to eat, and share".* Another respondent hinted on the need to *"have a grassy area where we can sit when it is warmer".*

Moreover, respondents expressed their needs for social space, where they can socialize with family, friends, and neighbours. One of the respondents disclosed her need to *"have space to sit outside around a table to socialise".*
Similarly, some respondents expressed their needs for open spaces to grow crops or for gardening. Some of the respondents reported this and stated, *"Grow vegetable, have more grass areas for playing on*" and "*probably make some raised beds and grow some edibles…".*

Few respondents stated the need for parking space. One of the responded hinted on the significance of parking space to him and wrote, *"…parking space would improve my life".*

Besides, space for children play, or physical activities spaces were expressed by many respondents as an important open space need. One respondent pointed out this and wrote, *"have more grass areas for playing on",* and another respondent stated *"…space for games, space for hammock…".*

Furthermore, many respondents hinted on the need for open space where they can carry out some domestic activities, or some do it yourself outdoor activities.

Other individual respondents present range of personal things they would like to do in their private and shared open spaces but could not do at the moment. These include among others space for meditation, hang out washing, keeping birds, pond, and yoga. One respondent need a private open space where he could *"Read a book, have a beer, have dinner, have a sleep [all in summer.]".*

4.15.3 Residents' perception on design decisions significant for open spaces planning in the terraced housing for promotion of residents' well-being

From the analysis of the responses to the question on respondent's perception on what has to be done or change significantly to allow their household do what they would like to do in the open spaces around their houses emanated nine themes of design

prerequisites for planning private and shared open spaces in terraced housing to promote the delivery of well-being to residents.

The themes were classified as optimum size, safety, security, lighting or sunshine, inclusive access, adaptability and flexibility, sharing, privacy, and maintenance and sustainability. Respondents provided range of issues that they perceived must change significantly to have satisfactory private and shared open spaces.

The private and shared open spaces were suggested to be designed for optimum size. One of the respondents noted, "*The space is not adequate for my personal desire, it is not really possible"*, but another respondent suggested on this, *"Increase the size of outside space".*

Second, design for safety. Open space should be designed for children and adults' safety, including the animals. One of the respondents commented on this, *"In future, it would be nice to leave kids to play and not have to worry about their safety".*

Third, design for security. Private and shared open spaces were required to be secured against intrusions, including human and animals. One of the respondents wrote *"... improve security ..." while another respondent recommended on security thus "secure gate on alleyway".*

Fourth, design for natural lighting and sunshine. Private and shared open spaces should provide the opportunity to receive sunshine and fresh air. One of the respondents complained about his private open space, *"Lack of lighting and poor condition of the path, the private back garden is decked. It is very slippery after rain".* Another respondent suggested, *"Nothing can be done to the present layout of the area but if building new properties, the privacy of the householder should be paramount and the angle of the garden, to gain as much sunshine should also be highly considered".*

Fifth, design for inclusive access. All intended users of private and shared open spaces should not be limited by design but should be able to use them satisfactorily. One the respondents suggested a provision for*, "... disability access".*

Sixth, design for adaptability and flexibility. Since the open space needs of the terraced housing residents are many and different, the private and shared open spaces should be designed to accommodate various activities through its adaptability and flexibility character. Respondents have perceptions that their private and shared open spaces should be able to support their multiple activities. One respondent pointed out, *"Because it belongs to me, I am free to use it in various ways and ... offers me control over ...use".*

Seventh, design to promote sharing. The private and shared open spaces should be designed to encourage social contact, communication, and a relationship among users according to users' choice and desirability. *One of the respondents suggested "socialising benefit from sharing space…"*

Eight, design to promote privacy. The design should support privacy in both private and shared open space. One respondent recommended, *"Fence might help with privacy,"* and another respondent emphasised, *"A bit more privacy*" in the shared open spaces.

Ninth, design to promote effective maintenance and sustainability. Respondents reported many problems associated with maintenance and management of the open spaces. Therefore, the design was suggested to promote proper maintenance and sustainability. One respondent revealed the need for *"…more maintenance and improvement".*

CHAPTER FIVE DISCUSSION OF FINDINGS

5.1 Introduction

This chapter presents the discussion of the research results that were presented in the previous section and covered the interpretation of these results and answered the research questions as well as evaluation of these results in relation to the literature.

The chapter begins by recapping the focus of the study and is structured according to the findings based on the research questions and aim after discussion on the demographic profile of the respondents. The primary aim of this study is to improve understanding of relationships between human well-being and open spaces in the residential environment, with a particular focus on terraced housing in Sheffield, UK. The study proposed about seven research questions to achieve the aim and investigated the perception of residents on the impact of the open spaces in the residential environment on their well-being. The proposed research questions were:

1. What are the typologies of open spaces in the terraced housing of Walkley neighbourhood of Sheffield as typical of residential setting?
2. How do the residents of the terraced houses use the open spaces in their residential environment?
3. What factors determine or affect residents of the terraced houses on how they use the open spaces in their residential environment?
4. What are the benefits and problems derived or encountered by the residents of terraced housing from the use of their open spaces?
5. How do these benefits or problems experienced by the residents of terraced housing from the use of their open spaces relate to their well-being?
6. What is the relationship between the different types of the open spaces available to residents of terraced housing in the residential environment?
7. How can the open space system of the terraced housing be improved to support the delivery of well-being to residents of terraced housing in the residential environment?

5.2 Demographic finding of the respondents

In the sample of the study, there were more women than men, although there were more men (52%) than women in the neighbourhood (SCC, 2013a). However, there are more women than men in Sheffield (SCC, 2016a). On age distribution, although the largest age group was 30-39 years, the other age groups were relatively equally represented in the sample and distribution is similar to that obtainable in the Walkley neighbourhood.

The sample was dominated by people in employment (73%), and 18% were retired. Also, while the sample was dominated by homeowners (65%), the tenants were well represented (31%). Likewise, in terms of the ethnic group, the sample was dominated by white (89%), which is the same for the population of the neighbourhood, although there were few other ethnic groups.

Moreover, in the sample, different periods of duration of living in the terraced housing were represented. These include those who just moved in less than two years (26%), those who have lived for a while (49%) and those who have lived there for more than twenty years (25%). On the nature of household, there were more two adults' households in the sample than others (63%), although single household was highest in the neighbourhood. Also, there were more households without children (67%) in the sample, although those with the kids and young people were relatively represented. Families with one child are more than those with two or more in the sample.

On the available features in the private and shared open spaces, for the sample, the majority of the residents (74%) had sitting areas, and half of them had at least a tree. Similarly, more than half of the residents in the sample had shrubs and lawn in their private and shared open spaces (Fig.4.21- 4.26). Few of the residents in the sample had ponds or water features, playing area, and barbecue. However, the majority of the residents in the sample stored bins in their yard and fence divides the open spaces between neighbours. On the whole, the sample is a fairly representative of Walkley neighbourhood and different features or attributes within the neighbourhood.

5.3 The types of open spaces in and around terraced housing

The study found the types of open spaces in and around terraced housing include private, shared/semi-private open spaces and public neighbourhood open spaces. The finding is in line with the submission of Friedman (2012) that outdoors space in town and terraced housing can be categorised to private, public and semi-private, with the semi-private accessible to the immediate residents but not the community.

The public/neighbourhood open spaces are areas without access restriction in the neighbourhood (Grose, 2009) and are multipurpose (Madanipour, 1999). The neighbourhood open spaces in the neighbourhood comprise of different types of open spaces (SG, 2008), and are accessible to the residents (Table 4.6). These include a major neighbourhood park, Ruskin Park (Fig. 4.9, Fig. 4.11-4.14), pocket parks located at different points in the neighbourhood (Fig. 4.15-4.16), amenities green spaces, play

areas for children, semi-natural green area (Fig. 4.17-4.18), burial grounds and churchyards, and parking lots at strategic points within the neighbourhood (Fig. 4.19). There are no public allotments located in the neighbourhood, although one is situated in the adjacent neighbourhood: Lower Walkley neighbourhood.

Apart from the neighbourhood open spaces in the residential setting of the terraced housing, there are private and shared open spaces around the terraced houses. The private open spaces are exclusively for each household use, while the shared open spaces are those shared between two or more households. 81% and 69% of the respondents have private and shared open spaces respectively around their terraced housing. 31% of the respondents did not share any open space with neighbours, although there is the expectation for a possibility of shared open spaces in the terraced housing (Friedman, 2012). Those with private open spaces only have separated the open spaces between them and their neighbours with walls entirely, thus inhibiting sharing of open space. From the results, the private and shared open spaces associated with terraced housing include front yard/garden, backyard/garden, side yard/garden, alleyway, parking space and common access. While backyards/gardens were common to almost all the terraced housing (98%), front yard/garden were absent in a few (39%). However, the majority of the residents have private front yards and back yards. The shared open spaces were limited to alleyways and general access for most of the residents, although few residents shared their front gardens (7%) and back gardens (20%) with their neighbours. Those who have only shared open spaces (no private open space) have the open spaces behind their houses not divided by a wall to each house. The yards or gardens: front, back, and side were diverse in size, configuration, feature and form (Fig. 4.20-4.26) and confirmed the submission of Cameron et al. (2012) and Smith et al. (2005) that the private domestic gardens are highly heterogeneous in form and function.

Since the availability of open spaces should not be taken as accessibility and usage (Lachowycz and Jones, 2013), the study explored further on accessibility and usage. Results found that 26% of the respondents use private spaces only, 14% shared open spaces only and 60% use both shared and private spaces. At the neighbourhood level, the majority of the respondents have access and use the public park (86%) and pocket parks (63%).

Variation in access to different types of open spaces within the same housing type may have implications on the usage and experience of open spaces.

Depending on availability and choice, some residents have access to all types of open spaces in the residential environment; private, shared and neighbourhood open spaces, while others have access to private and neighbourhood open spaces only or shared and neighbourhood open spaces only (Fig 5.1).

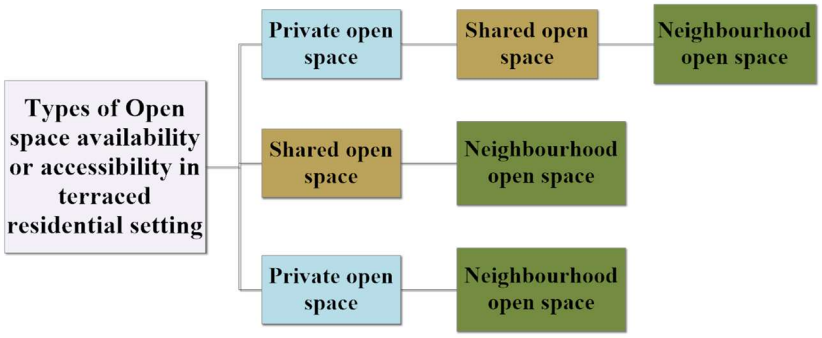


Figure 5.1 Types of open spaces accessibility by residents in terraced housing

5.4 The uses of open spaces in and around terraced housing

From the results of the study, the uses of the private and shared open spaces were multifarious and differed from household to household and during different weather. Most of the residents used their private open spaces for gardening and growing plants (58%), the family sit out, drying clothes, outdoor cooking or barbecue, playing with children or family members, and talking to neighbours and friends during warm weather. Finding was like the previous report, although the order is reversed, as sitting out was the most significant use, followed by gardening according to Hall (1987).

The shared open spaces were used by the highest number of the respondents as the access route to their properties (47%), for sunbathing (47%), storage, composting, talking to friends and neighbours and relaxation especially during the warm weather. Since most of the respondents have private open spaces, the alleyway or common access with the right of way, was the only shared open spaces, accounting for high uses as the access route. The high usage of shared open space for sunbathing during warm weather was due to many respondents without private open space but shared open space only, showing the influence of warm weather on the usage of shared open spaces (Table 4.11).

Moreover, it is interesting to note that respondents still use their open spaces during the cold or wet weather. The open spaces were used for gardening (29%), storage, access, watch birds or enjoy wildlife and for play especially during snow (snowman). The use of open spaces for gardening at all season and being the most important use may suggest the value or importance of gardening to the respondents. In

UK cities, out of all types of open spaces, the garden had been suggested to be the most used by people (Dunnett and Qasim, 2000).

Besides the use of private and shared open spaces by residents of terraced housing, the residents also made use of the neighbourhood open spaces, for example, neighbourhood park and pocket park. The majority of the respondents use the neighbourhood open space for walking or running (76.7%) and an opportunity to be outdoor (76.1%). Other uses include relaxing in the natural setting, getting away from day to day routine, enjoy wildlife, having time out with friends or relatives, using as an access route and socializing or talking with neighbours (Table 4.12). The finding was consistent with previous research studies (Bedimo-Rung et al., 2005; Chiesura, 2004) which indicates that the major uses of urban parks by residents include walking, the most cited, relaxing, being in nature, escape from the city, viewing, and family picnic or gathering.

Since engagement or use of the open spaces is important to have benefits of the open space (Keniger et al., 2013), the study explores factors that may impede or determine how respondents use their open spaces in the residential environment. The results indicate that neighbours' behaviour (interpersonal relationship), weather condition, the degree of privacy, and open space design are significant predictors of the use of private and shared open spaces in terraced housing. While privacy and open space design are top mentioned barriers to the utilization of the private open spaces, the most listed perceived barrier by the majority of the respondents for shared open space was neighbour's behaviour. Respondents revealed that hostile neighbours' behaviours had prevented them from using their shared open spaces and had caused them dissatisfaction and social exclusion. Based on the combination of the quantitative and qualitative results, the most perceived outstanding and critical factors that influence or determine the use of shared open spaces are neighbour's behaviour and open space design, which reflects findings and conclusions of Farida (2013) though in a very different context.

For the neighbourhood open spaces, the perceived factors that determine how respondents' household use the space include the state of the neighbourhood open spaces, the distance or proximity to household's house, and weather condition (Table 4. 14). The findings accord with previous research studies (Kaźmierczak, 2013; Lee and Maheswaran, 2011; Schipperijn et al., 2010; Cohen et al., 2007; Bedimo-Rung et al., 2005) that condition of park and geographical distance of potential user to park are important factors influencing the use of public parks. Figure 5.2 provides the summary

of uses of different types of open spaces by residents in terraced housing as well as the determining factors. While needs being served by various types of open spaces are different, there is overlapping and similarity although at different scale or level.

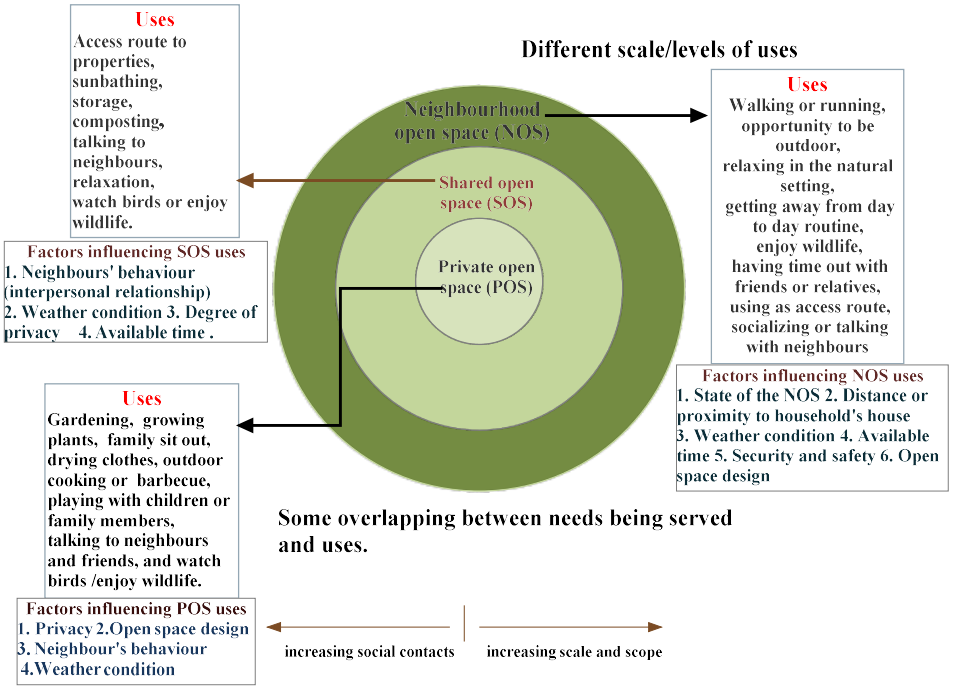


Figure 5.2 Uses of different types of open spaces by residents in terraced housing

5.5 Perceived benefits of private and shared open spaces in and around terraced housing.

Results from the study confirm that respondents perceived different benefits from the use of the private and shared open spaces in and around their terraced housing. These include social benefits, physical health or activity benefits, nature and wildlife connection, psychological benefits, extra functional domestic spaces, economic and natural utility benefits (laundry alternative), secure children's play area and benefit of access.

5.5.1 Social benefits

The study revealed that the respondents perceive the private and shared open spaces as a social space which facilitates the development of a social relationship and enhances social ties among users leading to family bonding particularly at the household level, neighbour's friendliness, increase social cohesion, sense of belonging, and community connection. The study results indicate a significant association and positive correlation

between private open space and promotion of family bonding. This finding agrees with previous studies (Kaźmierczak, 2013; Shinew et al., 2004; Dunnett and Qasim, 2000; Coley et al., 1997) although, in a different context, that open spaces promote the development of social ties among users. For examples, Dunnett and Qasim (2000) found that private gardens increase the chance of social contact, and Shinew et al. (2004) reported that community gardens promote social contact, interaction and sense of belonging.

5.5.2 Physical health or activity benefits

Public open spaces or parks promote physical and recreational activities (Lee and Maheswaran, 2011; Lee and Moudon, 2008; Bedimo-Rung et al., 2005; McCormack et al., 2004), and engagement in regular physical activities produces physical health and psychological health benefits (Pretty et al., 2007). The study confirmed that residents recognized the benefits of physical health or physical exercise from the use of their private or shared open spaces. Over 36% of the respondents reported that their private open spaces promote physical activities and some of the respondents linked garden with physical activities. The results revealed a significant association and positive correlation between private open space and promotion of physical activities. The findings are compatible with previous studies by Sugiyama and Ward Thompson (2006) and Dunnett and Qasim, 2000 that outdoor environment and private gardens provide an opportunity for older people to be active and benefits their physical health or condition.

5.5.3 Nature and wildlife connection

Results of the study confirm that the use of private open spaces and shared open spaces is perceived to provide the benefit of nature and wildlife connection at home. Respondents benefited from fresh air, sunshine, feeding of birds and watching the wildlife courtesy of the open spaces around their terraced housing. Likewise, some respondents reported the benefit of viewing nature from their houses, especially when restricted to indoor due to weather condition. Besides being connected to nature, respondents noted the opportunity to grow fruits and vegetables within their residential environment in the private and shared open spaces. All these exposed them to the natural elements and promoted connection to nature at the residential setting (Sugiyama and Ward Thompson, 2006).

5.5.4 Psychological benefits

Similarly, the results provide evidence that majority of the respondents perceived some level of psychological benefits associated with the use of their private open spaces. Respondents reported the benefits of positive personal emotional and mental health, having an outcome like relaxation, restoration, calmness and stress reduction from the usage of private open spaces. The findings are in line with the previous study by Stigsdotter and Grahn (2004) that private gardens in residential homes may reduce stress, and vital to offering a restorative environment to users. Also, study agrees with Maas et al. (2009a) and Maheswaran (2011) that green space provides a variety of psychological, emotional and mental health benefits.

5.5.5 Additional space benefit

Some respondents perceived terraced housing as relatively small houses or internal dwelling and therefore reported the private or shared open spaces as an extra room or extension space for their various domestic activities. Some of the activities listed for performance in the open space include minor repairs, do-it-yourself activities, washing, and outdoor eating or drinking. The findings are in line with the previous submission by Bhatti and Church (2004) that the back garden or open space of a house is a private outdoor living room.

5.5.6 Economic and natural utility benefits

Furthermore, another benefit that emerged was classified as an opportunity for natural laundry alternative. About 27.5% of the respondents used their private and shared open spaces for drying clothes benefiting from natural air and sunlight. Apart from reduced energy bills reported as an advantage of using the natural alternative, respondents claimed there were particular smell and refreshing associated with drying their clothes in the air in the private open space.

5.5.7 Secure children play area

The study results confirmed that respondents perceived the private open spaces to offer benefits of safe play area for children in the household which is crucial for families with children. 23% of the respondents have children, and the majority of them (83%) use their private open spaces to play with their kids. Open spaces around the house where parents could have surveillance of their children are considered a valuable space for kids to play and offer an opportunity for children to play together. The results indicate

a significant association and correlation between satisfaction with private open space and available children play area. The findings agree with the previous submission of the importance of children's play in the private open space (Hall, 1987).

5.5.8 Access benefit

The last category of profit derived from the private and shared open spaces by the respondents was access. Most respondents used their shared open spaces for access to their properties and gardens. This was important in terraced housing especially for respondents those who did not access their dwellings through the front door due to lack of front garden or yard or threshold to the street. In addition, some respondents reported that the opportunity of the shared access promoted social contact. However, few others felt the opposite, particularly where tension exist between neighbours on maintenance and other uses.

5.6 Perceived problems of private and shared open spaces in and around terraced housing.

Despite the several benefits perceived by respondents to be associated with private and shared open spaces in their terraced housing, some problems were also recognized to be connected with the provision and usage of the open spaces. The study suggests four broad categories of problems respondents find unsatisfactory with their private and shared open spaces: lack of privacy and intrusion, challenging neighbour's disposition, design-related challenges, and management-related challenges.

5.6.1 Lack of privacy

The study finds lack of privacy, both at private and shared open spaces as unsatisfactory and major problem that put many respondents away from using or enjoying their open spaces. Many respondents have challenges of intrusion and interruption in the use of their open spaces, especially the private open spaces. Some of the interruptions may be legitimate as the neighbours have the right of way through some of their neighbours' private open spaces in the terraced housing. Some of the forms of intrusion reported include animal, sound, virtual and smell. These interfered with the positive experience of the use of the private and shared open spaces, peculiarly private open space.

5.6.2 Design-related challenges

Another category of problems the study finds to be associated with both the private and shared open spaces in terraced housing is design related. These problems include lack of front garden or yard, lack of greenery, lack of sunlight, lack or inadequate parking space, small size of open space, lack of relatively flat surface which may be necessary for children's safety, and lack of appropriate facilities in the open spaces. Some respondents perceived their private and shared open spaces to be inadequate to accommodate different desired activities or social interaction, hence limited usability to an access route only. The result is similar to Farida (2013) findings although in apartment housing estate, that the layout of building, design, and quality of shared outdoor spaces affect their use and social interaction among residents.

5.6.3 Management-related challenges

Another form of problem associated with private and shared open spaces in the terraced housing is related to management of the open spaces. Inadequate or unsatisfactory management or lack of management arrangement for the open spaces, especially shared open spaces is a common cause of conflict reported among neighbours. The problem has the effect of limiting the use and positive experiences of the private and shared open spaces of residents, especially the shared open space (Farida, 2013).

5.6.4 Neighbour's behaviour related challenges

The challenging neighbour's disposition was another significant problem reported by respondents associated with the use of their private and shared open spaces and has the potential to affect their well-being. The study finds that incompatibility of neighbours may results in a constant conflict because of differences and could have a negative impact rather than supposed benefits of shared open spaces and positive relationship. Good or positive social interaction can also affect usage of shared open space; the same way open space can facilitate social contact and interaction.

5.7 Perceived contribution of open spaces in and around terraced housing to resident's well-being

The findings of the study provide evidence that respondents perceived positive contributions of the private and shared open spaces in the terraced housing to the well-being of their households. The positive contributions from the results are related to

dimensions of well-being and categorized as emotional well-being, social well-being, physical well-being, nature contact and connection, and economic well-being. Besides, study finds some problems associated with the open spaces especially the shared open space, and may have an adverse effect on the sense of well-being of residents.

The figure 5. 3 below provides the summary of findings of the category of benefits derived from the use of private and shared open spaces, associated problems that may limit the usage of these open spaces as well as the contribution to the different dimensions of well-being of the residents.

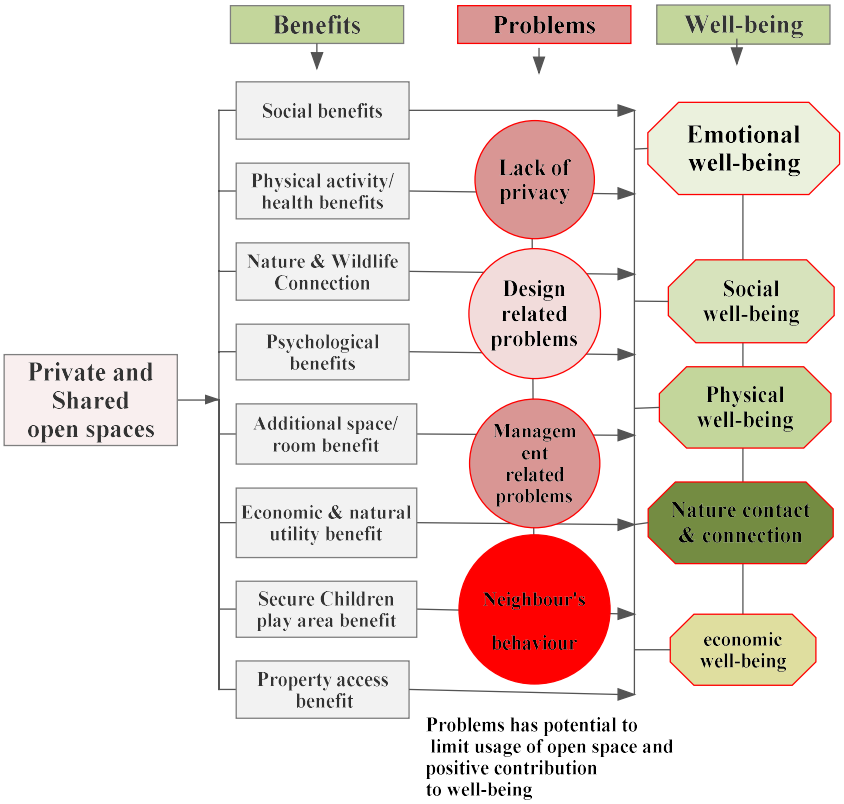


Figure 5.3 Perceived contribution of private and shared open spaces to well-being of residents in terraced housing

5.7.1 Emotional well-being

The study finds that the respondents perceive the private open space as an easy to reach space which provides opportunity as a place to relax, de-stress on days off or after work and recover from fatigue, which contributes to their positive emotional and psychological well-being. Other perception of benefits that related to emotional well-being expressed by respondents included among others improved mood and emotion, reduced stress, restoration, improved ability to perform a task, improved performance and productivity, calmness and peace.

The relationship between nature and emotional well-being has been suggested to be context specific (Huynh et al., 2013). However, the private open space through various benefits delivered to respondents is perceived to contribute to the emotional well-being of the respondents and constitutes the highest level of well-being expressed. The finding accords well with previous findings (Cox et al., 2017; O'Brien and Morris, 2014; Keniger et al., 2013; Lee and Maheswaran, 2011; Abraham et al., 2010; Milligan et al., 2004) that access to open space or nature provides psychological or emotional well-being, although not necessarily in terraced housing context. Gardening, being in a garden and having a view of nature from home have been suggested to impact positive emotional well-being (Burton et al., 2015; Wang and MacMillan, 2013; Stigsdotter and Grahn, 2004; Kaplan, R. 2001; Dunnett and Qasim, 2000) and the study findings confirm same in the context of the terraced housing. Similarly, the findings are in line with Ulrich's psycho-evolutionary theory (Ulrich et al., 1991) and the Attention Restoration Theory (Kaplan and Kaplan, 1989) as findings suggest that individual private and shared open spaces in the residential setting may have restorative properties which could mean positive well-being for users.

5.7.2 Social well-being

Moreover, the study results indicate that respondents perceive that both private and shared open spaces in their terraced housing contribute to their social well-being. The private open space contributes to social well-being by the promotion of positive family relationship and family bonding, facilitation of social interaction between family and friends, and sharing of recreation activities among family members. Also, shared open spaces are perceived as interactional spaces (Skjaeveland and Garling, 1997) which facilitate social interaction among adults and children, promotes conflict resolution, social integration, social cohesion, sense of belonging, social empowerment, feeling safe and feeling accepted, community connection and social support. The findings accord with previous findings (Kemperman and Timmermans, 2014; Huang, 2006; Dunnett and Qasim, 2000) that shared open space and garden provide an opportunity to meet with neighbours, increase social contact and social well-being. However, results reveal that the poor quality of the open space, especially the shared open space and the negative disposition of the neighbour may discourage the use of the shared open space and invariably affect the sense of well-being of the residents. This result is similar and in line with the previous findings by Farida (2013) that the use of shared outdoor spaces

and social interaction are substantially affected by the quality of space and neighbour's behaviour especially children in apartment housing.

5.7.3 Physical well-being

The findings from the study indicate that private and shared open spaces contribute to physical well-being; positive effect on physical function and physical health, of the residents in the terraced housing. The open spaces provide opportunities for play, gardening, and other physical activities by household members including children. These open spaces, especially the private open spaces are equipped with recreation and exercise facilities which encourage use and promote active living for the users (Lee and Moudon, 2008). The perceived benefits related to physical well-being include increased physical activity, reduced stress, improved physical health and promoted outdoor activities. These findings align with results of previous studies that open space facilitates physical exercise and promotes physical health (Cox et al., 2017; Lee et al., 2016; Shanahan et al., 2016; Kabisch et al., 2015; Lee and Moudon, 2008; McCormack et al., 2004).

5.7.4 Nature contact and connection

Another perceived contribution of private and shared open spaces to residents' well-being revealed by the study is nature contact and connection. The perception of benefits related to nature contact and connection included hearing birds, walking dogs, viewing nature, gardening, and affiliation with nature. The private and shared open spaces with vegetation provide an opportunity for contact with nature, good view and stimulate other direct benefits that led to a perceived positive sense of well-being. The results are compatible with previous findings (O'Brien and Morris, 2014; Bhatti and Church, 2004; Chiesura, 2004; Stigsdotter and Grahn, 2004; Dunnett and Qasim, 2000) that experience of nature in urban setting or garden is a source of positive feelings and valuable services. Private and shared open spaces with nature provide attractive and beneficial vistas (Clawson, 2015; Kaplan, R. 2001), enhance physical activities (Shanahan et al., 2016), afford opportunity for social interaction (Coley et al., 1997), promotes sensory stimulation and improves the quality of the residential environment (O'Brien and Morris, 2014).

Moreover, these findings are in line with biophilia theory that humans have a natural tendency to be associated with nature (Grinde and Patil, 2009; Wilson and Kellert,

1993) since most of the residents value their private gardens and reported an attachment to them, including birds and animals.

5.7.5 Economic well-being

The private and shared open spaces are perceived to contribute to the dimension of the economic well-being of residents through the production of fruits, vegetables, and food. Similarly, study finds that opportunity for natural laundry of clothes is interpreted by residents as personal satisfaction and results in saved energy and reduced bills. Economic well-being was the lowest dimension of well-being perceived as a contribution of private and shared open spaces in terraced housing. The finding agrees with a previous study by Keniger et al. (2013) that private gardens provide the benefit of food production, however not a feeling of satisfaction and financial gain associated with drying of clothes in open space as the current study revealed.

Generally, the findings showed the perception of contribution to the multiple dimensions of well-being by the private and shared open spaces in the terraced housing, although the private open space is perceived and expressed to contribute more.

Although different dimensions of well-being are articulated as perceptions of the contribution of private and shared open spaces by the respondents, these dimensions are however interrelated. The various well-being dimensions or benefits do not occur independently but are delivered concurrently or one giving rise to another. For example, the perceived benefit of connection with nature in the private open space as one type of benefit could lead to emotional well-being as an effect of nature connection and at the same time promotes physical activities or play as well as contributes to social interaction or interpersonal relationship among parties involved in the play or physical activities. The analysis of the relationship between the themes suggests a level of relationship between emotional well-being and social well-being, as well as between emotional well-being and physical well-being.

5.7.6 Negative effect on well-being

Despite the perceived positive contribution of private and shared open spaces to the well-being of residents in terraced housing, the study finds that some problems encountered in the use of the private and shared open spaces may deter from the sense of well-being of the residents.

These problems associated with the private and shared open spaces according to the study findings include lack of privacy and intrusion, design related challenges,

management related challenges and challenging neighbour's disposition. The perceived impact of these private and shared open spaces associated problems on the well-being of the residents includes physical or emotional disturbance in the form of noise, annoyance and fatigue, dissatisfaction and frustration, inconveniences and personal stress, conflict and socialization problem.

For example, the small size and topographic nature of the private and shared open spaces may limit the opportunity for certain physical activities and consequently confine physical activity or health benefits.

Moreover, poor quality of shared open space resulting from management problem may discourage the use of space and prevents social interaction. Similarly, conflict and tension produced by residents over shared open space decision and management may produce poor social interaction and support. These may compromise the social well-being of residents. This accords with previous findings by Farida (2013) although in different housing setting, that the quality of the shared open space impacts on social interaction and quality of life of residents.

Also, unmanaged private and shared open space could become a source increased anxiety or fear similar to the experience in public open space context (Kuo et al., 1998), and affect the emotional well-being of residents.

5.8 The relationship between the different types of the open spaces and well-being of residents of terraced housing

Three types of open spaces were found to be associated and encountered by residents of terraced housing in the residential environment. These include private open space, semi-private or shared open space and neighbourhood open space. It is evident from the study that residents have access to at least two of the three (See an example in figure 5.4).

5.8.1 Preference and uses of different types of open spaces

The study found that out of the three types of open spaces: private, shared and neighbourhood/public in the residential environment, the majority of the respondents (74%) ranked private open space as the most significant open space to them. However, about 20.5% and 5.5% of the respondents rated neighbourhood and shared open spaces respectively as most important to them. The shared open space was ranked least important.

The findings indicated that respondents preferred private open spaces to other types of open spaces because of the following eight factors or attributes: nearest with the highest level of accessibility, privacy (personal space), ability to have personal control, attachment or familiarity developed over time with the space, personal value for everyday commodity, perceived higher level of safety, perception of significance to family well-being, and personal satisfaction and productivity.

However, the few respondents who ranked shared open space as the most significant was noted to have no private open space at the moment but shared and neighbourhood open spaces. The shared open space was preferred because of the relative privacy and nearness to the respondents.

The category of respondents that preferred neighbourhood open space to other types of open spaces have different reasons which were captured as five factors. These include the need for wider social contact that was not available with private and shared open spaces, need for larger natural open space for different activities that the private garden could not afford, the need for multiple activities, nearness to the residents, and the need to make up for the deficiency of private or shared open spaces at respondents terraced house. Because of the significance of open spaces to the well-being of residents, some respondents that were not satisfied with their private or shared open spaces reported visiting the neighbourhood open space as make-up. There are significant association and positive correlation between satisfaction level of the respondents with private or shared open space at home and factor influencing the use of neighbourhood open space.

Also, the study found that there were significant association and correlation between satisfaction of respondents with private open space and using private open space only, and using both private and shared open spaces, but not for using shared open space only. The results confirm and suggest the importance of private open space to residents in terraced housing

Surprisingly, having rated the private open space as most important compared to other types of open spaces, and established the importance of private open space, the results also showed that majority of the respondents were satisfied with their neighbourhood open space. In addition, there was a significant association and correlation between the private open space or shared open space and neighbourhood open space. This suggests the importance of both private open or shared open space and neighbourhood open space to residents in the residential environment. The finding

supports the previous work of Coolen and Meesters (2012) that both private and public open spaces are essential and could not be substituted for each other.

5.8.2 Predictors and uses of different types of open spaces

The study also found that various factors influence respondents on the usage of the different types of open spaces. The findings reveal that available time to users, open space design, security or safety condition of the neighbourhood open space, satisfaction level with private or shared open space at user's home and weather condition are deciding factors for usage of neighbourhood open space and correlated with respondents' satisfaction with neighbourhood open space.

However, neighbour's attitude, available time and weather condition are strong factors influencing the usage of shared open space, while the degree of privacy and open space design are the important determining factors for usage of private open space. These factors were found to be significantly associated and correlated with residents' satisfaction with the shared and private open spaces. The findings suggest that neighbour's attitude, privacy, and open space design are predictors of usage and satisfaction of shared and private open spaces.

5.8.3 Benefits and features of different types of open spaces

Moreover, for the features of the open spaces, there was a significant association and correlation between greenery features of the open spaces of residents and satisfaction with their open spaces, and benefits of the open spaces. Greenery was measured in the study by the availability of trees, shrubs, and lawn in the open space. These findings suggest the importance of trees, shrubs, and lawn as components of private and shared open spaces that could promote the well-being of residents. The results accord well with Grinde and Patil (2009) that the presence of nature in the environment impact positively on people's well-being, while environment "devoid of nature may act as a discord" (p.2332).

5.8.4 Benefits and forms of different types of open spaces

Besides, the study found there are significant association and positive correlation between respondents' satisfaction and usage of private open space only, and usage of both private and shared open spaces, but no significant association for usage of shared open space only. Similarly, there were a significant association and positive correlation

between the benefits reported by respondents and use of private open space only, and use of both private and shared open spaces. However, there is no significant association between benefits derived and usage of shared open space only. Moreover, the effect of the correlation was higher in those who have access to both private and shared open space than those with private open space only. The findings suggest access to both private and shared open spaces may be necessary for maximum benefits by respondents.

Although the front yards or gardens are missing in some respondents' houses (38.5%), the study found that front yard is significant, whether used as private or shared open space. The front, back, and side yards are significant and positively correlated with respondents' satisfaction for use as private open space only. The other forms of open spaces are not statistically significant.

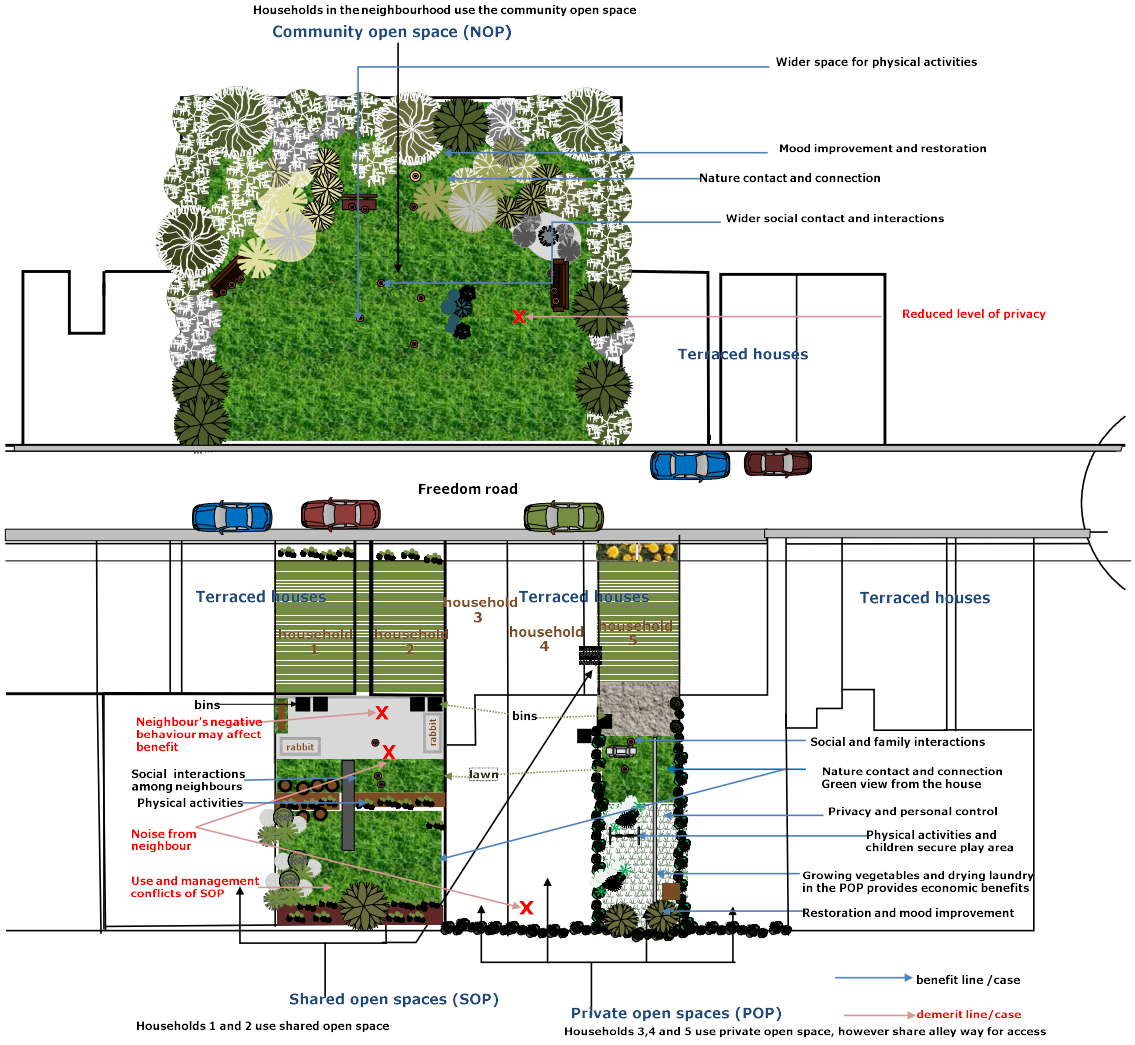


Figure 5.4 Mapping of the contribution of open spaces in and around terraced housing to well-being of residents' households

Similarly, results indicate both front and back yards as private open space are essential for respondent's satisfaction. However, association and correlation between satisfaction and backyard or garden were higher than front yard or garden. The findings suggest the importance of front garden, and back garden as forms of open spaces significant for open space benefits in terraced housing.

Figure 5.4 above is an explanatory diagram of the relationship between the three types of the open spaces and their contribution to benefits, problems and well-being of residents in the example of a selected part of the Freedom road, Walkley neighbourhood.

5.8.5 Demographics and different types of open spaces

The results of the test for independence indicated that age group, duration in the terraced housing, and tenure among the respondents' characteristics were significantly associated with satisfaction of respondents with some open space types and open space benefits.

The findings indicate that age and duration in the house are important factors for usage of private open space only. Aged people and those who have spent more years in the house tend to use the private open space more than the younger generation and new residents in the houses. Similarly, homeowner tends to prefer and have satisfaction with the use of private open space only.

However, for shared open space only, tenure and duration were significantly associated with usage and satisfaction. Findings suggest that tenants tend to use the shared open space than house owners, as well as those who are new than old residents.

For neighbourhood open space, age, duration in the house, children age and ethnicity are significant and associated with use and benefits. Unlike private open space, youths tend to use the neighbourhood open space than the aged, children between 6-12 years use more than those less than 5years, and those who have lived longer time in the house than new tenants or homeowners. These findings were in line with the previous study by Lachowycz and Jones (2013) that demographic is possible moderating factors to the relationship between open space and well-being.

CHAPTER SIX CONCLUSION

6.1 Introduction

This chapter as the concluding section provides the overview of the significant findings of the research study and recommendations for built environment professionals on designing for well-being, as well as the limitation of the research study. Besides, it makes suggestions for future research and ends with concluding remarks.

6.2 Overview of key findings

The goal of the study is to increase and improve understanding of the relationships between human well-being and open spaces in the residential environment, with a focus on terraced housing in Sheffield, UK. The purpose is to contribute to filling the gap in the literature and provide empirical evidence on the effect of the open spaces on the well-being of residents in the residential environment, especially terraced housing. The study explored terraced housing residents' perception of the effect of the open spaces in their residential environment on their well-being. Relevant research questions around the subject were made to gain full understanding of the theme of inquiry.

However, considering the nature of the study and complicatedness associated with human well-being and open space relationship, a combination of mapping technique and household survey methods were applied, collecting both qualitative and quantitative data that were used in the study.

The study provides empirical evidence from users of the residential environment that the open spaces, private and shared, in and around their terraced housing contribute to their multi-dimensions of well-being. The finding is harmonious to some previous studies on the subject (Burton et al., 2015; Sugiyama and Ward Thompson, 2007).

The study identified three different types of open spaces in the residential environment, private, shared and neighbourhood open spaces, especially for terraced housing dwellers (Friedman, 2012). The private and shared open spaces are in the immediate vicinity or attached to the building, while the neighbourhood open space is within reach in the neighbourhood. There are various types of neighbourhood open spaces that residents may visit in the neighbourhood which includes parks, mini parks, sports area, car park and squares and streets. The acknowledgement of the differentiation of open spaces to distinct type may be important to understand human-open space relationship and experiences. Also, the study found that the open spaces in

and around the terraced houses were highly heterogeneous in forms and functions, even within the same terraced housing type.

Moreover, the study found that availability of open spaces around a house is not synonymous to accessibility and usage. The finding may be significant for research design in open space-human studies (Lachowycz and Jones, 2013). Similarly, the research study revealed that residents use the private and shared open spaces differently. The private open spaces were popularly used for growing flowers and gardens; the family sits-out and relaxation, drying clothes, outdoor cooking or barbecue, playing with children and talking with friends. On the other hand, the shared open spaces were used for access to properties, sunbathing, especially for those without private open spaces, storage, compositing, talking to neighbours and friends, and relaxation. However, while residents used their neighbourhood open spaces for various purposes, they were exceedingly used to get away from day to day routine, have a walk and access route. Besides, the research study found that residents use their private and shared open spaces during wet and cold weather, especially for gardening, playing, and storage.

The study found that residents engaged with the open spaces in their vicinity at different levels: visual, contact, and passage (Keniger et al., 2013), and derived a different range of benefits that were associated with their well-being. These advantages include social, physical, economic and natural utility, psychological, additional space, nature and wildlife connection, secure children play area and access benefits.

Furthermore, findings of the research revealed that residents of the terraced housing perceive that the private and shared open spaces in and around their houses contribute to different dimensions of well-being of their households which comprise emotional well-being, social well-being, physical well-being, nature contact and connection, and economic well-being. However, the emotional well-being and social well-being were more prevalent and reported by the respondents.

Nevertheless, the study found that the benefits of open space and positive contribution to the well-being of a particular household may be jeopardized by factors that inhibit or interfere with the practical use of their open spaces. Such factors include lack of privacy within the open space, open space design-related problems, open space management-related challenges, and neighbour's behaviour related challenges. The study found reported some perceived negative sense of well-being like frustration, noise, fear, annoyance, poor social relationship due to conflict on usage and poor management of the open spaces, and unpleasant neighbour's attitude. The research found that neighbour's behaviour is a strong predictor to the usage of shared open

spaces and perhaps private open space for some residents. Other factors include open space design and degree of privacy. For neighbourhood open spaces, the study found that the leading factors that determined usage were the condition of the public open space and availability of time by the users, and weather condition.

Furthermore, the study confirmed that urban open spaces are the network of different open spaces, and the residential open space system is a network of private open space, shared open space and neighbourhood open space. The majority of the residents have access to private open spaces and regard them as highly valued for personal life. However, the study found that they also use the neighbourhood open space, some even on a daily or weekly basis. The findings suggest that both private or shared open spaces that are personal and perhaps experienced on a daily basis and the neighbourhood open spaces visited sometimes are necessary for people' satisfaction.

Interestingly, the study found that residents with unsatisfactory shared open spaces (even some private open space) use neighbourhood open spaces as a replacement or alternative resources. Similarly, those with pleasant experiences from private open spaces also visit neighbourhood open spaces as supplementary or complementary resources to add to their experiences. Thus, findings confirm the unique role of these different types of open spaces and their interdependence and interconnection.

Also, study findings suggest that greenery and children play area would be significant components of private and shared open space for well-being benefits. Likewise, having access to both private and shared open spaces rather than shared alone may be important for maximum benefits of open spaces in and around the terraced housing.

The research contributes to knowledge on the importance of open spaces in the residential environment, primarily private and shared open spaces in the terraced housing to the well-being of the residents. It confirms the perception of residents that the private and shared open spaces around their terraced housing contribute to different dimensions of well-being of their households. Besides, the study demonstrates that combination of various methods may be a better approach to understanding the complex relationship between well-being and open spaces in a highly heterogeneous environment like residential setting.

The results of the research study revealed that private and shared open spaces that would promote delivery of well-being to residents in terraced housing must meet certain design requirements. These conditions are presented as recommendations to the professionals in the built environment in the following section.

6.3 Recommendations for built environment professionals on designing for well-being

Open space design is one of the factors that can influence or limit the usage of open space by intending users. The study reveals that the design of open spaces: private, shared and neighbourhood is among the top determinants for using these resources. In addition, results of the research indicate that certain features of the private open space (greenery and children play area) are statistically significant for the well-being of private open space users. Moreover, the study found three themes are important for resolving associated problems with private and shared open spaces, considering respondents' open space needs and current challenges.

These emerging themes include:

1. Solve associated design and planning problems of the open spaces
2. Attitude change by neighbours
3. Promote a balance between privacy and sharing of shared open spaces.

The first and the last themes are design related solutions, confirming the significance of design of open space.

The design of open space is imperative considering the limitation and impact a poor design may impose on users and eventually on their well-being. From the results of the research, the following design philosophy emerged to promote the well-being of open space users (Figure 6.1).

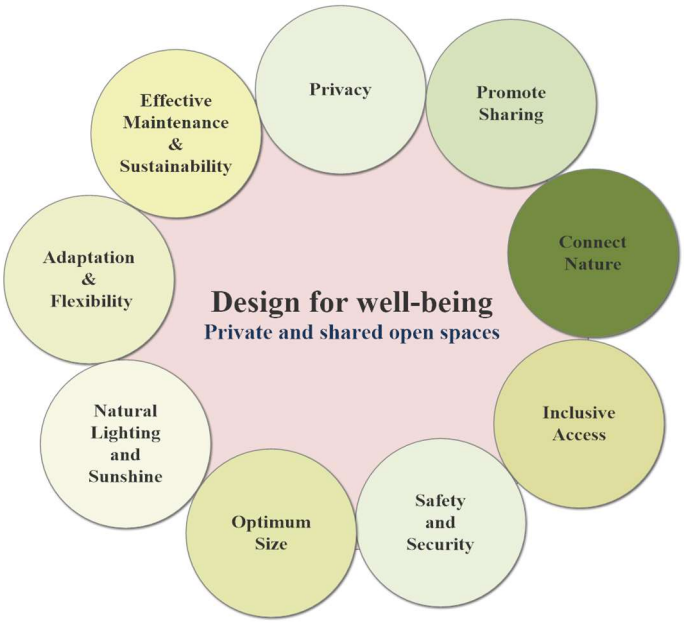


Figure 6.1 Design philosophy for private and shared open spaces to promote well-being of users

The design philosophy may be regarded as design pre-requisites or guidelines for planning private and shared open spaces in terraced housing to support the delivery of well-being to residents. Therefore, they are provided as recommendations for environmental professionals, especially planners and landscape architects for designing open space for delivery of well-being. These include:

6.3.1 Design for privacy

Lack of privacy has been a re-occurring hindrance or limitation to use of private open spaces in homes. As revealed by this study, users suffer from various forms of intrusions: visual, sound, smell, animal and human in private open space in terraced housing. The design of private open space should provide privacy and control over the outdoor room to the user. The design elements could be utilized to improve the challenge of intrusion and delineate personal private territory. Because of the location of the front yard, it may not be entirely private, unlike the backyard that gives more privacy, however, design element could help in providing a reasonable level of privacy. Similarly, hedges or fences can be used in the backyard to ensure privacy and control as well as prevent visual, animal and noise intrusions (Friedman, 2012). Figure 6.2 shows examples of a green fence that may be used to improve privacy of the private open spaces.

Figure 6.2 Green fence at the backyards to improve privacy of the private open space.

6.3.2 Design to promote sharing

Apart from lack of privacy, other nature of the challenge that limits the use of shared open space as revealed by the study is lack of sense of ownership by the intended users. Shared open space should, therefore, provide a secured semi-private open area for

groups of households or residents (Levitt, 2010). It should be designed to promote sharing between neighbours. The location of open space, amenities, and facilities should encourage use and accessible to all intending users or households meant to share space. The shared open space should offer multiple recreational opportunities to serve the diversity of intending users.

Although it is a shared space, it is not a public space; therefore, a level of privacy must be provided to encourage use. The design must strike a balance between sharing and privacy in the semi-private space (see figure 6.3).

Figure 6.3 Shared open spaces at the backyard of households to promote sharing and privacy.

6.3.3 Design to connect nature

The importance of nature or greenery to the human being is well established and elucidated by Biophilia theory (Grinde and Patil, 2009; Wilson and Kellert, 1993). The result of the study shows a significant association and correlation between greenery of the private and shared open spaces and perceived well-being of the residents. Hence, the private and shared open spaces should be designed for inclusion of plants, trees, water feature and natural landscape to promote sensory stimulation which is essential for the promotion of well-being (Pleasant et al., 2013).

The world is experienced through human senses of touch, smell, hearing, sight, and taste; hence design should promote connection to nature through all these human senses in the private and shared open spaces. Residents should also be able to view nature from inside when real engagement in the outdoors is not feasible, especially during unfavourable weather condition.

Figure 6.4 Back gardens dominated with greenery for nature connection.

Similarly, nature is essential to children for play, and play area should include natural landscape (CABE, 2008b). In practical term, in a neighbourhood with limited private green space, the size of pavement or patio should be minimised, while the lawn size is maximised (Friedman, 2012) to promote connection to nature or greenery at home. Figure 6.4 above illustrates examples of backyard or gardens with greenery to encourage nature connection at home.

6.3.4 Design for inclusive access

Inclusive access concerns physical accessibility and usability. The private and shared open spaces should be designed with the consideration of the end-users needs. The residents include children, adult, aged, and residents with any disability. All of them should, therefore, be able to use the open space, as an inclusive environment is responsive to people's need, flexible in use and provides choices rather than a single design solution (CABE, 2008a).

Figure 6.5 Private back garden with ramps, steps and rail for inclusive access.

Likewise, the design should encourage everybody to play and interact together without limitations or barriers. Ramps and steps may be necessary to provide access to those with limited mobility, and rails to support elderly and people with disability (See figure 6.5 above).

6.3.5 Design for safety and security

Concern for safety and security was raised by residents in the study as one of the critical considerations for the use of private and shared open spaces, especially the shared open space. The fear of falling and fear of crime discourage people from going outdoors (IHIE, 2002) while feeling safe and secure is a strong determinant of older people's general life satisfaction and encourages their use of outdoor space (Marcus and Francis, 1997). Thus, the design of both the private and shared open spaces should respond to provide and encourage safety and security.

Likewise, parents should be able to watch their children from inside when using shared open spaces. The design should, therefore, provide for visibility of outdoor area from the indoor area, and gives physical and psychological protection. Similarly, paving surfaces and grade changes should be designed not to compromise safety. A smooth relatively level surface in the outdoor area may permit ease of movement and reduce hazard (IHIE, 2002). See figure 6.6 below.

Figure 6.6 Shared open space with relatively level surface to reduce hazard and promote safety.

6.3.6 Design for optimum size

The size of a garden has a significant role in determining its composition (Smith et al., 2005) as well as activities that may take place in the garden (Levitt, 2010). The amount

of space provided for outdoor activities is essential, and space provided should be compatible with anticipated human activities in them (Pleasant et al., 2013). The result of the study indicates that some residents find their open spaces area too small or grossly inadequate to use for essential domestic activities which they desire to do. Thus, the size of private and shared open spaces should be at least adequate to accommodate the intended users and activities. From the research findings, open space proposed for children play should make provision to occupy elements and equipment for children outdoor games (See figure 6.7).

Figure 6.7 Back gardens with adequate size to accommodate different activities.

6.3.7 Design for natural lighting and sunshine

People like using their private open space for relaxation and sunbathing in good weather as revealed by the study. It is important to be able to use the private and shared open spaces in any weather by designing for a balance between sun and shade using planning and landscaping (Friedman, 2012).

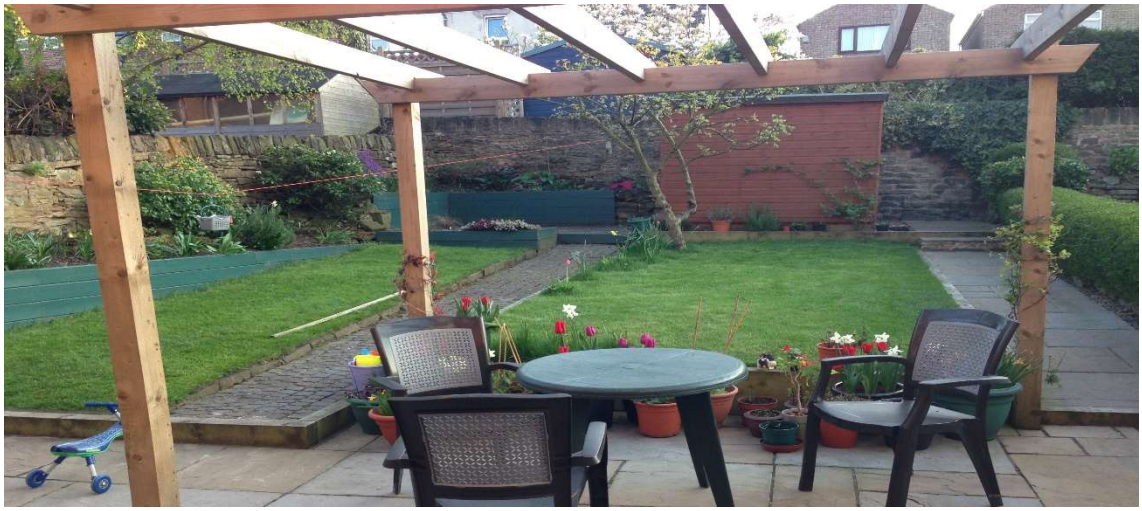


Figure 6.8 Back garden with access to natural lighting and sunshine.

Trees or shade should not cover the whole open space or prevent opportunity for receiving sunshine. Trees appropriate for space should be considered. Also, seating area in the open space may be located where users can easily get summer breezes (Marcus and Francis, 1997). See figure 6.8.

6.3.8 Design for adaptability and flexibility

The design of private and shared open spaces should be flexible, multifunctional and adaptable. This is important to meet household's changing needs because members are in different stages of life and this is dynamic. The design of the open space should, therefore, provide an opportunity for residents to adapt space to serve their needs at the various points in life.

The application of both hard and soft surface in private and shared open spaces is recommended to encourage diversity of use and at all times (Friedman, 2012). The design of outdoor area that would permit a choice of sunny or shade at different times, as well as variety of activities and settings, would offer diverse experiences. Figure 6.9 below illustrates an open space design for multifunctionality.

Figure 6.9 Shared open space with opportunity for diversity of use and activities.

6.3.9 Design for effective maintenance and sustainability

The private and shared open spaces should be designed for ease of maintenance in mind. Unkept and poorly maintained open space may affect the quality of the open space and eventually usage. Design with the use of plants which will reduce outdoor water, fertilizer needs and resilient would be essential for maintenance and sustainability. Environmental friendly features and sustainable materials should be utilized for the construction of open space. See figure 6.10 for example.

Figure 6.10 Private and shared open spaces design for low maintenance and sustainability.

6.4 Limitation of the Research

Like in every research, this study has its limitations. While the approach to the study was a combination of methods and systematic random strategy was used to select respondents, interpretation of findings outside the study population would be with caution. Generalizability and transferability of research findings to other types of dwelling in the residential environment, apart from the terraced housing may not be feasible. Even within the terraced housing, the application may be limited to a particular type of terraced housing. For example, within the UK, the terraced housing is highly variegated. However, the understanding of this particular case may benefit other types of housing in the residential environment.

Second, in research that involved recollection of experiences, recall bias may impact the study outcome, but this may be unlikely in this study as respondents wrote down their opinions and were precise in some past matters.

Third, while a probability sampling technique was used for the survey and sample was a fair representation of the study population, the majority of the respondents are employed people and white by ethnicity. This was unavoidable because the neighbourhood was white dominated. The result may have been biased toward the white ethnic group and employed population.

6.5 Suggestion for future research

For the future investigation, since the current result seems skewed towards the employed population and white ethnic group, other different population may be studied

to understand the effect of ethnicity, and employment status of residents on the perception of the impact of private and shared open spaces on well-being.

Besides, since the current study focused on a specific dwelling type, terraced housing, and other dwelling types are characteristically different, there is a need to investigate other types of dwellings in the residential environment to understand the effect of housing type on the perception of the impact of open spaces on residents' well-being.

Moreover, the current study suggests greenery and nature at home as a significant component of the private and shared open spaces for well-being. It is worth investigating this further. The understanding of the type of greenery or nature that would engender a high sense of well-being may be essential for designing better future homes for well-being.

Besides, the contribution of shared open space to social well-being or social benefits in a residential environment is suggested for further examination. The results showed both private open space and shared open space are essential for maximum benefits in terraced housing but private open space may be more important for well-being benefits. Therefore, the significance of the shared open space for well-being is unclear and would merit further investigation.

6.6 Concluding remark

The research suggests and provides empirical support that the private open space and shared open space in the terraced housing contribute to the multi-dimensions of the well-being of the residents.

To improve the well-being of residents along this respect, stakeholders must promote the design of open spaces that would increase the sense of well-being of house users. Future homes must include appropriate private and shared open spaces to promote the well-being of users through this domain. Moreover, designers may have to design a flexible, multipurpose open space that would meet different needs of users at home front.

Similarly, the study suggests a link between the neighbourhood open spaces and private and shared open spaces as a complete and unbroken network of open spaces necessary for full benefits of well-being of dwellers in the residential environment.

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APPENDICES

APPENDIX A: Covering/Inviting letter

Covering/Inviting letter

08/03/2016

Dear Householder,

I am writing you to ask for help to complete a survey on a research project titled: **Human Well- being and Open Spaces in and Around Terraced Housing**. I am a postgraduate research student at the Department of Landscape, University of Sheffield.

I would like to ask for a few minutes of your time to assist my research by providing your opinion about how open spaces around your house and neighbourhood influence your sense of well-being by completing the attached questionnaire. I am doing this research to find out how people in terraced houses use the open spaces around their houses and their perception on the influence of these open spaces on their well-being.

This survey is being circulated to randomly selected households living in terraced houses in Walkley, Sheffield. One person in the household who is age 18 or above can complete the questionnaire on behalf of the household. You do not need to do anything as a result of participating in this survey. It is your opinion alone we need to help with the research. The researcher who delivered the survey to your house will call back to collect the questionnaire at specified dates on the questionnaire, wearing the University of Sheffield ID for identification purpose.

Participation in this research is entirely voluntary. All information provided in the survey will be treated confidentially.

If you are willing to help me with this survey, I should be grateful if you would first read the following participant information sheet for detailed information about the research project, and then complete the consent page and the questionnaire. Thank you in advance for your kindness.

Yours faithfully,

Toyedemi2.
David Oyedemi
08 /03/16

APPENDIX B: Research Participant Information Sheet

What is the project's purpose?

The aim of this research project is to find out how people in terraced houses use the open spaces in their residential area and their perception of the influence of these open spaces on their well-being. The study would be conducted in the Walkley neighbourhood of Sheffield.

Why have you been chosen and do you have to take part?

You have been selected to participate in this survey because you live in a terraced house in Walkley, Sheffield, which is the research study area, and you are part of a sample of over five hundred households in terraced houses in Sheffield that have been randomly selected. Participation in this study is voluntary. It is up to you to decide whether or not to take part. You do not need to give any reason to anyone if you are not interested in taking part in the study. If you do decide to participate you will only need to complete the questionnaire.

How can you be involved?

If you choose to take part in the research, please complete the questionnaire provided which should take you less than 30 minutes. Please note that just one person in your household who is aged 18 or over may complete the questionnaire on behalf of your household. The researcher who delivered the survey to your house will call back at your house to collect the completed questionnaire on the specified date on the questionnaire.

Are there disadvantages and risks of taking part?

There are no foreseeable disadvantages or risks associated with taking part other than giving up some of your time to answer the questionnaire. The questions are about how you use the open spaces around your house and your opinion about how they influence aspects of your well-being. However, if you find that you do not wish to answer any particular question, please don't hesitate to opt out or leave it unanswered.

What are possible benefits of taking part?

While there may be no immediate benefits for those people taking part in the research project, it is hoped that this work will contribute to help improve our understanding of how best to design terraced residential open spaces for the well-being of residents.

Participants' privacy and information confidentiality?

All the information that we collect about you during the research will be kept strictly confidential. Your information will remain anonymous at all time so that no one could link them to you or identify you in any reports or publications. The research data generated from your response will be used to write a report and is likely to be published in academic articles and journals. The research data collected would be handled and stored in anonymous form.

Who is organising the research?

The research is being undertaken in the Department of Landscape, the University of Sheffield by a postgraduate research student, David Oyedemi. It has been ethically approved by Landscape Department Ethics Review Committee at the University of Sheffield.

Contact for further information:

David Oyedemi, Lead Researcher at arp11ado@sheffield.ac.uk OR

Dr. Kevin Thwaites, Research Supervisor at k.thwaites@sheffield.ac.uk 01142220620

APPENDIX C: Research Participant Consent Form

Research Project Title: Human Well- being and Open Spaces in and Around Terraced Housing

Your participation in this research project is welcome but entirely **voluntary.** Please ensure you read the participant information about the research before you give consent by filling this form.

Consent

If you wish to take part in this study, please tick the box below to confirm your consent.

1. I confirm that I have read and understand the participant information sheet explaining the research project.
2. I understand that taking part in this research is voluntary. Voluntary participation means that I do not need to answer questions I consider inappropriate and may stop filling out the questionnaire at any point.
3. I understand that my responses would be kept strictly confidential and secure by the researcher. I give permission to the researcher to have access to my anonymised data.
4. I understand that my name will not be linked with research material and would not be identified in any reports or publications. I therefore agree that the research data generated from my response be used to write a report and possibly publication in academic articles and journals.

I consent to take part in the research, Human Well-being and Open Spaces in and Around Terraced Housing.

Please tick the box below and provide only initial and signature (for confidentiality purpose) to give consent.

☐ Participant's Initial ……..

Participant's signature ……..

Date ……....

Contact details

Principal Investigator: David Oyedemi/ Research Student, Department of Landscape, University of Sheffield/ arp11ado@sheffield.ac.uk

Research Supervisor: Dr. Kevin Thwaites/ Department of Landscape, University of Sheffield / k.thwaites@sheffield.ac.uk/ 01142220620

APPENDIX D: Questionnaire

The University Of Sheffield.

Questionnaire /Survey

Human Well-Being and Open Spaces in and Around Terraced Housing


Introduction

The questions in the survey cover information about open spaces around your house and neighbourhood, how you use them, and your opinion of the influence of these open spaces on your well-being.

Who should complete the questionnaire?

Please note that one member of the household who is over 18 years should complete the questionnaire on behalf of the household.

How to return the questionnaire

The researcher who delivered the survey to your house will call again at your house to collect the completed questionnaire on the specified dates below. **Please put the completed questionnaire in the polythene bag/envelope it came with outside your front door for the researcher to pick on the specified date below, especially if you would not be available.** The researcher will be wearing the University ID for identification purpose. In case you are not available at the first visit time and you did not remember to put the completed questionnaire outside of your front door, the researcher will try to collect at the second visit time.

First visit time: .....

Second visit time: .....

Thank you very much for your help and kindness

Questionnaire

Please tick the appropriate answer and provide answers where necessary

A. Information about open spaces around your terraced house

A1. What type of open spaces do you have around your house?

☐ Private open space (space entirely for your household use, whether front, back or side yard/garden, that is not shared with neighbour)

☐ Shared open space (space shared with other household or neighbour, whether front, back or side yard/garden, alley way, common access, other)

A2. Which of the specific open spaces around your house is private or shared open space? Use the table below and classify the specific open spaces available around your house. Please add any types of open spaces available to you that is not included in the table.

	Type of open space around the house		
Name of space	**Private**	**Shared /semi private**	**Not available**
Front yard/garden			
Back yard/garden			
Side yard/garden			
Alley way			
Parking space			
Common access			

A3. Which of the open spaces does your household have access to and use?

☐ Private open space only ☐ Shared open space only ☐ Both private and shared open spaces

A4. What does your household use your PRIVATE open spaces around your house for during the warm months? If you don't have private open spaces, go to question A5.

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A5. What does your household use your SHARED open spaces around your house for during the warm months? If you don't have shared open spaces, go to question A6.

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A6. What does your household use the open spaces around your house for during WET or COLD weather (Autumn/Winter)?

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……..…
……..

A7. What are the major factors that determine or influence how your household use your SHARED open spaces around your house? Please add any factor that is not included in the table that is important to you.

Factor	How important is this determining factor?				
	Not Very important	Not Important	Important	Very Important	No opinion or Not applicable
Open space design					
Weather					
Neighbours' behaviour					
Available time					
Degree of privacy					

A8. What are the factors that prevent or discourage your household from using your SHARED open spaces around your house? If there is none, go to question A9.

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A9. What are the benefits (physical, social, emotional, others) that your household get from using your private and shared open spaces around your house? If there is no benefit, go to question A11.

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A10. Briefly describe how these benefits in A9 above relate or contribute to the quality of life of your household

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A11. What does your household find unsatisfactory or as disadvantages about your private and shared open spaces around your house? If there is none, go to question A13

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A12. Briefly describe how these disadvantages/limitations in A11 above affect or detract from the quality of life of your household

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A13. What do you think can be done to remove or address these disadvantages listed in question A11 above?

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A14. What would your household like to do in the open spaces around your house which you cannot do at the moment?

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A15. What do you think has to be done or change significantly to allow your household do what you like to do in the open spaces around your house?

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<u>B. Information about open spaces in your neighbourhood</u>

B1. **Apart from the open spaces around your house, what other open spaces does your household have access to in your neighbourhood? Please add others not included on the list.**

☐ Public park/gardens ☐ Pocket/mini parks ☐ Public squares ☐ Public water-fronts/ river-bank ☐ Woodland area ☐ Allotments /community growing spaces ☐ Other, please specify……
……
……

B2. What does your household use the neighbourhood open spaces for? Please add any activity that you use the neighbourhood open space for that is not included in the table.

Activity	**How often do you or your household use the neighbourhood open space for this activity?**					
	Daily or most day	At least once a week	At least once a month	once in two months	Never	Not applicable
Walk dog/pets						
Go for walk/run						
Get away from day to day routine						
Have opportunity to be outdoors						
Meet new people						
Use for education purpose						
Have bike ride / cycling						
Play with my children						
Use as access route						
Relax in natural setting						
Socialize or talk to neighbours						
Enjoy wildlife						
Have time with friends or relatives						
Social events						
Use available recreational facilities						
Grow your own food (allotment/community garden						

B3. What major factors influence your household to use the neighbourhood open spaces?

Factor	How important is this factor?				
	Not Very important	Not important	Important	Very important	No opinion or Not applicable
Open space design					
Weather condition					
The distance/proximity to my house					
Available time					
Need to socialize with others in the neighbourhood					
Security condition/ safety					
Satisfaction level with private /shared open space at my house					
State or condition of the public open space/facility					
Availability of amenities e.g. seating, children's play equipment					

C. General evaluation or Information about the open spaces in your residential setting

C1. Over all, how satisfied or happy are you with your open space in your residential area?

	Level of satisfaction with your open space					
Type of open space	Very dissatisfied	dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied	Not sure or Not applicable
Private open space						
Shared open space						
Neighbourhood open space						

C2. Rank the open space types in your residential area in order of importance to you, awarding 1 to the most important and 3 to the least important.

Type of open space	**Rank** (1 or 2 or 3)
Private open space around the house	
Shared open space around the house	
Neighbourhood open spaces	

C3. Why is the open space you ranked highest in question C2 above the most important open space to you and your household?

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D. Personal and Household Information

D1. What is your gender? Male ☐ Female ☐

D2. Which age bracket do you fit into? ☐ 20-29 years ☐ 30-39 years ☐ 40-49 years ☐ 50-59years ☐ 60 -69 years ☐ 70 and above years

D3. What is your current employment status? ☐ Full time employment ☐ Part time employment ☐ Student ☐ Unemployed ☐ Self-employed ☐ Looking after family/friend ☐ Retired ☐ Other

D4. Which one of the following describes the tenancy status in your home?
☐ Homeowner/landlord ☐ Shared ownership (partly owned and partly rented) ☐ Tenant/rent ☐ Live here, rent free

D5. How long have you lived in your current house/accommodation? Please state years and months: ……. years ……. months

D6. How many adults (over 18 years) are there in your household living in your current house or accommodation? Please state number……

D7. How many children/young people are there in your household living in your current house/accommodation including those visiting? Please state number based on age bracket. If none, go to question D8
5 years or under ……. 6-11 year ..... 12-18years ……

D8. Which of the following best describes your ethnic group?
☐ White ☐ Black/Black British ☐ Asian/Asian British ☐ Mixed/Multiple ☐ Chinese ☐ Other

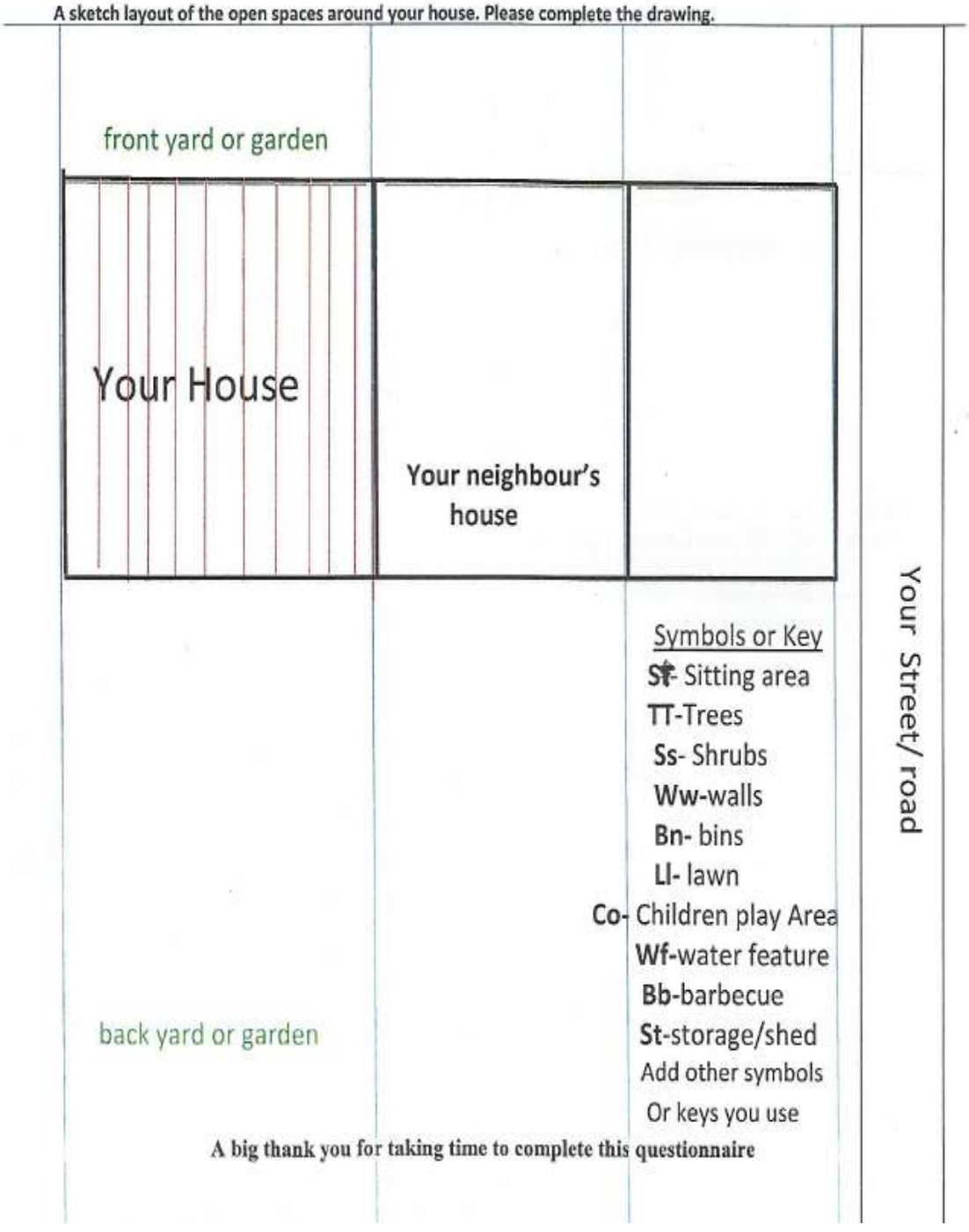
E. A sketch layout of the open spaces around your house

Using the symbols on the plan provided below, please mark the location of these features on the plan if you have them. The plan represents typical features of the terraced house you occupy, so it may not be exactly the same as your home, but please locate features as accurately as you can. Create additional symbols if needed for other features and explain the meaning in the key section.

E1. Circle areas that are very important to your household and you are happy with on the drawing of the layout of your open spaces. E.g. (SS)

E2. Mark 'X' on areas that are not interesting or cause annoyance to your household on the drawing of the layout of your open spaces and suggest reasons. E.g ✂ noise from neighbour's dogs

A sketch layout of the open spaces around your house. Please complete the drawing.



A big thank you for taking time to complete this questionnaire

APPENDIX E: Notice of Calling at your house

Notice of Calling at your house

Just to let you know I called.

The research student from the University of Sheffield

Dear Sir/Madam

About a week ago, I put a questionnaire through your door, requesting for your help with my research about how you use the open spaces around your house and how this affects your well-being. I tried to collect the questionnaire today but unfortunately, I missed you.

I will try and call again on

……

to collect the completed questionnaire. I look forward to hearing about your experience of the open spaces around your house and its association with your well-being. This project has received approval from the Department of Landscape's Ethics committee, University of Sheffield.

I want to thank you in advance for your assistance and kindness in completing the questionnaire. Please don't hesitate to contact me if you have any questions at arp11ado@sheffield.ac.uk.

With best regards.

Toyedemi2

David Oyedemi

APPENDIX F: Follow up letter

Follow up letter 04/04/16

Re- Human Well- being and Open Spaces in and Around Terraced Housing

Dear Sir/Madam

About two weeks ago, I put a questionnaire through your door, requesting for your help with my research about how you use the open spaces around your house and how this affects your well-being. I tried to collect the questionnaire twice last week, but unfortunately, I missed you.

I am enclosing with this follow- up letter another copy of the questionnaire and a self-addressed, stamped envelope. If you have already completed the initial questionnaire, I would be very grateful if you could put in the self – addressed envelope provided and post. Otherwise, please use the new copy of the questionnaire provided and return in the envelope provided. I look forward to hearing about your experience of the open spaces around your house and its association with your well-being. This project has received approval from the Department of Landscape's Ethics Committee.

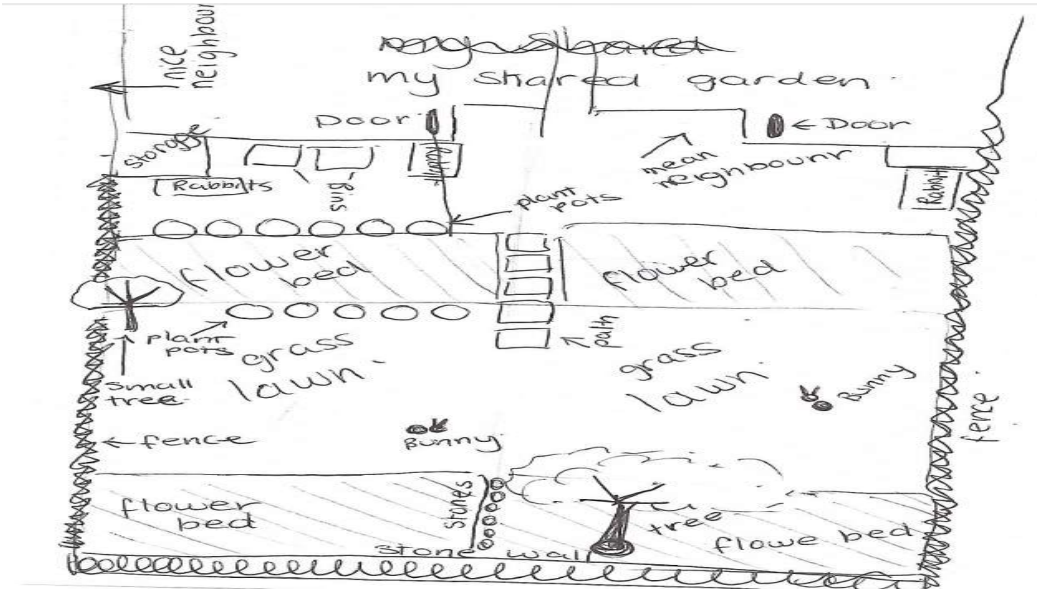
I want to thank you in advance for your assistance and kindness in completing this survey. Please don't hesitate to contact me if you have any questions at arp11ado@sheffield.ac.uk.

With best regards.

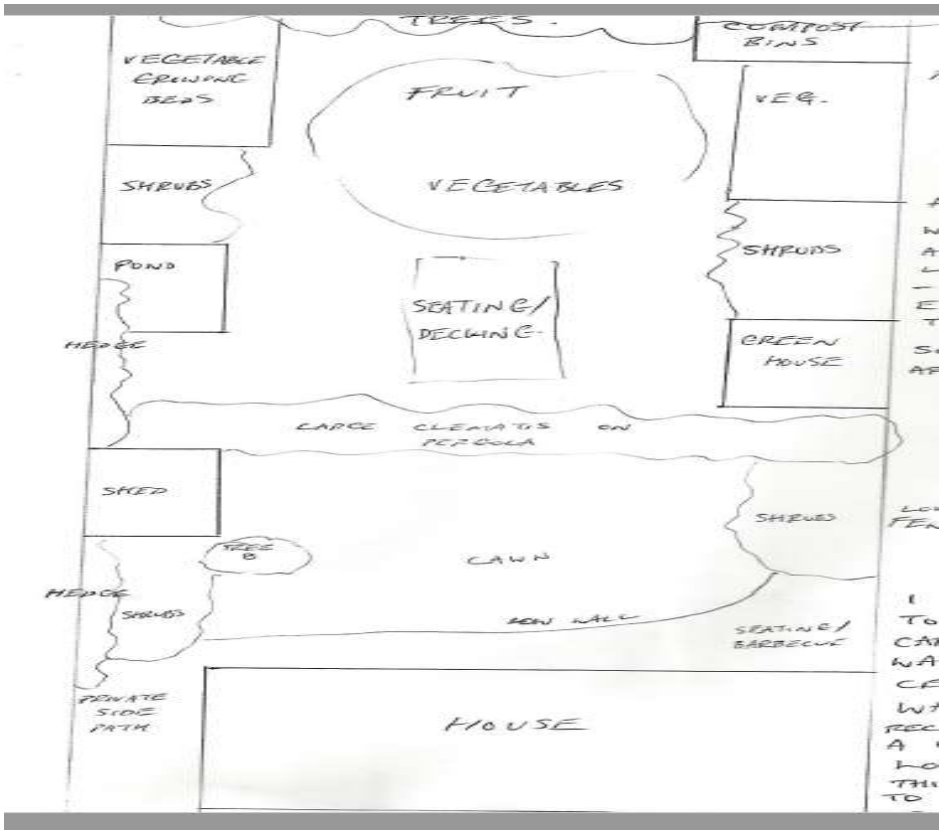
Toyedemi2

David Oyedemi

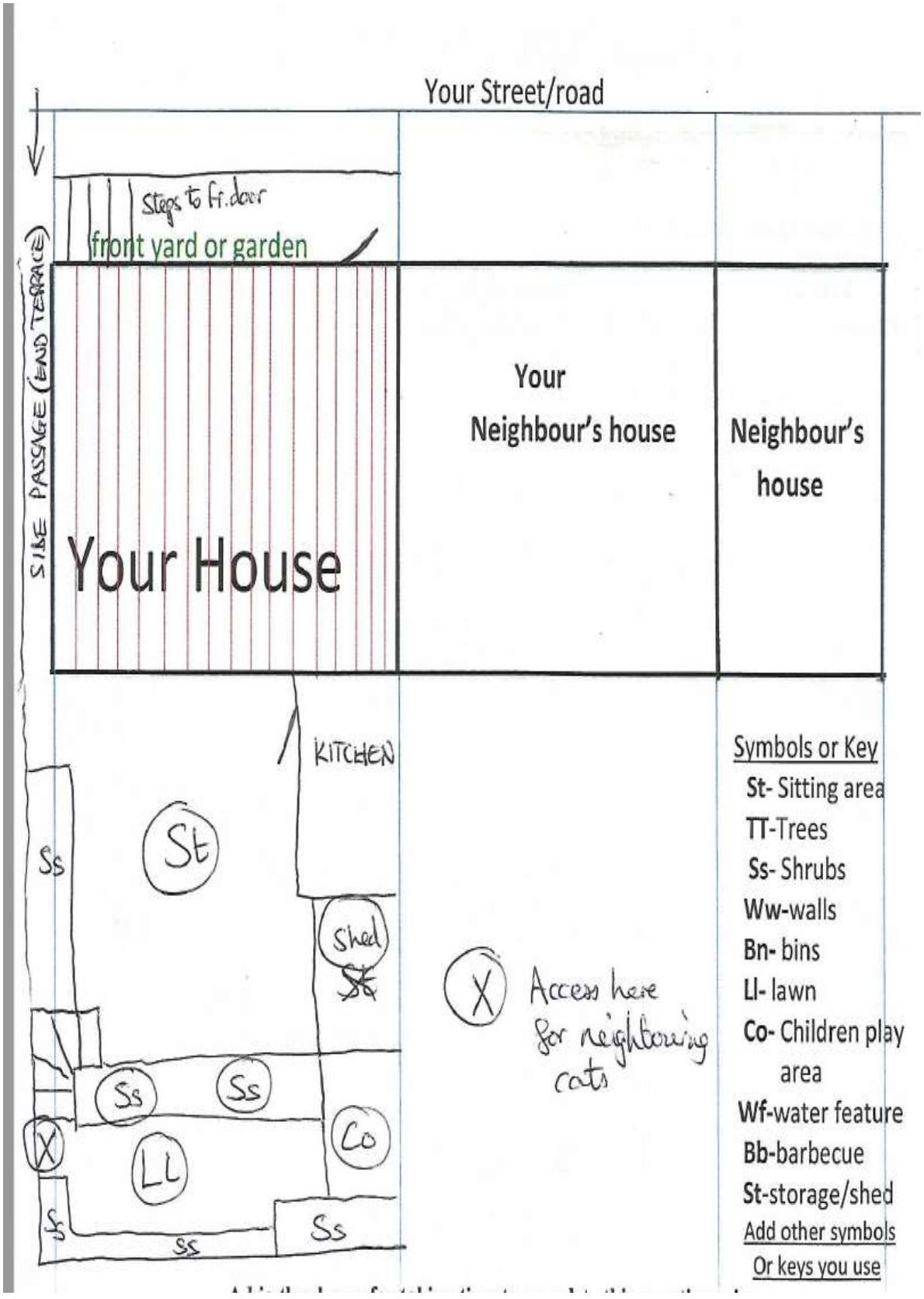
APPENDIX G: Samples of research participants' mapping of the private and shared open spaces



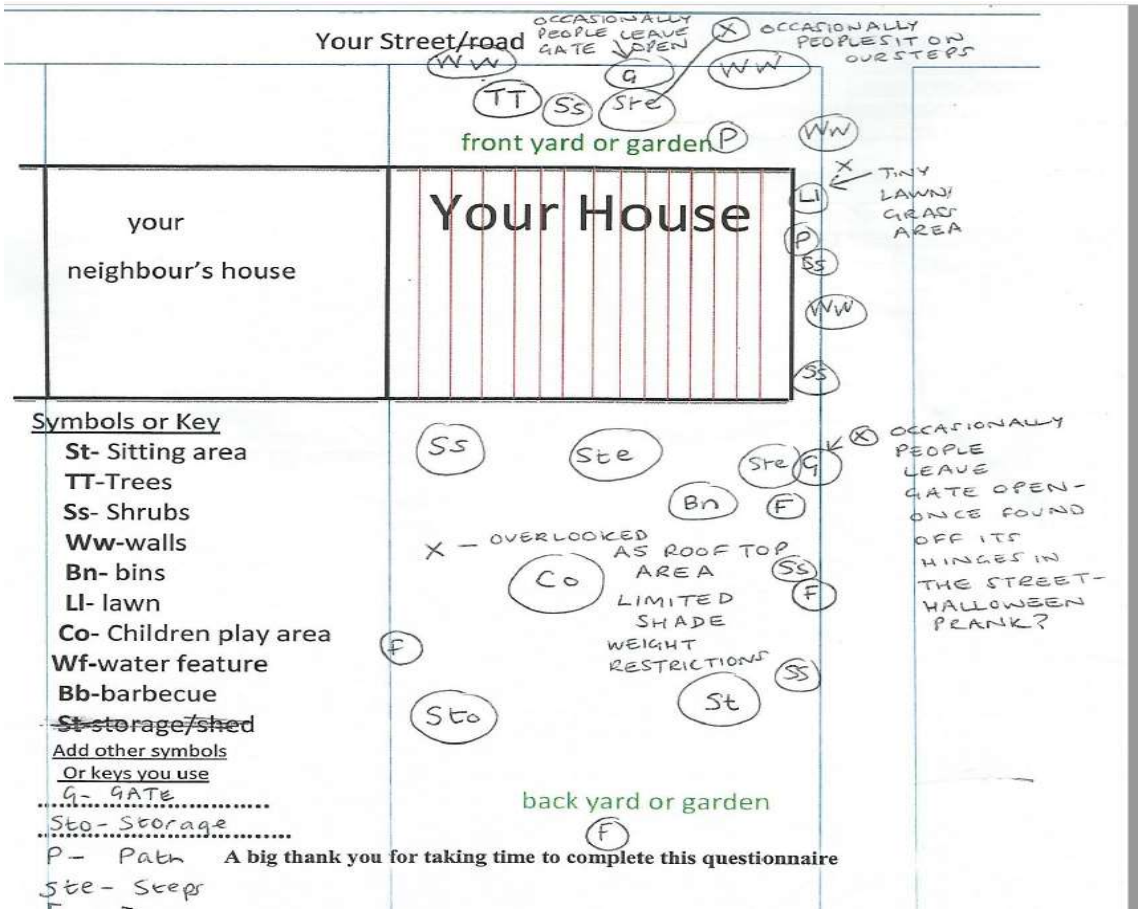
Sample A- Map of a shared open space by one of the participants



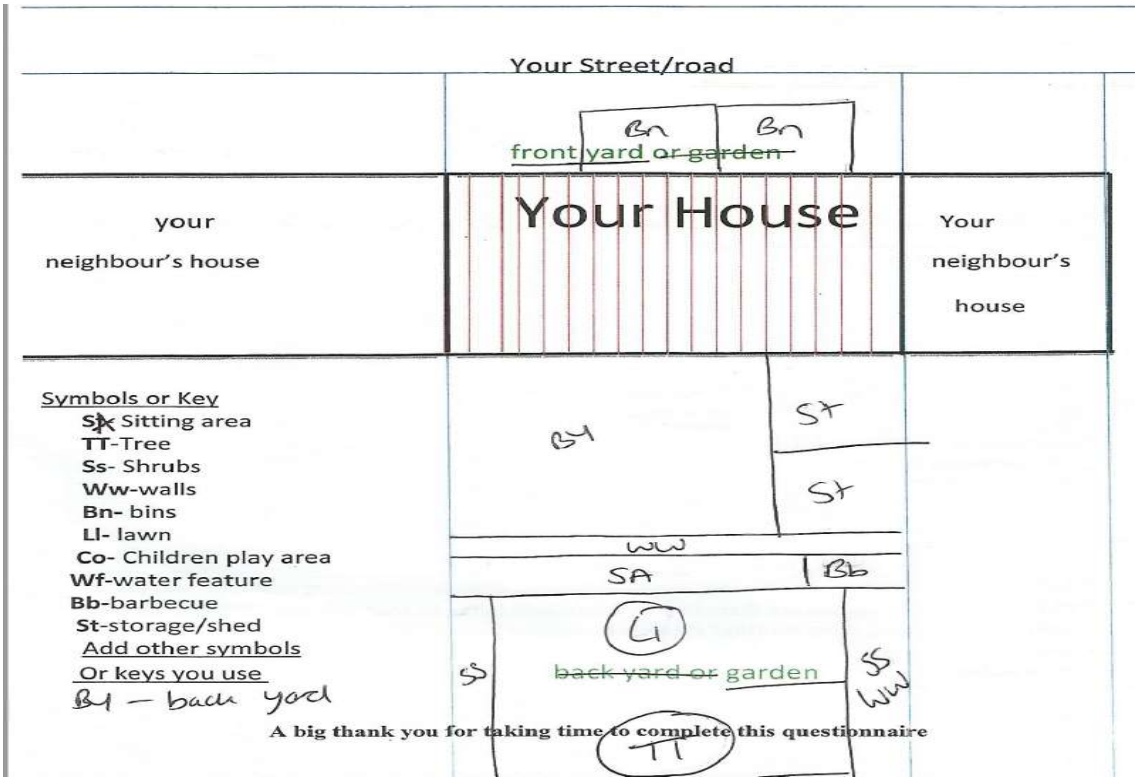
Sample B- Map of a private open space by one of the participants



Sample C- Map of a private open space by one of the participants



Sample D- Map of a private open space by one of the participants



Sample E- Map of a private open space by one of the participants

APPENDIX H: Cross tabulation between Satisfaction with private open spaces and availability of private open spaces

			privateOS		Total
			no	yes	
private open space	not sure/applicable	Count	17	5	22
		% within private open space	77.3%	22.7%	100.0%
		% within privateOS	47.2%	3.1%	11.2%
		% of Total	8.7%	2.6%	11.2%
	very dissatisfied	Count	0	6	6
		% within private open space	0.0%	100.0%	100.0%
		% within privateOS	0.0%	3.8%	3.1%
		% of Total	0.0%	3.1%	3.1%
	dissatified	Count	5	12	17
		% within private open space	29.4%	70.6%	100.0%
		% within privateOS	13.9%	7.5%	8.7%
		% of Total	2.6%	6.1%	8.7%
	neither satisfied nor dissatisfied	Count	4	17	21
		% within private open space	19.0%	81.0%	100.0%
		% within privateOS	11.1%	10.6%	10.7%
		% of Total	2.0%	8.7%	10.7%
	satisfied	Count	4	70	74
		% within private open space	5.4%	94.6%	100.0%
		% within privateOS	11.1%	43.8%	37.8%
		% of Total	2.0%	35.7%	37.8%
	very satisfied	Count	6	50	56
		% within private open space	10.7%	89.3%	100.0%
		% within privateOS	16.7%	31.3%	28.6%
		% of Total	3.1%	25.5%	28.6%
Total		Count	36	160	196
		% within private open space	18.4%	81.6%	100.0%
		% within privateOS	100.0%	100.0%	100.0%
		% of Total	18.4%	81.6%	100.0%

Source: SPSS Output

APPENDIX I: Cross tabulation between Satisfaction with private open spaces and use of private open spaces only

			privateOP only		Total
			no	yes	
private open space	not sure/applicable	Count	20	2	22
		% within private open space	90.9%	9.1%	100.0%
		% within privateOP only	13.6%	4.1%	11.2%
		% of Total	10.2%	1.0%	11.2%
	very dissatisfied	Count	4	2	6
		% within private open space	66.7%	33.3%	100.0%
		% within privateOP only	2.7%	4.1%	3.1%
		% of Total	2.0%	1.0%	3.1%
	dissatified	Count	16	1	17
		% within private open space	94.1%	5.9%	100.0%
		% within privateOP only	10.9%	2.0%	8.7%
		% of Total	8.2%	0.5%	8.7%
	neither satisfied nor dissatisfied	Count	19	2	21
		% within private open space	90.5%	9.5%	100.0%
		% within privateOP only	12.9%	4.1%	10.7%
		% of Total	9.7%	1.0%	10.7%
	satisfied	Count	53	21	74
		% within private open space	71.6%	28.4%	100.0%
		% within privateOP only	36.1%	42.9%	37.8%
		% of Total	27.0%	10.7%	37.8%
	very satisfied	Count	35	21	56
		% within private open space	62.5%	37.5%	100.0%
		% within privateOP only	23.8%	42.9%	28.6%
		% of Total	17.9%	10.7.5%	28.6%
Total		Count	147	49	196
		% within private open space	75.0%	25.0%	100.0%
		% within privateOP only	100.0%	100.0%	100.0%
		% of Total	75.0%	25.0%	100.0%

Source: SPSS Output

APPENDIX J: Chi-Square test between Satisfaction with private open spaces and use of private open spaces only

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	14.305[a]	5	0.014
Likelihood Ratio	16.202	5	0.006
Linear-by-Linear Association	9.176	1	0.002
N of Valid Cases	196		

Source: SPSS output a. 3 cells (25.0%) have expected count less than 5. The minimum expected count is 1.50.

APPENDIX K: Cross tabulation between Satisfaction with shared open spaces and use of shared open spaces only

			Shared OP only		Total
			no	yes	
shared open space	not sure /applicable	Count	44	3	47
		% within shared open space	93.6%	6.4%	100.0%
		% within sharedOP only	26.0%	10.7%	23.9%
		% of Total	22.3%	1.5%	23.9%
	very dissatisfied	Count	4	1	5
		% within shared open space	80.0%	20.0%	100.0%
		% within sharedOP only	2.4%	3.6%	2.5%
		% of Total	2.0%	0.5%	2.5%
	dissatisfied	Count	13	4	17
		% within shared open space	76.5%	23.5%	100.0%
		% within sharedOP only	7.7%	14.3%	8.6%
		% of Total	6.6%	2.0%	8.6%
	neither satisfied nor dissatisfied	Count	46	4	50
		% within shared open space	92.0%	8.0%	100.0%
		% within sharedOP only	27.2%	14.3%	25.4%
		% of Total	23.4%	2.0%	25.4%
	satisfied	Count	43	11	54
		% within shared open space	79.6%	20.4%	100.0%
		% within sharedOP only	25.4%	39.3%	27.4%
		% of Total	21.8%	5.6%	27.4%
	very satisfied	Count	19	5	24
		% within shared open space	79.2%	20.8%	100.0%
		% within sharedOP only	11.2%	17.9%	12.2%
		% of Total	9.6%	2.5%	12.2%
Total		Count	169	28	197
		% within shared open space	85.8%	14.2%	100.0%
		% within sharedOP only	100.0%	100.0%	100.0%
		% of Total	85.8%	14.2%	100.0%

Source: SPSS Output

APPENDIX L: Chi-square test between satisfaction shared open spaces and use of shared open spaces only

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.835[a]	5	0.166
Likelihood Ratio	8.171	5	0.147
Linear-by-Linear Association	3.283	1	0.070
N of Valid Cases	197		

Source: SPSS output a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is .71.

APPENDIX M: Cross tabulation between Satisfaction with shared open spaces and use of both private and shared open spaces

			both priSHA OS		Total
			no	yes	
Shared open space	not sure/ applicable	Count % within shared open space % within both priSHA OS % of Total	33 70.2% 42.9% 16.8%	14 29.8% 11.7% 7.1%	47 100.0% 23.9% 23.9%
	very dissatisfied	Count % within shared open space % within both priSHA OS % of Total	2 40.0% 2.6% 1.0%	3 60.0% 2.5% 1.5%	5 100.0% 2.5% 2.5%
	dissatisfied	Count % within shared open space % within both priSHA OS % of Total	4 23.5% 5.2% 2.0%	13 76.5% 10.8% 6.6%	17 100.0% 8.6% 8.6%
	neither satisfied nor disatified	Count % within shared open space % within both priSHA OS % of Total	10 20.0% 13.0% 5.1%	40 80.0% 33.3% 20.3%	50 100.0% 25.4% 25.4%
	satisfied	Count % within shared open space % within both priSHA OS % of Total	19 35.2% 24.7% 9.6%	35 64.8% 29.2% 17.8%	54 100.0% 27.4% 27.4%
	very satisfied	Count % within shared open space % within both priSHA OS % of Total	9 37.5% 11.7% 4.6%	15 62.5% 12.5% 7.6%	24 100.0% 12.2% 12.2%
Total		Count % within shared open space % within both priSHA OS % of Total	77 39.1% 100.0% 39.1%	120 60.9% 100.0% 60.9%	197 100.0% 100.0% 100.0%

Source: SPSS Output

APPENDIX N: Chi-Square test between Satisfaction with Shared open spaces and use of both private and shared open spaces

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	28.876[a]	5	.000
Likelihood Ratio	29.265	5	.000
Linear-by-Linear Association	13.889	1	.000
N of Valid Cases	197		

Source: SPSS output a. 2 cells (16.7%) have expected count less than 5. The minimum expected count is 1.95.

APPENDIX O: Correlation test between Satisfaction with open spaces (private and shared) and (1) nature of open spaces, (11) neighbourhood open spaces

		Private open space	Shared open space
1.	Characteristics	Spearman's rho correlation coefficient	
Usage type	Private open space only	0.241*	-0.035*
	Shared open space only	-0.463*	0.134
	Both private and shared open space	0.106	0.205*
Specific open space nature/type	Front yard/garden	0.205*	-0.289*
	Back yard/garden	0.401*	-0.118
	Side yard/garden	0.197*	-0.134
	Alleyway	0.075	0.070
	Parking space	0.093	-0.077
	Common access	-0.061	0.145*
	Others	0.111	0.097
II			
Neighbourhood open space satisfaction		0.149*	0.268*
*=Correlation is significant at 0.05level (2 tailed)			

Source: SPSS output

APPENDIX P: Correlation test between Satisfaction with shared open spaces and factors influencing the use of shared open spaces by households

		Shared open space
Factors influencing shared open space usage	Characteristics	Spearman's rho correlation coefficient
	Neighbour's behaviour	0.249*
	Weather condition	0.225*
	Available time	0.225*
	Degree of privacy	0.194*
	Open space design	0.130
	Others	0.022
*=Correlation is significant at 0.05level (2 tailed)		

Source: SPSS output

APPENDIX Q: Chi-Square test of private open space only (A) and shared open space only (B) and respondents' characteristics

Characteristics of the residents		Open space usage by respondents%			
		A%	X^2	B%	X^2
Gender	Male	37.2	5.846	29.6	1.164 ns
	Female	61.8	ns	70.4	
Age Group: years	20-29	7.8	15.402*	32.1	9.844 ns
	30-39	19.6		28.6	
	40-49	19.6		10.7	
	50-59	13.7		14.3	
	60-69	19.6		3.6	
	70 and above	19.6		10.7	
Employment Status	Full time	35.3	11.958	53.6	2.910 ns
	Part time	15.7	ns	21.4	
	Student	7.8		7.1	
	Unemployed	0		0	
	Self-employed	9.8		7.1	
	Looking after family	0		0	
	Retired	31.4		10.7	
	Other	0		0	
Tenure	Homeowner/landlord	70.6	2.982	39.3	13.695*
	Shared ownership	0	ns	3.6	
	Tenant	25.5		57.1	
	Rent free	3.9		0	
Duration in current house:	Less than 1.6	13.5	14.278*	50.0	11.116*
	1.7 - 5.0	15.4		25.0	
	5.1 - 20.3	32.3		10.7	
	20.31+	38.5		14.3	
Adults in the household	1	28.0	2.592	28.6	5.192 ns
	2	68.0	ns	53.6	
	3	4.0		10.7	
	4	0		7.1	
Children in the household	5 years or under 0	80.4	0.190	92.9	2.973 ns
	1	11.8		3.6	
	2	5.9		3.6	
	3	2.0		0	
	6-11 years 0	82.41	8.293*	100	3.282 ns
	1	1.8		0	
	2	3.9		0	
	3	2.0		0	
	12-18 years 0	88.2	5.827	96.4	1.729 ns
	1	9.8	ns	0	
	2	2.0		3.6	
	3	0		0	
Ethnic origin	White	89.6	2.952	82.1	7.951 ns
	Black/Black British	11.5	ns	7.1	
	Asian/Asian British	1.9		3.6	
	Mixed/Multiple	0		7.1	
	Chinese	0		0	
Source: SSPS Output X^2 = Pearson Chi square value, * = p significant at <0.05, ns = not significant, A= Private open space only, B= Shared Open space only					

Source: SPSS output

APPENDIX R: Chi-Square test between usage of both private and shared open spaces (C), and Neighbourhood open space (D) and respondents' characteristics.

Characteristics of the residents			Open space usage by respondents%			
			C%	X^2	D%	X^2
Gender	Male		32.5	3.029 ns	36.9	0.372 ns
	Female		66.7		62.0	
Age Group: years	20-29		13.6	10.312	15.9	13.252*
	30-39		38.1	ns	34.1	
	40-49		17.8		18.2	
	50-59		13.6		13.5	
	60-69		11.9		10.0	
	70 and above		5.1		8.2	
Employment Status	Full time		51.7	8.904 ns	51.2	10.480
	Part time		16.1		16.5	ns
	Student		5.1		6.5	
	Unemployed		0.8		0.6	
	Self-employed		6.8		7.1	
	Looking after family		4.2		2.4	
	Retired		14.4		15.3	
	Other		0.8		0.6	
Tenure	Homeowner/landlord		66.9	2.556 ns	65.3	2.527 ns
	Shared ownership		0.8		1.2	
	Tenant		28.0		29.4	
	Rent free		2.5		2.9	
Duration in current house:	Less than 1.6		25.9	3.525 ns	26.2	6.190 ns
	1.7 - 5.0		29.3		26.8	
	5.1 - 20.3		23.3		25.0	
	20.31+		21.6		22.0	
Adults in the household	1		28.0	0.272 ns	27.8	1.419 ns
	2		62.7		62.8	
	3		7.6		7.1	
	4		1.7		2.0	
Children in the household	5 years or under	0	79.7	1.106 ns	81.8	3.210 ns
		1	13.6		12.4	
		2	5.1		4.1	
		3	1.7		1.8	
	6-11 years	0	92.4	2.637 ns	91.8	14.837*
		1	4.2		6.5	
		2	3.4		1.8	
		3	0		0	
	12-18 years	0	95.8	1.942 ns	95.3	5.572 ns
		1	2.5		4.1	
		2	1.7		2.0	
		3	0		0	
Ethnic origin	White		91.46	3.539 ns	88.7	8.101 ns
	Black/Black British		.0		8.3	
	Asian/Asian British		0.9		0.6	
	Mixed/Multiple		0.9		1.8	
	Chinese		0.9		0.6	

Source: SSPS Output X^2 = Pearson Chi square value, * = p significant at <0.05, ns = not significant, C=Both private and shared Open space usage, D= Neighbourhood open space usage

Source: SPSS output

APPENDIX S: Chi-Square test between Satisfaction with open spaces and respondents' characteristics

Characteristics of the residents		Satisfaction with open spaces			
		E	F	G	H
Gender	Male Female	X	X	X	X
Age Group: years	20-29 30-39 40-49 50-59 60-69 70 and above	√	X	X	√
Employment Status	Full time Part time Student Unemployed Self-employed Looking after family Retired	√	√	√	√
Tenure	Homeowner/landlord Shared ownership Tenant Rent free	X	X	√	X
Duration in current house:	Less than 1.6 1.7 - 5.0 5.1 - 20.3 20.31+	X	√	X	√
Adults in the household	1 2 3 4	X	X	X	X
Children in the household	5 years or under 0 1 2 3	√	X	X	X
	6-11 years 0 1 2 3	X	X	X	√
	12-18 years 0 1 2 3	X	X	X	√
Ethnic origin	White Black/Black British Asian/Asian British Mixed/Multiple Chinese	X	X	X	√

Note: E- Usage of private open space only, F-Usage of shared open space only, G- Usage of both private and shared open spaces, H- Usage of neighbourhood open space. √ means p is significant at <0.05, and X means p is not significant.

APPENDIX T: Correlation test between open spaces (private and shared) and Benefits, spatial features and important features of open spaces to households

		Private open space	Shared open space
	Characteristics	Spearman's rho correlation coefficient	
Open space benefits	Relaxation/pleasure/restoration	0.039	0.034
	Reading in the sunlight	0.025	0.090
	Obtain vitamin D from the sunlight	-0.134	-0.069
	Socializing	0.067	0.046
	Promotion of family bonding	0.195*	0.043
	Increase community connection	0.056	0.090
	Promotion of physical activities	0.215 *	0.048
	Others	0.032	-0.119
Open spaces spatial attributes	Have sitting area in the open space	0.058	-0.089
	Have trees in the open space	0.259*	-0.080
	Have shrubs in the open space	0.149*	-0.171*
	Have fence/wall dividing space	-0.078	-0.096
	Have bins in the open space	-0.088	0.027
	Have lawn in the open space	0.205*	-0.020
	Have children play area space	0.157*	-0.065
	Have pond or water feature	0.140	-0.076
	Have barbeque in the open space	0.115	0.055
Important features of the open spaces to the households	Happy with sitting area	-0.030	0.025
	Happy with trees and shrubs	0.059	0.043
	Happy with lawn area	0.083	0.038
	Happy with children play	0.166*	-0.073
	Happy with water feature or pond	0.116	-0.017
	Happy with barbeque	0.139	0.087
	unhappy or annoyance associated with open space	-0.084	-0.010
	status of front garden	0.143	0.112
*=Correlation is significant at 0.05level (2 tailed)			

APPENDIX U: Chi-Square test between Features in the private or shared open spaces that respondents' households considered important and were happy with and Benefits of open spaces

Variable or description	% of participants that indicated of +ve/yes	Significant association with the benefits	
		private open spaces	shared open spaces
Sitting area in the private or shared open spaces are important to the household and happy with it	28.5	0.000	
Trees or and shrubs in the private or shared open spaces are important to the household and happy with them	22.5	9.494*	0.231
Lawn area in the private or shared open spaces are important to the household and happy with it	20.0	2.172	0.117
Children playing area in the private or shared open spaces are important to the household and happy with it	4.5	0.316	0.064
Pond or water feature in the private or shared open spaces are important to the household and happy with it	4.5	0.316	0.064
Barbecue in the private or shared open spaces are important to the household and happy with it	8.0	1.672	0.091
Having area or issue in the private or shared open spaces that are not interesting or causing annoyance to the household	17.0	0.356	0.056
The importance or otherwise of the front garden or yard to the household Not important or indifference Problematic or uninteresting Important and happy with	 96.0 1.2 2.5	 10.935 *	 **0.234

a= X^2 = Chi square Yates continuity correction value for 2x2
b= Phi coefficient
#= significant association with benefits of private and shared open spaces
**=Cramer's V coefficient with Pearson Chi Square value for 2x3
* = p significant at <0.05

Source: SPSS Output

APPENDIX V: Chi-square test of Benefits of open spaces and type of open spaces respondents have access to and use

			X^2	df	Phi coefficient
Use private open spaces only	26	74	*4.385	1	-0.161
Use shared open spaces only	14	86	2.133	1	0.091
Use both private and shared open spaces	60	40	*7.55	1	0.206

Note: For independence using Yates Continuity Correction shows there is significant association between the use of private open spaces only and both private and shared open spaces and benefits of open spaces. There was no significant association between the use of the shared open spaces only. The effect of the association is small for private open space only and medium for both private and shared open spaces applying Cohen' s criteria of 0.1 for small, 0.3 for medium and 0.5 for large (Pallant, 2013; Cohen, 1988).

Source: SPSS Output

APPENDIX W: Correlation test between Satisfaction with neighbourhood open spaces and usage of neighbourhood open spaces by households

Correlations Spearman's rho		
Walk dogs/pets	Correlation Coefficient	-.007
	Sig. (2-tailed)	.918
Go for walk/run	Correlation Coefficient	.238*
	Sig. (2-tailed)	.001
get away from day to day routine	Correlation Coefficient	.283*
	Sig. (2-tailed)	.000
Have opportunity to be outdoors	Correlation Coefficient	.243*
	Sig. (2-tailed)	.001
meet new people	Correlation Coefficient	.178*
	Sig. (2-tailed)	.012
use for educative purpose	Correlation Coefficient	.053
	Sig. (2-tailed)	.461
have bike ride/cycling	Correlation Coefficient	.084
	Sig. (2-tailed)	.239
play with my children	Correlation Coefficient	-.057
	Sig. (2-tailed)	.426
use as access route	Correlation Coefficient	.107
	Sig. (2-tailed)	.136
relax in natural setting	Correlation Coefficient	.271*
	Sig. (2-tailed)	.000
socialize or talk to neighbour	Correlation Coefficient	.153*
	Sig. (2-tailed)	.033
enjoy wildlife	Correlation Coefficient	.196*
	Sig. (2-tailed)	.006
time with relatives/friends	Correlation Coefficient	.273*
	Sig. (2-tailed)	.000
social events	Correlation Coefficient	.179*
	Sig. (2-tailed)	.012
use available recreational facilities	Correlation Coefficient	.189*
	Sig. (2-tailed)	.008
Grow own food/allotment	Correlation Coefficient	.113
	Sig. (2-tailed)	.115
others	Correlation Coefficient	-.097
	Sig. (2-tailed)	.174
N= 196, * =Correlation is significant at 0.05 level (2 tailed)		

Source: SPSS Output

APPENDIX X: Correlation test between Satisfaction with neighbourhood open spaces and factors influencing usage of neighbourhood open spaces by households

Correlations	Spearman's rho	
available time	Correlation Coefficient	*.342
	Sig. (2-tailed)	.000
open space design	Correlation Coefficient	*.303
	Sig. (2-tailed)	.000
Security condition/safety	Correlation Coefficient	*.283
	Sig. (2-tailed)	.000
State or condition of public open space/facilities	Correlation Coefficient	*.264
	Sig. (2-tailed)	.000
Satisfaction level with private or shared open space at home	Correlation Coefficient	*.253
	Sig. (2-tailed)	.000
weather condition	Correlation Coefficient	*.244
	Sig. (2-tailed)	.001
Need to socialize with others in the neighbourhood	Correlation Coefficient	*.237
	Sig. (2-tailed)	.001
distance/proximity to my house	Correlation Coefficient	*.195
	Sig. (2-tailed)	.006
Availability of amenities/ seats/equipment	Correlation Coefficient	*.161
	Sig. (2-tailed)	.024
Others	Correlation Coefficient	.074
	Sig. (2-tailed)	.306
N=196, * =Correlation is significant at 0.05 level (2 tailed)		

Source: SPSS Output