CHAPTER 5

The Measurement of Fertility in Keighley 1851-1881

"You ask me if it is possible to represent everything in scientific terms.

I answer, Well, it is possible but it is like expressing Beethoven's Ninth Symphony as an air pressure curve."

Albert Einstein.

Section 5.1: Introduction

In the preceding chapters the reasons for wishing to study marital fertility in Keighley over a thirty year period in the second half of the nineteenth century have been set out. Factors which may have been affecting fertility at that time and in that particular place have been examined and the sources of data utilised to illustrate our understanding of these factors have been catalogued.

The present chapter aims to report, analyse and discuss the measurement of marital fertility observed amongst the population of Keighley, 1851-1881, and has two foci of attention: the methods used in the calculation of the fertility figures, and the figures themselves. While protocol demands that these two elements should be treated separately it will be shown that, in Keighley at least, they were closely intertwined and therefore could not be meticulously compartmentalised.

As the main interest of this study lay in the relationship between textile work and fertility levels, when the population was sub-divided in order to compare fertility experiences within a population, the

divisions were based on occupation. Two sorts of distinction were made; firstly, by industrial sector (e.g. agriculture, metal work, textiles) and secondly, by skill-level. To all intents and purposes the latter represented social class although, following the Registrar General in the 1911 Census, textile workers were put into a class by themselves. The divisions, and the reasoning behind them, are discussed in greater detail in Appendix B.

Another factor which, it was considered, might be related to fertility levels was birthplace, different areas having differing norms of behaviour. The results of the calculations of fertility made on the basis of birthplace have not been included in this chapter, but may be found in Appendix C.

Previous studies (e.g. Hinde, 1985a; Smith, C.W., 1982) had considered changes in fertility behaviour by fitting age specific marital fertility (ASMF) schedules derived from the census returns of their study populations, against a set of standard schedules derived from a model designed by A.J. Coale (Coale, 1971) and further developed in collaboration with T.J.Trussell (Coale & Trussell, 1974, 1978). Here too use has been made of Coale's measures M and m, however, as it will be shown, certain of the assumptions basic to Coale and Trussell's model are breached by a population in which women do not necessarily enter the home immediately upon marriage, especially if that population is sub-divided in relation to women's occupational status. The implications of this for the interpretation of M and m are discussed below. In 1984 Hinde and Woods proposed that if, as they believed, Coale and Trussell's schedule was "not representative of certain regional natural fertility patterns amongst historical populations", then it would seem logical to "specify new schedules which (would)

approximate more closely to such patterns" (Hinde & Woods, 1984). They then proceeded to devise a new "British Standard" fertility schedule which they claimed would more closely approximate nineteenth century marital fertility levels, encompassing as it did populations with poorer nutritional levels and higher incidences of deficiency diseases than those used by Coale & Trussell. The opportunity has been taken in this thesis to compare the results obtained using both standard schedules in order to assess their applicability in the context of a nineteenth century Yorkshire mill town.

In order to calculate the marital fertility of the Keighley population and its various sub-groups the number of couples where the wife was pre-menopausal had to be identified, along with the number of their children under the age of 5. In order to standardise the fertility measures, only those couples where both partners were enumerated together on census night were to be included. Section 5.2 discusses the process of identification of the couples to be used in the calculation of the fertility measures and outlines some of the characteristics of the groups which they form.

Section 5.3 then considers Coale & Trussell's use of model schedules of marital fertility and some of the problems which arise. Hinde and Woods' "British Standard" schedule is discussed in Section 5.4.

In calculating ASMF rates (ASMFRs) allowance has to be made for living children not being enumerated with their parents and for children not living to be enumerated. Section 5.5 shows how these issues were approached in the course of this study.

Interpretation of the M and m measurements obtained is given in Section 5.6A and it is shown that these measures can be inadequate in

their indication of the use of fertility control in a population such as that in Keighley. Section 5.6B shifts the emphasis to the Total Marital Fertility Rate (TMFR), a further measure which can be derived from a population's ASMFRs, in a bid to better understand the behaviour patterns, not all of which are directly related to fertility, which underlie the levels of fertility observed within the study population.

Finally Section 5.7 puts forward some tentative conclusions which include a need for longitudinal data on the population. This, in turn, leads on to Chapter 6.

Section 5.2: Defining whose fertility was to be measured

In order to calculate marital fertility, those couples eligible for inclusion in such a measure first had to be identified. For each of the census data sets all women between the ages of 15 and 49 were located and categorised according to their marital status. The span 15-49 was taken as representing a woman's reproductive years but it should be noticed that, as the data was collected at certain "points in time", some women who would have been included in this age group at some time in the previous decade will have passed out of it by the date of the census. This only has bearing on the present exercise where a woman has had a child in her late 40s and then passed her fiftieth birthday in the five years previous to the census, which means, therefore, that the fertility span in fact ends, on average, at age 47.5. It would appear, in fact, that few women in Keighley had babies after their forty-fifth year, the census showing only a very small minority who did so. The same argument applies at the other end of the age span but at very young ages marital fertility is not an

appropriate measure. Thus only where many women continue to bear children into their late forties might the number of eligible couples, and therefore the true level of fertility, be underestimated.

Those women in the "married" category were further divided according to whether or not their husbands were present on census night. Further differentiation then took place as to whether a woman had any of her own children present with her or not. In order to carry this out all young children under the age of five were identified and, if possible, assigned to their mother, whatever her marital status. If a child was residing away from his or her parents on census night, if the mother was dead or absent from home, or if there was some doubt over the relationship between child and adult no assignment could be made and the child was placed in an "unallocatable" category. Simple though it sounds this procedure was full of snares. These merit further discussion as they illustrate both the limits of the data set and the difficulties of reducing complicated human existence to a few numbers.

For instance, take the situation where a young child was enumerated as the "child of the head of household" in a family where the "mother" appeared to have several daughters over 15 years old followed by a long childless gap before the child in question. Was this child an "after-thought" indicative of a mistake in, or deliberate stoppage of, otherwise unproven birth control or was he or she the illegitimate offspring of one of the older daughters? If the "mother" was less than 50 years old the child had to be considered as her child, unless evidence was provided to the contrary. Were she over 50 and no indication was given as to whether one of the daughters was, in fact, the real "mother", the child went "unallocated". Of course if the mother was 50 or over

at census but had been less than 50 at the birth of the child then the latter could have been an "own child". However, to include such women, few as they are, would inflate the figures for the 45-49 age group and affect the ASMFR calculations. This is one of the penalties of using "point in time" data to investigate "over time" phenomena. Although we are measuring the number of children a woman has had in the five years previous to the census we are consigning her to the age group to which she belongs at census. At a later stage in the calculations (see Section 5.6 below) adjustments are made using Sprague's Oscillatory Interpolation Equation to allow for this factor throughout the 15-49 age group. However, at this stage it means that children born to women in their late 40s in the five years before a census stand a decreasing chance of being included in "own child" measures, with the increase in their mother's age at the birth.Thus, if all children under age of five on census night are to be included in the measures, the "own child" ratio should include women in the 50-54 year age group. In populations where many women continue to bear children into their late 40s the true level of fertility may be underestimated for this reason.

A further problem concerning the allocation of children to mother was faced when a child was living with his or her paternal grandparents and the married son and daughter-in-law of the head of household. Is the "grandchild" the offspring of the younger married couple or of another absent married son or even of an absent, unmarried daughter? Unless evidence was provided to the contrary, as it was on occasion by the manner in which the household was listed, the child was allocated to the daughter-in-law present on census night. Other similar problems arose, but they were infrequent, and the solution was

the same, the child under five being allocated to the eligible married woman present unless this association could be disproved.

In Figure 5.1, Category A shows the complete classification of women aged 15-49 by marital status, presence or absence of husband and presence or absence of young children. Category B has been added to represent those children under the age of 5 on census night who could not be allocated to their mother.

The number of women in each of the nine categories at each census is displayed in Table 5.1.

As this study is interested specifically in marital fertility rates we must now discount all single women from the calculations. Further, there is no way of knowing, from the census returns, how long a widow has been bereaved and therefore whether or not her fertility might have differed had her husband survived. The women in groups 6-9, therefore, play no part in the calculation of the marital fertility measures.

The women in groups 2-5, although married, also have to be discounted. There is no way of gauging the length of the husband's absence. He may just have been away overnight or he may have been away "tramping" i.e. looking for work (Hobsbawm[1], 1950-51; Southall, 1982) leaving his wife and children in a town which offered them reliable employment. Lown, in her study of silk workers in Halstead, North Essex, also found evidence for such behaviour:

> "In a situation where stable employment for women was available but male employment was precarious it was not unusual for women to remain in the area while male kin went in search of a livelihood in other parts of the country. What is uncertain...is the amount and regularity of any contribution from the husband toward the maintenance of

Figure 5.1 The classification of women aged 15-49 by marital status, presence of husband on census night and presence of own children aged less than 5 on census night (A) and those children aged less than 5 who could not be allocated to their mother on census night (B).

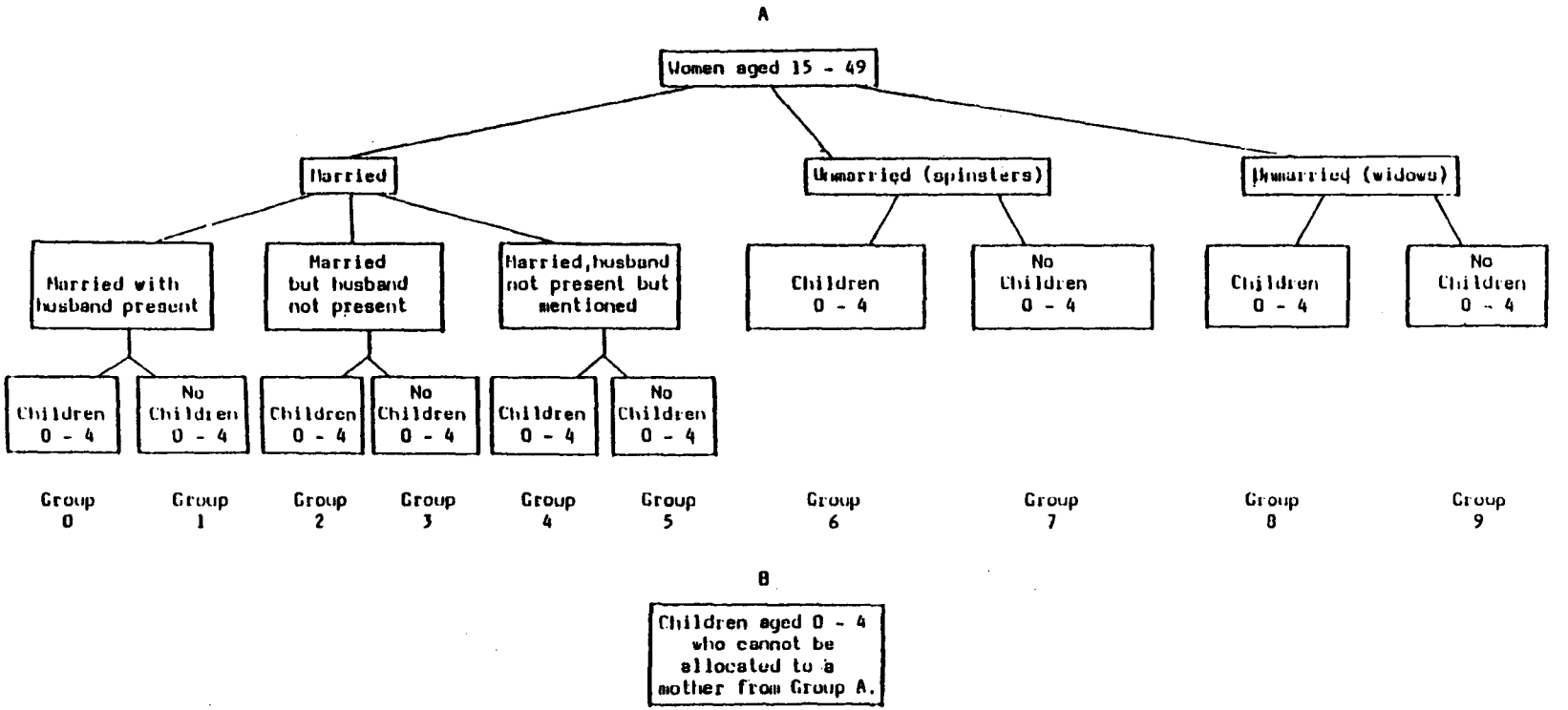


Table 5.1 Classification of women in the fertile age group (15-49 years) by marital status, presence of husband on census night and presence of own children under the age of 5 on census night. Keighley 1851-1881.

Category[1]	1851		1861		1871		1881	
	N	%	N	%	N	%	N	%
0	1011	24.3	1172	25.5	1615	26.9	2006	26.3
1	768	18.5	857	18.6	1221	20.3	1628	21.3
2	33	0.8	62	1.3	75	1.2	98	1.3
3	66	1.6	118	2.6	112	1.9	158	2.1
4			3	0.1	1	0.0	1	0.0
5			3	0.0				
6	19	0.4	20	0.4	22	0.4	32	0.4
7	2133	51.4	2214	48.2	2733	45.6	3432	44.9
8	28	0.7	32	0.7	43	0.7	49	0.6
9	94	2.3	113	2.4	176	2.9	234	3.1
Total	4152		4594		5998		7638	

Source: Census enumerators' books, Keighley 1851-1881

Notes: 1. The categories are defined in Figure 5.1

In 1851, 1861, 1871 & 1881 women aged 15-49 represented respectively 54.7%, 53.5%, 53.8% and 52.9% of all women.

the household which he had left."

(Lown, 1983, p. 303)

Certainly the relatively large increase in the number of women in groups 2-5 from 1851-1861 corresponds well with the dislocation of male woolcombers. Perhaps the strain of redundancy led to abnormal marital stress and, at a time when "divorce" was a very unlikely option, "separations" increased. The husband may have "absconded" possibly on the pretext of going on "the tramp", leaving the family "chargeable" to the local Poor Law Union. Notices offering rewards for information "as will lead to the conviction of any one of such offenders" were a regular feature in mid-century local newspapers.

"Stephen Thornton, aged 41, Slater" is listed in the 1851 Census as being a 36 year old slater, living with his wife Hannah who was not employed and remained at home to look after the couple's three children: William (aged 10), John (aged 8) and Margaret (aged less than 1 year). In 1856 Stephen was listed amongst the absconded husbands in the Keighley Advertiser and Airedale Courant (see Figure 4.5). In 1861 Stephen remained absent and Hannah, still returning herself as "married" in the census, was out working as a weaver. Her two sons were also out at work, one as a turner and one as a textile hand. Margaret does not appear to have survived the inter-censal period; she is not listed as being anywhere else in Keighley, but Hannah now had a two year old daughter, Ann. It is interesting to speculate, when trying to account for Ann's presence, whether Hannah had formed a new relationship (perhaps the reason for her husband's departure?), or resorted to prostitution to maintain the family for a while, or possibly received her husband back for an unspecified period. We cannot tell, therefore, whether Ann can be

included in a measure of marital fertility. Hannah, and other women in groups 2-5, have therefore been omitted from the following calculations.

In his 1971 article Coale remarks that "marital fertility below 20 is often influenced strongly by the frequency of pre-marital conception leading to marriage" (Coale, 1971, p. 206). The number of women married under the age of 20 in Keighley 1851-1881 was actually very small, so small as to invite the random element in human reproduction to play a large part in the ASMFR for this age group. The small numbers were also liable to hinder calculations of the other fertility measures by upsetting certain of the statistical techniques. For these reasons all wives aged 15-19 were dropped from further calculations.

The marital fertility rates were, thus, calculated using only these women in groups 0 and 1 in Figure 5.1, i.e. these women aged 20-49 who were married and whose husband was present on census night. Having identified a woman in a census for inclusion in the fertility measures, her record and that of her husband, both with the number of children-under-five present with them on census night appended, were removed from the main census data file (containing information on every individual present in the study area on whichever census night was being examined), and re-written to a new file. The smaller size of this new data file, named PARENTS, made manipulation and analysis of the data a much less computer-time consuming affair[2]. Once the PARENTS file had been sorted, to ensure that the proper husband and wife combinations[3] were listed, the two separate records for husband and wife were merged to form "couple" records, allowing characteristics of the wife to be cross-tabulated against characteristics of her

husband and vice versa.

A great body of literature exists concerning the "household" in past times (e.g. Laslett & Wall, 1972; Wall, Robin and Laslett, 1983). However in this study, while the role of household organisation is acknowledged as an important constraint on behaviour, to be further discussed in Chapter 6, the main focus here is on "the couple" as a reproductive unit, be they part of an extended household, a nuclear household or simply a conjugal unit. In this chapter we concentrate on the relationships between a couple's fertility and two attributes specific to the individuals involved: occupation and class.

It should be noted here that the analysis discussed below is based only on our knowledge of those couples who survived until census night and those who remained in Keighley until the same date. If mortality or migration are in any way class, age or fertility specific then the results may well be biased. Further discussion of the topic of bias is undertaken in the next chapter but here we must remember these limits to our interpretation.

With each couple now forming one record they could be classified according to the husband's occupation, the wife's occupation or by the combination of both occupations. Out of the populations recorded in the study area in the censuses of 1851, 1861, 1871 and 1881 (see Table 4.1) 1753, 2011, 2799 and 3591 couples respectively were identified as contributing towards marital fertility. Table 5.2A shows how these were broken down by husband's occupation (i.e. his industrial grouping (see Appendix B)). The trades excepting textiles and metal-mechanical work (TETMM) group, includes not only the five categories listed above it but also men in trades (e.g. food, mining) whose fertility could not be calculated separately because of

Table 5.2 The number of couples in each of the husband's occupational groups at each census when [A] the wife's occupation is not considered, [B] when the wife is a housewife and [C] when the wife is occupied outside the home.

Husband's Occupation	Wife's Occupation											
	A				B				C			
	1851	1861	1871	1881	1851	1861	1871	1881	1851	1861	1871	1881
All couples	1753	2011	2799	3591	1256	1359	2143	2922	496	652	656	669
Professional	47	49	70	84	44	45	69	82	3	4	1	2
White Collar	36	46	80	161	30	41	73	150	7	5	7	11
Shopkeeper	125	152	217	281	115	134	196	258	10	18	21	23
Transport	34	65	98	201	28	50	85	169	6	15	13	32
Clothing	110	110	104	111	85	81	87	92	25	29	17	19
Miscellaneous	75	90	126	166	61	69	99	139	14	21	27	27
Housing	145	188	348	395	105	127	292	325	40	61	56	70
Agriculture	113	126	77	79	79	76	52	53	34	50	25	26
TETMM	527	619	817	1059	395	437	657	874	132	182	160	185
Metal-mechanical	194	405	873	1179	155	290	638	956	39	115	235	223
Textiles	759	643	443	461	475	348	307	338	284	295	135	123
1.Overlooker	88	103	113	157	68	78	85	113	20	25	28	44
2.Woolsorter	64	69	88	79	50	39	67	61	14	30	21	18
3.Warpdresser	44	58	62	69	31	37	46	56	13	21	16	13
4.Woolcomber	419	228	30	25	246	105	21	17	173	123	9	8
5.Weaver	97	104	49	15	44	33	24	7	53	71	25	8
6.Special Textiles	34	54	78	84	27	37	48	58	7	17	30	26
Higher Status (1+2+3)	196	230	263	305	149	154	198	230	47	76	65	75
Lower Status (4+5+6+)	563	413	180	156	326	194	109	108	237	219	70	48

Source: Census enumerators' books, Keighley 1851-1881

Notes: 1. These figures, for the total number of couples where the wife was aged 20-49 and both spouses were present on census night, include men whose occupation could not be classified in the scheme used in this table. These included "general labourers", the unemployed and those who did not fill in the occupation column on their census return. Also included in the total figure, but not in the rest of the table, are servants, paupers and the retired. The total number of couples who contribute only to the total figures, and the percentage of those totals which they represent, are given below. The rise in the incidence of censally reported unemployment, plus the increasing number of "general labourers" over the study period is reflected by these figures.

	N	%
1851	65	3.7
1861	105	5.2
1871	299	10.7
1881	366	10.2

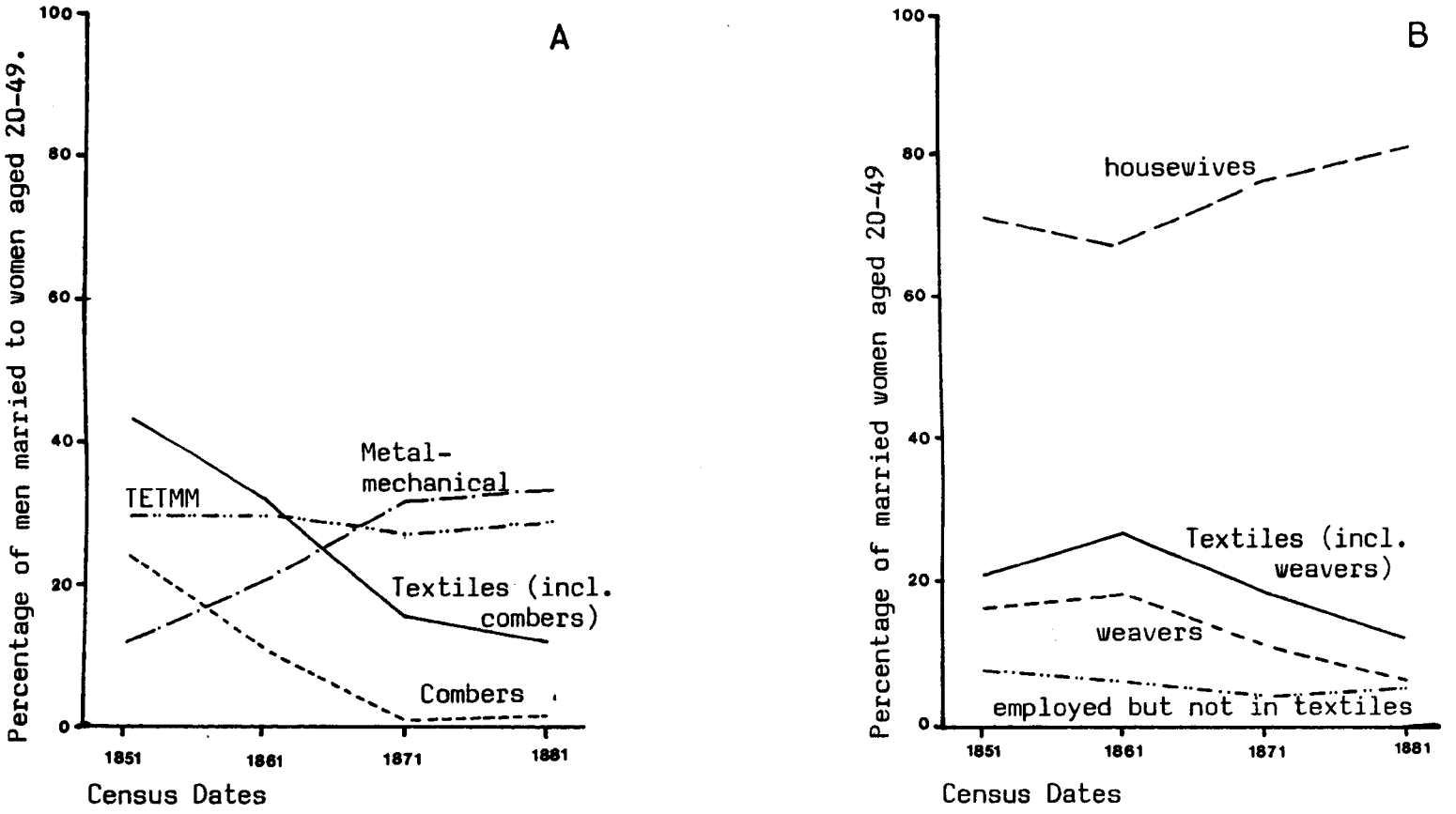
2. TETMM = Trades other than textiles and metal-mechanical work.
The TETMM occupational group includes men in employment categories, such as mining or the food trade, where the number of employees was too small to permit separate measures of fertility to be taken. The number of men in the TETMM group is, therefore, somewhat larger than the combined total of men in the five groups preceding it.
3. The over-all Textiles figures include all men working in textiles not just those in the six groups listed. The Lower Status Textile group includes all those in Textiles who are not in the Higher Status occupations.

the small size of their married workforce. The individual groups within the TETMM category were amalgamated to put them on a comparable scale with the two main employment groups: textiles and metal-mechanical work.

Note 1 to Table 5.2 explains the discrepancies between the total figures and the summation of the respective columns. From this it can be seen that a considerable proportion of the population at each census could not be allocated to an occupational sector and therefore only contributed to the fertility measures for the population as a whole. A large number of those in the "occupational sector unsure" category were returned as "general labourers". It is possible that if a trade were experiencing a slump at the time of the census and if consequently a relatively large proportion of the workforce were taking temporary jobs until the situation improved then the fertility measures calculated for that trade would be unrepresentative of men usually working in that trade. Unfortunately, this is one of the penalties incurred by use of census data.

Figure 5.2A illustrates the relative fortunes of the men, married to women aged between 20 and 49, in the three main industrial groups. Combers are included to show how great a part the decline in their numbers played in reducing the strength of the male textile workforce. This figure can be compared with that in Chapter 3 (Figure 3.10) where all economically active males were classified by industrial sector. For instance, the slowed rate of decline amongst the married textile men 1871-1881, compared with that amongst the total male workforce in textiles serves to emphasise just how many workers increased school attendance removed from the mills. The greatest difference between Figure 5.2B and Figure 3.10B.

Figure 5.2 The percentage of (A) men married to women aged 20-49 and of (B) married women aged 20-49 in certain occupations: Keighley 1851-1881.



Source: Census enumerators' books.

is the proportion of housewives. This category, not surprisingly accounts for a much larger proportion of the married women. The proportion of married women working outside the home looks comparatively small but represents between 1 in 4 and 1 in 3 married women of childbearing age. As we shall see, however, in certain age groups and amongst the wives of men in particular occupations the proportion of working wives could be much higher. Textiles was by far the most common occupation for married women, with the largest proportion of these being weavers. Of those employed but not in textiles the majority were clothing workers; dressmakers, milliners and the like.

While it had originally been hoped that a husband's occupational category could be subdivided by a wife's occupational category, the numbers involved dictated that from the latter only two subdivisions could be created: housewives and those employed outside the home. Tables 5.2B and C show the numbers involved while Table 5.3 gives the percentage of married men in each occupational category who had a working wife. The latter table suggests that married women's work peaked, in general, in 1861 and declined quite markedly,thereafter, an impression borne out by Figure 5.2B. It also indicates that many more working class husbands than middle class husbands had working wives and that textile workers were especially likely to have their wives out at work (see also Figure 3.13).

It should be remembered that all these remarks are based on data gathered from four points in time. If 33% of wives were working on census night this does not preclude the other 67% from working in the mills at some point in their lives - as, indeed, Chapter 3 shows the vast majority probably did. An expanding, contracting or static

Table 5.3 The number of couples in each of the husband's occupational groups where the wife is returned as being employed ([C] in Table 5.2) expressed as a percentage of the total number of couples in that group, Keighley 1851 - 1881.

Husband's Occupation	Wife in employment N				Percentage			
	1851	1861	1871	1881	1851	1861	1871	1881
All couples	496	652	656	669	28.3	32.4	23.4	18.6
Professional	3	4	1	2	6.4	8.4	1.4	2.4
White Collar	7	5	7	11	18.9	10.9	8.7	6.8
Shopkeeper	10	18	21	23	8.0	11.8	9.7	8.2
Transport	6	15	13	32	15.7	23.1	13.2	15.9
Clothing	25	29	17	19	22.7	26.4	16.3	17.1
Miscellaneous	14	21	27	27	18.7	23.3	21.4	16.3
Housing	40	61	56	70	27.6	32.1	16.1	17.7
Agriculture	34	50	25	26	25.3	33.7	16.1	16.1
TETMM	132	182	140	185	23.0	27.8	17.7	16.4
Metal-mechanical	39	115	235	223	20.1	28.4	26.9	18.9
Textiles	284	295	135	123	37.4	45.7	30.7	26.5
1.Overlooker	20	25	28	44	22.7	24.3	24.8	28.0
2.Woolsorter	14	30	21	18	21.9	43.5	23.9	22.8
3.Warpdresser	13	21	16	13	29.5	36.2	25.8	18.8
4.Woolcomber	173	123	9	8	41.3	53.7	30.0	32.0
5.Weaver	53	71	25	8	54.6	68.3	51.0	53.3
6.Special Textiles	7	17	30	26	20.6	31.5	38.5	30.9
Higher Status (1+2+3)	47	76	65	75	24.0	33.0	24.7	24.6
Lower Status (4+5+6+)	237	219	70	48	42.1	53.0	38.9	30.8

Source: Census enumerators' books, Keighley 1851-1881

Notes: 1. TETMM = Trades other than textiles or metal-mechanical work

2. See Note 3, Table 5.2.

number of jobs being filled by a constantly changing stream of work-hands when "caught" by the census looks far more stable in the "snap-shot" than is actually the case. The Clough's wages books, for instance, showed evidence of rapid turnover of labour (see Chapter 4, Section 4). The 1851 census's textile hands are not necessarily the 1861 census's textile hands, therefore change may take place because the actors change and not because the original individuals actually alter their behaviour. At this stage in the analysis, however, "occupation" is held constant, not the individuals. The effects of this on fertility measurement are discussed below.

When husbands' social class is considered (Table 5.4A) the expansion over time of all the other classes, at the expense of the textile workers, is obvious. As the footnote mentions, general labourers" could now be placed in the "unskilled" category and therefore the numbers omitted from classification are considerably reduced, especially at the two later censuses. With fewer divisions the numbers in each were large and thus, while housewife and working wife were again differentiated (see Table 5.4B & C), it was also possible to look at those working-class couples where the wife worked specifically in textiles. The proportion of working wives rises from Social Class I to Social Class V at every census (Table 5.5A). The very high proportion of Social Class V husbands whose wives were out at work, exceeding even that of the textile workers (see Figure 3.14 and accompanying text), gives credence to the belief that women went out to work out of financial necessity. Again in every class the peak census for wives employed was 1861. From Table 5.5B we can see, however, that if a textile worker's wife was out at work she was more likely than the wife of any other class of husband to be a textile

Table 5.4 The number of couples in each of the husband's "class" groups at each census when [A] the wife's occupation is not considered, [B] the wife is a house wife, [C] the wife is employed and [D] the wife is employed in textiles, Keighley 1851-1881.

Husband's Class	Wife's Occupation							
	A				B			
	1851	1861	1871	1881	1851	1861	1871	1881
I. Professional	47	49	70	84	44	45	69	82
II. Lower Middle Class	161	198	297	442	144	175	269	408
III. Skilled	217	276	448	673	177	222	377	578
IV. Semi-skilled	327	501	958	1168	251	358	748	951
V. Un-skilled	177	280	498	600	120	171	321	457
VI. Textiles	759	643	443	469	475	348	307	336
	C				D			
	1851	1861	1871	1881	1851	1861	1871	1881
I. Professional	3	4	1	2				
II. Lower Middle Class	17	23	28	34				
III. Skilled	40	54	71	95	21	34	54	64
IV. Semi-skilled	76	143	210	217	52	108	182	167
V. Un-skilled	57	109	177	143	40	102	158	115
VI. Textiles	284	295	135	123	245	282	120	109

Source: Census enumerators' books, Keighley, 1851-1881

Notes: Not all husbands could be assigned to a class, some being returned as simply "unemployed", "retired", etc., while in other cases the occupation column had been left blank in the enumerator's book. The numbers not included in the above table are:

	N	%
1851	65	3.7
1861	64	3.2
1871	85	3.0
1881	163	4.6

Table 5.5.A The percentage of husbands in each "class" whose wives work, Keighley 1851-1881.

Husband's Class	Percentage of wives working			
	1851	1861	1871	1881
I. Professional	6.4	8.2	1.4	2.4
II. Lower Middle Class	11.8	13.1	10.4	8.3
III. Skilled	22.6	24.3	18.8	16.4
IV. Semi-skilled	30.3	39.9	28.1	22.8
V. Unskilled	47.5	63.7	55.1	31.3
VI. Textiles	37.4	45.7	30.7	26.9

Table 5.5.B The percentage of men in each of the working class "classes" with working wives whose wives work in textiles, Keighley 1851-1881.

Husband's Class	Percentage of working wives working in textiles			
	1851	1861	1871	1881
III. Skilled	52.5	63.0	76.0	67.4
IV. Semi-skilled	68.4	75.5	86.7	76.9
V. Unskilled	70.2	93.6	89.3	80.4
VI. Textiles	86.3	95.9	88.2	87.9

Source: Census enumerators' books, Keighley 1851-1881.

worker (except in 1871 when this honour was marginally held by Social Class V). It would also appear that when the proportion of wives of men in Social Classes III and IV who went out to work began to drop 1861-1871, it was not the female textile workers who left work first, as a greater proportion of the wives who were working in 1871 were textile workers than had been the case in 1861.

If the husband's occupation is not considered (H.O.N.C.), certain female occupational categories contained sufficient married women to allow fertility measurements to be taken. So many married women in their fertile years were weavers that it was possible to subdivide this group by their husband's occupation and still retain categories large enough for measurements of fertility to be taken, thus allowing some more detailed intra-occupational comparisons. The numbers involved are listed in Table 5.6.

Each of the groups tabulated in Tables 5.2 to 5.6 was, where possible, to contribute to the analysis of fertility behaviour in Keighley, by providing data from which fertility indices could be derived. The next section discusses the indices used in this study and examines the calculations required to produce them.

Section 5.3: Model Schedules of Marital Fertility

In 1971 Coale proposed the idea of model schedules of marital fertility based on his discovery of "uniformity in the age pattern of proportions ever married" combined with the previously known "strongly typical" age pattern of marital fertility in populations in which deliberate birth control was, or is, not practised (Coale, 1971). Such "natural fertility", so named by Louis Henry (1961), has been much discussed (see, for example, Leridon & Menken, 1979)

Table 5.6 The number of couples in wife's employment groups with the husband employed in various occupations, Keighley 1851-1881. (For groups where the wife is a housewife see Table 5.2)

Wife's Occupation	Husband's Occupation	N			
		1851	1861	1871	1881
Textiles	Not considered	357	531	533	483
Weaver	Not considered	283	390	316	251
Weaver	Weaver	49	64		
Weaver	Comber	123	70		
Weaver	Lower status textiles	188	163	56	
Weaver	Metal-mechanical		75	113	77
Weaver	TETMM	49	99	65	79
Spinner	Not considered	12	26	49	46
Special textiles	Not considered	30	69	120	115
Employed but not in textiles	Not considered	138	122	123	186
Clothing	Not considered	50	56	56	73

Source: Census enumerators' books, Keighley 18551-1881.

Note: TETMM = Trades other than textiles or metal-mechanical work.

and cognisance taken of the fact that the level of "natural" fertility can vary from population to population and within populations over time as fecundability, sexual taboos, infant feeding practices and other social mores alter (see, for example, Knodel & Wilson, 1981). Coale's model was designed to take into account the fact that similar patterns of marriage could engender varying patterns of potential, if not actual, marital fertility. A model schedule for a population's marital fertility can be calculated from the equation:

$$r(a)/n(a) = M \exp(m.v(a))$$

where $r(a)$ is the age specific marital fertility rate (ASMFR) of age group 'a' in an observed age specific marital fertility schedule,

$n(a)$ is the ASMFR for age group 'a' in a standard schedule. This is usually taken as the marital fertility of a population which displays "natural fertility",

$v(a)$ is a function expressing the tendency for older women in populations practising contraception to effect particularly large reductions of fertility below the "natural" level ($n(a)$),

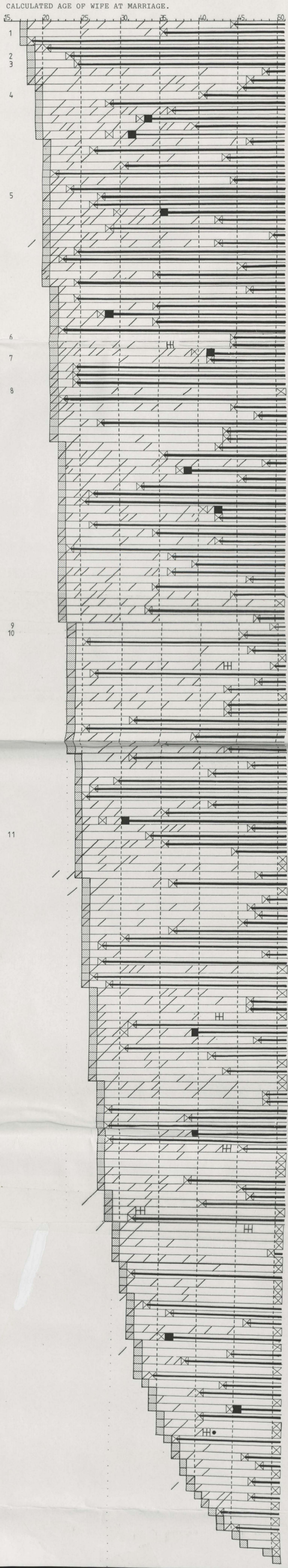
M is a scale factor related to the ratio $r(a)/n(a)$ at some chosen point, usually the age group 20-24,

m is "an expression of the degree of voluntary restriction in the observed schedule". (Hinde & Woods, 1984).

Originally Coale had used the fertility schedule of the Hutterite sect in the 1920s, one of the highest marital fertility schedules known, to provide the values of $n(a)$. However, in acknowledgement of the wide range of "natural fertility" levels to be found in historic populations, Coale & Trussell redefined the values of $n(a)$, for age groups from 20-24 to 45-49, by "calculating the arithmetical average of schedules designated by Henry as natural"(Coale & Trussell

Figure 6.16 Birth spacing by Mother's age at marriage, couples married 1851-1861, traced from Registrar's Indexes of Marriage for Keighley to the 1861 census and beyond.

Key: as for Figure 6.13.



1974). (The corresponding values for v(a) were calculated from schedules listed in the United Nations Demographic Yearbook for 1965). The resultant schedule, listed in Table 5.7 has now been dubbed the Coale & Trussell Standard Schedule. The degree of "voluntary restriction" practised by a population and indicated by the value of m had to be calibrated. Coale & Trussell (1978) set m of a value of 0.2 or greater as indicating that married couples within a population were controlling their fertility in a parity specific way.

Equation 1 can be re-expressed as

$$\ln r(a)/n(a) = \ln M + m.v(a) \qquad (2)$$

which, in turn, can be rendered in the form of the regression

$$Y = a + bx \qquad (3)$$

(Coale & Trussell, 1978).

Once the values of r(a) are known for a study population we can then insert X (i.e. v(a)) and Y (i.e.ln r(a)/n(a)) in equation 3 above. The next step is to calculate a and b using the formula

$$y - \bar{y} = r.\frac{\sigma y}{\sigma x}.(x - \bar{x}) \qquad (4)$$

where $\bar{y}$ = mean of all Ys.

r = correlation co-efficient of points (X, Y) when plotted on a graph

σy = standard deviation of all Ys.

M and m can thus be calculated for a particular population. It should be noted that, using the above method, M is not solely dependant on the level of fertility in the 20-24 age group but is affected by the assumption that there is no fertility limitation practised by this age group, i.e. v(20-24) is taken to be 0.00.

A problem of using this regression approach occurs when an age

Table 5.7 The parameters n(a) and v(a) used by Coale & Trussell in their Standard Schedule of Marital Fertility.

Age Group	n(a)	v(a)
20-24	0.460	0.000
25-29	0.431	-0.279
30-34	0.395	-0.667
35-39	0.322	-1.042
40-44	0.167	-1.414
45-49	0.024	-1.671

Source: Coale, A.J. & Trussell, T.J. (1978) "Technical Note: Finding the Two Parameters that Specify a Model Scedule of Marital Fertility." Population Index; 44. pp 203-213

group has no members in it. In an overall population this could only occur in very exceptional circumstances but where a population has been subdivided in such a way that some of the sub-groups are age selective, certain age groups may be devoid of members. Four examples occurred in Keighley; of the 75 female weavers married to metal-mechanical workers in 1861, the 99 weavers married to men in TETMM in 1861, the 49 weavers married to TETMM workers and the 52 textile workers married to semi-skilled men in 1851 none were aged 45-49. In cases such as these neither a full ASMFR schedule nor any of the other fertility measures could be calculated.

Coale & Trussell, on the other hand, noted that problems with the procedure would arise if any r(a) values were zero as the logarithm of zero cannot be defined. In the present study this was not a frequent occurrence and when it did appear it was confined to the two oldest age groups. In these cases a very "small fraction of a child" was inserted in order that r(a)/n(a) would not equal zero. It also allowed inflation factors to be applied to "reinstate" children belonging to mothers in these age groups who may have died in the five years preceding the census (see Section 5.5 below), a quite possible occurrence, given that all parities of birth are subject to high degrees of risk of early death when the mother is over 40 years of age (World Health Organisation, 1978). The insertion of the fraction should, therefore, have minimal effect on the overall fertility measures but it does occasionally produce rather peculiar age specific marital fertility rates. Indeed, Coale & Trussell suggest that calculations of the regression equation should omit X and Y for the 45-49 age group as the number of women having children in this age group is usually relatively small and

therefore one or two atypical fertility levels can seriously affect the regression equation. This advice was followed in the calculations reported here as the incidence of r(a) being zero was highest in the 45-49 age group, the alterations made were not reflected in the level of M and m.

The regression line $\ln (r(a)/n(a)) = \ln M + m.v(a)$, once M and m have been calculated, can be seen as the model marital fertility schedule for the population in question as n(a) and v(a) are set for each age group and M and m are set for the population therefore the only varying factor is r(a). A gauge of how well the ASMF schedule of the observed population fits that predicted for it by Coale & Trussell's model can, therefore, be gained by calculating the mean square error term (MSE):

$$\sum (\ln r(a) - \ln \hat{r}(a))^2/n$$

where n = number of points used to fit the regression line, i.e. the number of age groups involved: 5

$r(a)$ = actual ASMFR for observed population in age group 'a'.

$\hat{r}(a)$ = predicted ASMFR for observed population in age group 'a'.

Coale & Trussell state that

> "A mean square error value of zero indicates a perfect fit...a value of 0.005 indicates a mediocre fit and a value of 0.01 indicates a terrible fit."
>
> (Coale & Trussell, 1978).

For convenience MSE will be reported here multiplied by one thousand ($x10^3$). Thus an MSE$x10^3$ of 5 represents a mediocre fit while one of 10 is a terrible fit.

Before interpretation of M, m and MSE is carried any further, however, criticism of the above model should be noted and the method

of calculating the ASMFR curves for the study population and its sub-divisions should be described and discussed.

Section 5.4: Modifications to Coale & Trussell's Standard Schedule

The discussion so far has centred around the standard fertility schedule of Coale & Trussell. However, in 1984 Hinde and Woods suggested that the populations from which Coale & Trussell calculated n(a) and v(a) could not be considered representative of late nineteenth century England. They showed, as has Wilson (1984), that natural fertility levels in England had been lower than the European, and especially the French, average well before industrialisation. This, they suggest, might have been related to the prevalence of debilitating diseases such as tuberculosis and rickets in England. If this is true then English urban areas during the late nineteenth century may very well have had natural fertility levels even lower than the contemporary national average as these two particular ailments hit particularly hard in the industrial cities and towns (Cronjé, 1902; Dubos & Dubos, 1953; Rosen, 1973). Hinde and Woods argue that:

> "if a model is to be used to test for the presence of family limitation, it is important that the standard chosen n(a), should represent the pre-control pattern of fertility in the particular population under study and that the schedule of deviations from that pattern v(a) should conform to the expected course of fertility control in that population".
>
> (Hinde & Woods, 1984, p. 315)

They, therefore, recalculated n(a) and v(a) using populations different from those of Coale & Trussell which, they believe, are more closely representative of late nineteenth century natural fertility levels in England and Wales. They have dubbed their new natural

fertility standard "the British Standard" as it includes data from Scotland. Table 5.8 gives n(a) and v(a) for the British Standard to allow comparison with Table 5.7. Figure 5.3 compares the two standard schedules visually.

It can be seen that the new standard schedule starts at a level lower than that of Coale & Trussell: and that the decrease in level of fertility with age is considerably more rapid up to the age of 30 in the former than in the latter. The rate of decline in the later age groups is not so rapid according to the British Standard, as it is in the case of its predecessor. If the ASMFR for age group 20-24 is set to 100 and the fertility rates of the other age groups are set in proportion to this (see Figure 5.4) then it becomes apparent that Coale & Trussell's standard populations were considerably more fertile, especially in their 30s than the "British population" apparently were. The levels of v(a) are therefore considerably lower in the British Standard than in Coale & Trussell's standard population as the reduction in fertility required to reach the levels of a controlling population was not so great.

Hinde and Woods also argue that Coale and Trussell's designation of an m value of 0.2 or more to indicate parity specific marital fertility control is not sufficiently stringent, given the variations which can be found in this measure for populations with "natural fertility". (Hinde & Woods, 1984).

They suggest that an m value of 0.3 or more would be a more certain indicator of the practice of fertility limitation when using Coale & Trussell's data whereas a value of 0.25 or more when using the British Standard, given its greater sensitivity in the British context would indicate the same. The authors agree, however, that where time

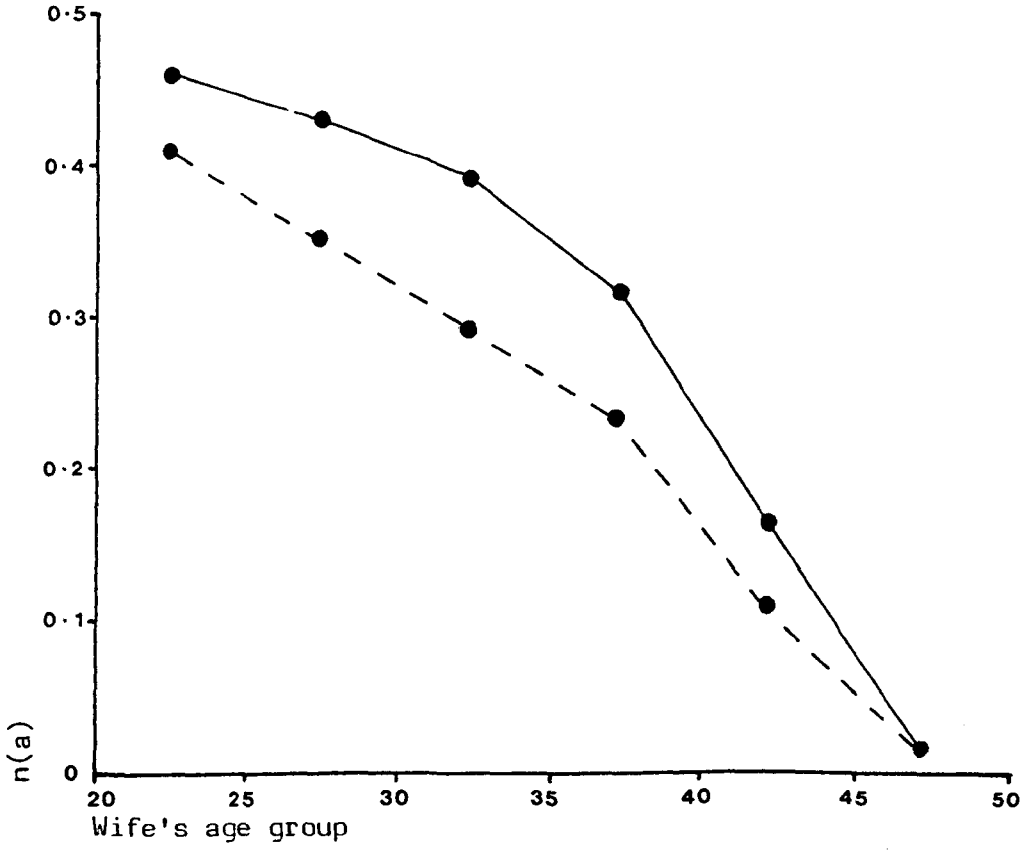
Table 5.8 The parameters n(a) and v(a) used by Hinde & Woods in their British Standard Schedule of Marital Fertility.

Age Group	n(a)	v(a)
20-24	0.409	0.000
25-29	0.356	-0.156
30-34	0.295	-0.307
35-39	0.238	-0.496
40-44	0.115	-0.641
45-49	0.021	**

Source: Hinde, P.R.A. & Woods, R.I. (1984) "Variations in Historical Natural Fertility Patterns and the Measurement of Fertility Control." Jnl. of Biosocial Science; 1,6. pp 309-321.

Note: ** Not calculated. (see above reference).

Figure 5.3 The standard age specific marital fertility schedules (n(a)) of Coale and Trussell and Hinde and Woods.

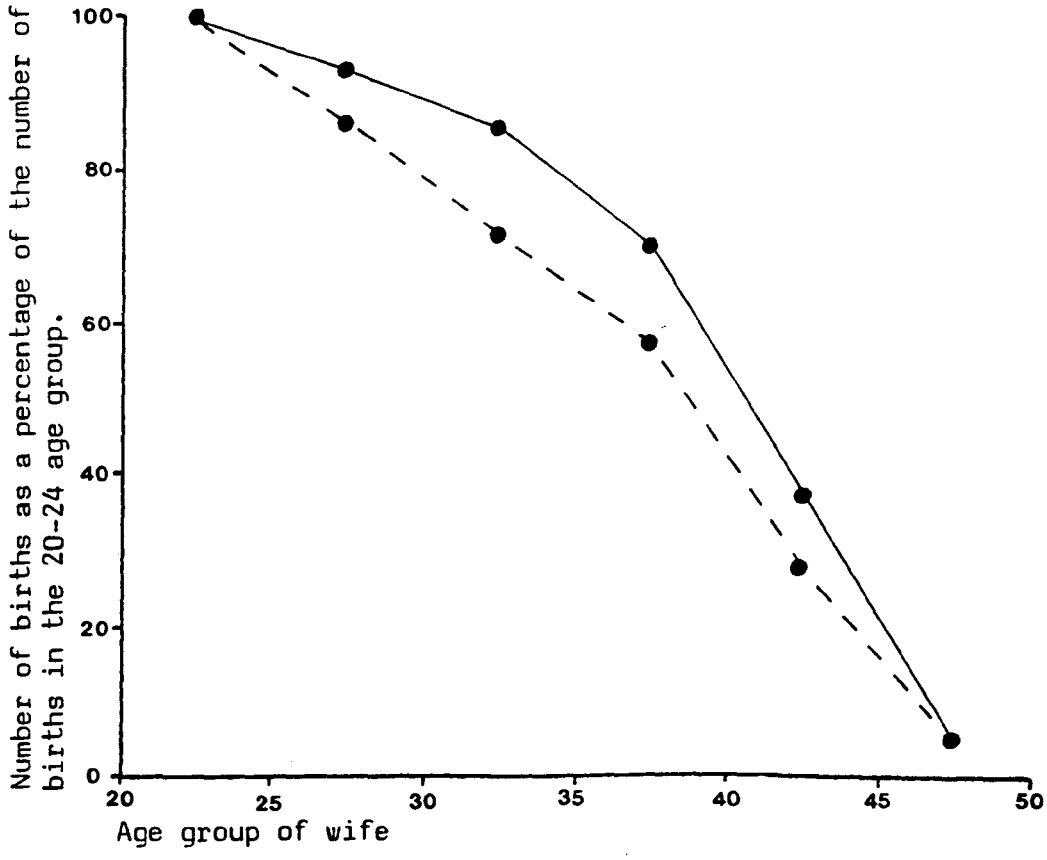


Coale and Trussell Standard.

Hinde and Woods "British" Standard.

For sources see text.

Figure 5.4 The Coale-Trussell and British Standard Schedules: number of births per age group relative to the ASMFR for the 20-24 year age group when this is set to 100.



Key: Coale and Trussell Standard

Hinde and Woods "British" Standard.

For sources see text.

series data is available then an upward trend in the value of m would be the surest means of detecting increasing uptake of birth control.

As several authors have used the Coale-Trussell Standard in their work (Woods & Smith, 1983; Wilson, 1984; Knodel & Wilson, 1981; Hinde, 1985) the results reported here should be comparable with theirs. However, the chance has been taken here to compare the performance of their model with that of the Hinde & Woods model when applied to late nineteenth century British industrial populations. Calculations have therefore been carried out using both standard schedules and where appropriate in the following sections, the two sets of results have been reported.

Section 5.5: Calculating Age Specific Marital Fertility Rates from the Census Enumerators' Books

It has already been shown how couples to be included in the calculation of the fertility measures were identified, and the number of their own, under 5 year old, children present with them on census night tabulated. In order that ASMFRs might be computed, all the couples in a particular group were divided by the wife's age at census into six classes: 20-24, 25-29, 30-34, 35-39, 40-44 and 45-49 year olds. It was then possible, with the aid of the Statistical Package for the Social Sciences (SPSS) to calculate on the computer cross-tabulations of "age of wife" by "number of own children aged less than five" for whichever occupational or class grouping was being considered. Table 5.9 shows one of the resultant tabulations.

The number of wives in each of the six age groups and the corresponding numbers of own children are then entered into a programme entitled FERTILITY, designed by P.R.A. Hinde for use on a PET micro-

Table 5.9 A crosstabulation of wife's age by number of own children under 5 years old present on census night, Keighley 1851.[1]

Wife's Age[2]	Number of own children aged <5 present on census night				Total number of couples	Total number of children
	0	1	2	3		
20-24	50	42	18	6	116	96
25-29	44	70	47	4	165	176
30-34	47	44	36	4	131	128
35-39	48	45	36	7	136	138
40-44	57	25	22	1	105	72
45-49	78	22	5	1	106	35

Source: Census enumerators' books, Keighley 1851.

Notes: 1. The tabulation is for those couples where the husband is in textiles and the wife's occuption is not considered.

2. Couples where the wife was aged less than 20 were not included in the calculations of the fertility measures and therefore have not been shown in this table.

computer following guidelines laid out by Coale & Trussell (Hinde 1985a). For each group observed the programme first converts the child-woman ratios by age-of-wife-at-census into age specific marital fertility rates (ASMFRs) by age-of-wife-at-birth-of-child, using Sprague's Osculatory Interpolation Formula (Grabill & Cho, 1965; Shryock & Seigel, 1976). It then goes on to calculate the total marital fertility rate, or TMFR, (that is; the number of children a woman could expect to have if she married aged 20 and proceeded through her childbearing years experiencing the same ASMFR in each five year age band as those women in the observed population)[4] for the given group. Finally it computes the values of M, m and MSE against both the Coale & Trussell Standard schedule and the British Standard schedule. The figures produced by the programme for the various subdivisions of Keighley's population, and their interpretation are presented in Section 5.6 below.

Before the ASMFRs could be calculated, however, the number of children included in the child-woman ratios had to be adjusted to take account of, firstly, those children who were alive on census night but who were not enumerated with their parents and, secondly, of those children who had been born alive, to the couples involved, during the five years prior to the census but who had died before they could be enumerated. Sub-sections 5.5A and 5.5B discuss in turn how the two correction factors were calculated to adjust observed numbers of children to include an estimation of their unobserved siblings in the fertility measures calculated by the FERTILITY programme.

Section 5.5A: How many live children were missed from the child-woman ratios?

Of all the children, under the age of five, enumerated within the Keighley study area, at least 85 per cent at each census were returned as living with both their father and their mother (Table 5.10). The remaining percentage could be divided into those children who were

Table 5.10 Allocation of children under age 5 to mothers aged 15-49, Keighley 1851-1881. The number of children in different categories and their percentage of the total number of children aged less than 5.

Date	Total no. Children aged < 5	1 No. of children aged < 5 allocated to mothers in Group A1, Fig. 5.1		2 No. of children aged < 5 allocated to mothers in Groups A2-9 Fig. 5.1		3 No. of children aged < 5 in Group B, Fig. 5.1		4 No. of children aged < 5 not included in fertility analysis (Col.2 + Col.3)	
		N	%	N	%	N	%	N	%
1851	1785	1531	85.8	102	5.7	164	9.2	266	14.9
1861	2044	1766	86.4	142	6.9	136	6.6	278	13.6
1871	2782	2466	88.6	166	6.0	150	5.4	316	11.3
1881	3568	3139	88.0	240	6.7	189	5.3	429	12.0

Source: Census enumerators' books, Keighley 1851-1881.

Notes: 1. These children were enumerated with both their parents on census night.

2. These children were enumerated with their mother only on census night.

3. These children were not with their mother on census night, or their mother could not be identified as resident in the same household.

4. A further small percentage of children would not appear in the fertility measures because their mothers were aged 15-29. This age gruop was not included in the calculations of M, m and MSE.

allocated to their mother but not their father and those who could not be allocated to their mother. As Table 5.10 shows the former category comprised 5.2% of all children in 1851 and 6.6-6.9% 1861-1881. If we return to Table 5.1 the increase in "fatherless" children would appear to stem from the greater number of women in groups 2-5, i.e. women returned as "married" although their husbands were absent on census night, as discussed above (Section 5.2).

Conversely, the proportion of children who could not be allocated to their mother was high in 1851 and declined over the succeeding two censuses, to rise slightly again in 1881. Speculation about the reasons for this is more difficult. Perhaps the old habit of "boarding out" children with relatives if space became too restricted at home (Thompson, 1945) was falling into disfavour. Maybe in times of "trouble", such as employment crises, relatives were less willing to take extra mouths into their homes. Possibly, the habit did not diminish but older children were boarded out rather than the very young ones. Maybe population change meant that fewer young couples had relatives in the neighbourhood with whom young children could stay.

Table 5.11A describes the status of the "unallocated" children in the 1851 Census and shows that the great majority were staying with their grandparents. 13 of the children (i.e. 0.7% of all the children under 5) were living with widowed fathers but we cannot tell how many of the "grandchildren", "relatives", "visitors", or "lodgers" were also orphans. An attempt was made to trace the 155 children "unallocated" in the 1851 Census in the 1861 Census to see how many did have parents living in Keighley. Table 5.11B displays the results. Unfortunately rapid population turnover coupled with high child mortality resulted in less than half of the children being traced. Of the 64 who had

Table 5.11.A Status of children aged < 5 unallocated to their mother in the household in which they were living. Keighley, 1851 & 1871. The number of children in each situation and the percentage they form of all unallocated children aged < 5.

Relationship to Head of Household	1851		1871	
	N	%	N	%
Child	24	14.6	38	25.3
Stepchild	3	1.8	11	7.3
Grandchild	84	51.2	57	40.0
Nephew/niece	21	12.8	24	14.7
Visitor (unaccompanied)	11	6.7	3	2.0
Lodger (unaccompanied)	8	4.9	10	6.0
Other	13	7.9	7	4.7
Total	164		150	

Notes: 1. 15 of these were the children of widowed fathers, in 7 cases the "mother" was over 50 and therefore assumed to have been too old to bear the child (see text), and in 2 cases although the father reported himself married the mother was not at home on census night.

2. 17 of these were the children of widowed fathers, in 13 cases the "mother" was over 50 , and in the other 8 cases although the father was married the mother was absent on census night.

Table 5.11.B What became of the 164 children aged < 5 unallocated to their mother in the 1851 census when an attempt was made to trace them in the 1861 census.

Outcome of tracing	N	% of the 164
Could not be traced in the 1861 census	103	62.8
Did not require tracing as they were the children of men recently widowed in 1851	15	9.1
Had been reunited with their parents by 1861	11	6.7
Were acknowledged as illegitimate in the 1861 census	9	5.5
Were still with members of the household in which they were living in 1851 in 1861, still no identifiable parents present	19	11.6
Were found living with people different from their 1851 household in 1861, but not with their parents	3	1.8
Were found in 1861 with one or other parent, but the latter's marital status in 1851 could not be ascertained	4	2.4

Source: Census enumerators' books, Keighley 1851 & 1871
Nominal record linkage of census enumerators' books, Keighley 1851-1861.

survived and remained in the study area for the decade, 11 had been reunited with their parents who, a check in the 1851 file revealed, had been staying elsewhere in Keighley on census night, 1851. A further 26 children, however, remained away from their parents, either as part of the household in which they were found 10 years earlier or elsewhere in the town. It cannot be told from the enumerators' books whether these children were indeed orphans, or whether they were the illegitimate offspring of one of the daughters present in the household of 1851, as had been shown to be true in 8 cases, or whether some other reason existed for their separation from their parents.

Table 5.11A also lists the household status of the 158 children unallocated to their mothers in 1871 for comparison with the 1851 data. Although the numbers are small, two points are striking. Firstly, the increase in the number of children in the "child" category. Three times as many "mothers" were over age 50 in 1871 as in 1851 (see Notes 1 and 2, Table 5.11). Does this indicate that more women were having, in their late forties, children who were surviving longer, or does it indicate a greater number of people trying to hide an illegitimacy or, in fact, a greater willingness to accept an illegitimate infant into the family? We cannot tell. In 1871 a new category has appeared: married men, with young children, without wives. Were wives enjoying greater freedom to spend days away from home or were they more willing, or able, to leave their husbands rather than their husbands leave them?

Secondly, the marked decrease in the number of children staying with their grandparents stands out. Perhaps this does indeed show, as postulated above, that the influx of migrants into the town meant that more families were further removed from parents' parents. Figures shown in Chapter 3 (Table 3.6) indicated that between 1861 and

1871 the percentage of Keighley-Bingley born husbands and wives in the study area saw quite a marked decline and the "incomers" were mainly from outside Yorkshire; although as Lancashire was just "a step up the road" this could have been an influx from towns hit hard by the cotton famines. Still grandparents may have been several days' journey away.

This raised the question of how many children were actually staying outside the study area while their parents were recorded within it on census night? And how many children had the enumerator accidentally missed out altogether?

As part of the nominal record linkage exercise reported in Chapter 6, a group of families was identified and followed over the study period. From this data the likelihood of a young child being missing from the census can be approximated. For each census 1851-1871 all couples where the wife was aged 20-29 were identified and traced to the succeeding census and, if possible, beyond. As interest lay only with those couples who had recently started their family, amongst those couples where the wife was aged 25-29 only those couples where there were no children aged 5 or over were included. This, of course, was subject to error if the couple had had an older child but it had died before the census but this limitation had to be accepted. Obviously, this is not a representative sample of all couples included in the fertility measures: it covers both young women with their first children, who it might be thought, would be least willing to "farm out" their new charges,[5] while also including the highest proportion of working mothers (see Table 5.18) with the greatest need of someone to look after their offspring. However, to marshall a more representative sample would be very time consuming and might possibly yield fewer returns than the work would justify. Of the 492 couples picked out

from the 1851 Census, 206 (i.e. 42%) could be traced in the 1861 Census. These couples had, altogether 195 children enumerated with them in 1851. However, by 1861, 208 children who, given their ages, should have been enumerated in 1851 were returned by the same couples. Thus at least 13 children were "missing" from their families' census returns in 1851;[6] there may have been more as if a missing child had died in the intervening decade he would not appear to register his 1851 absence in 1861. Perhaps, by chance, a child may also have been away from home on both census nights. In 1851, therefore, 6.25% of the children who should have been enumerated with their parents were missing. This seems to be a relatively high figure; the exercise was repeated for the 1861 and 1871 censuses and the percentage of "missing" children was 3.1% and 2.8% respectively. Even when these figures are inflated to allow for "still missing in the following census" children, and, as Haines (1979) suggests, some adjustment is made for the misreporting of children's ages the discrepancy between the 1851 and 1861 and 1871 figures still remains.

Haines (1979), among others, "in the absence of any firm information" assumed that 5% of children were missing from the returns of their parental home. It was decided to ascribe this figure to the returns of 1861 and 1871 for Keighley but to enlarge the figure to 7% for 1851 in light of the findings reported. As no figures were available for 1881 it was assumed that there too 5% of own children would be missing. These figures may, in fact, underestimate the number of "missing" children in 1851 and overestimate them in the later years. However, any difference in the figures will, therefore, be a minimum rather than an overstated maximum.

Having estimated a correction factor for missing live children

one must now be found to allow for these children who died before they could be recorded in the census.

Section 5.5B: How many children did not live to be enumerated?

Those children who had been born to couples involved in the fertility measures during the five years preceding the census but who had not survived to be enumerated had to be accounted for within the calculations of the FERTILITY programme. A mortality inflation factor $\underline{K}^*$, was required. This would be calculated using the equation:

$$\underline{K}^* = \frac{(5 \times l_o)m + (5 \times l_o)f}{({}_1L_o + {}_4L_1)\underline{m} + ({}_1L_o + {}_4L_1)f} = \frac{5l_o}{{}_5L_o} \qquad (6)$$

where l_o = number of children born alive (taken from a life table population)

${}_nL_x$ = the average number of persons alive aged x to x+n in completed years. Because of the much greater chance of death in the first year it is best to calculate ${}_1L_o$ and ${}_4L_1$ separately.

m,f signify where separate calculations have been made for males and females respectively to allow for differences in numbers born and expectation of survival at a given age.

In order to work out this equation while faced with a distinct paucity of data, several contortions had to be made.

Life tables for 1861 exist at R.D. level (Woods, 1982b)[7] but Keighley R.D. covered a much larger and more diverse population than the urbanised study area (see Figure and Table 4.1). For the whole R.D. in 1861 life expectation for women was 38.75 years and 38.12 years for men. This compares with 46.35 years for women and 44.02 years for men in the almost totally "rural" R.D. of Pateley Bridge and 37.64 years for women and 35.86 years for men in Bradford, an almost totally urban R.D.

In his 1855 report to the General Board of Health, William Ranger showed that between 1849 and 1853 in an area within "one mile radius from the centre of Keighley" the deaths of children under 5 contributed 42-52% of all deaths (Ranger, 1855). The designated area included about 90 per cent of the study population and therefore Ranger's figures are liable to be more representative than those at the R.D. level of the mortality rates within the study area.

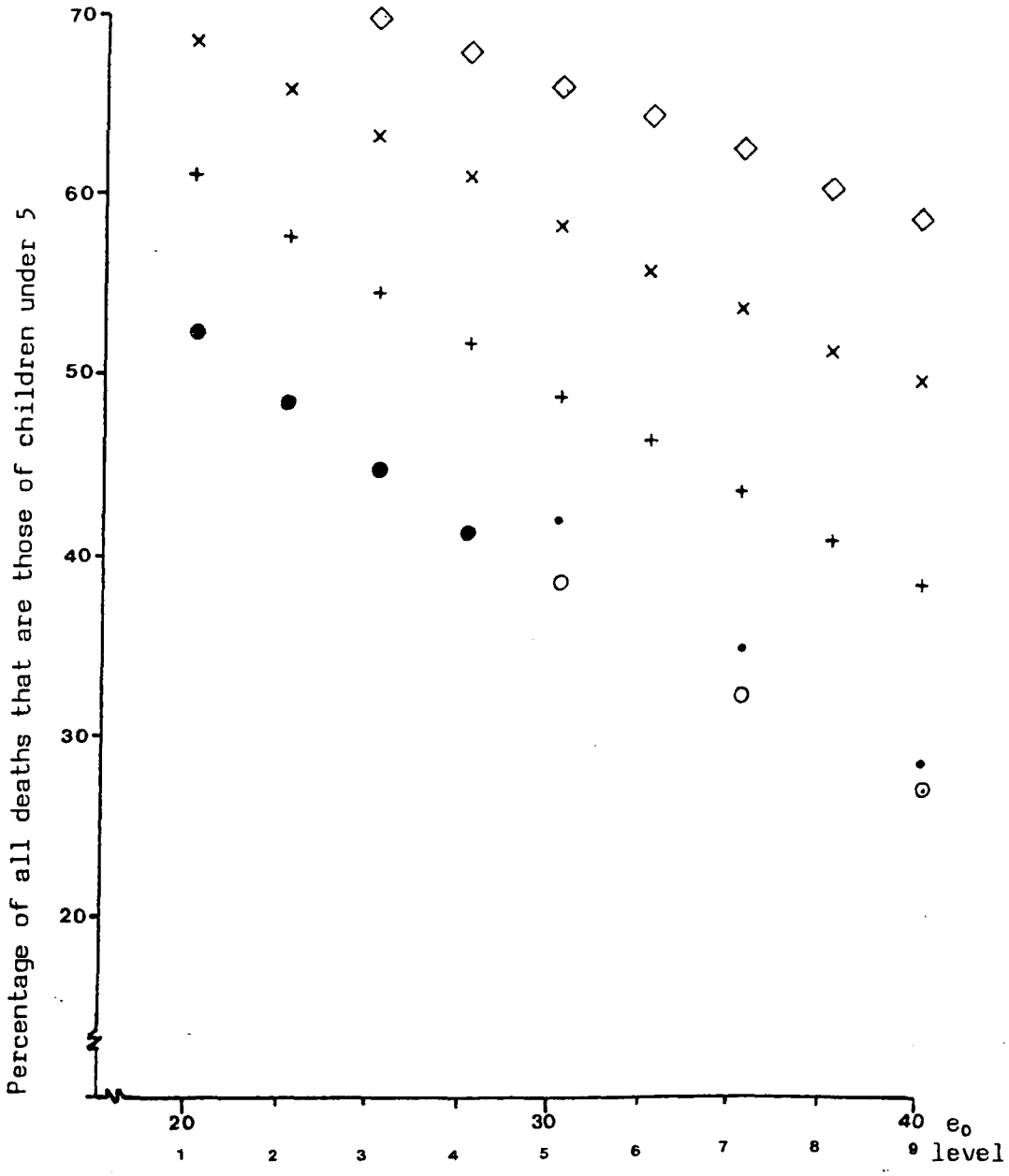
Were the population of Keighley town a demographically stationary one; i.e. experiencing equal birth and death rates,then Ranger's figures would indicate a very low life expectancy (between 24 and 30) in the urban centre, necessitating a life expectancy almost as high as that in Pateley Bridge in the remainder of the R.D. in order to average out to 38.4 years overall. We know, however, that the population was not stationary. Unfortunately, an exact figure for the rate of "natural growth" for 1851 is not available.

Between 1861 and 1863 Keighley R.D. experienced a natural growth rate (i.e. an excess of births over deaths) of 3.28% per annum, 1871-73 it was 4.03% per annum and in 1881-3, 2.63% per annum (Figures personally supplied by Woods). It was assumed that the trend upwards in natural growth had begun before 1850, peaked in 1871 and declined to 1881-3 levels. If we assume that 1851-3 natural growth rate was at a level similar to that of 1881-3 we can then take the assumption a stage further. Keighley R.D. is divided into three subdistricts: Keighley, Bingley and Haworth. The natural growth rates in each of these districts, 1881-3, was 2.42, 2.98 and 2.9% per annum respectively. We know that child and infant mortality within Keighley town itself was high and therefore it is likely that the excess of births over deaths was less than that in rural areas. It was therefore assumed that the

natural growth rate of the urban area, in 1881, was a little less than 2.4% and set it at 2% per annum. This rate was therefore assumed to pertain in 1851 also. Coale & Demeny (1983) have produced tables which can be used to correlate life expectancy with the proportion of deaths accounted for by children under 5 for different rates of natural growth. Figure 5.5 illustrates some of the relevant tables in graphical form including also Wrigley & Schofield's (1981) estimates for a stationary population as well as those from life tables calculated by the "Empirical Method" (Woods, 1985). It is easy to see that, if mortality levels remain the same but growth rates increase, then the proportion of deaths contributed by the under 5s also increases.

Reading off from Figure 5.5 it would seem that even the apparently high rates of child and infant mortality which Ranger describes were quite low if the population was indeed experiencing 2% per annum natural growth. It may be that the 1881-3 level of natural increase underestimated that of 1851-3. If we take mortality to children under 5 as contributing 52% of total deaths (i.e. the highest figure reported by Ranger) then life expectancy in Keighley in 1851 would be approximately 36.5 years,[8] a figure very close to that for Bradford R.D. in 1861. It was therefore decided to apply the Bradford life expectancy figures to equation 6. This yielded a $\underline{K}^*$ of approximately 1.3. It was further decided to apply this mortality inflation factor to all four census years. Further differentiation between the four years, given the meagreness of relevant data, would be almost impossible. It might also be argued that as overall infant mortality did not begin to decline until the turn of the twentieth century the high rates in Keighley were unlikely to have improved drastically over the thirty year study period and, therefore, the number of children missing from the returns because

Figure 5.5 Life expectation at birth plotted against the percentage of deaths contributed by the under 5 year olds, for populations with different rates of natural increase.



Key to source of figures:

- • Empirical Life Tables. (Woods, 1985a; Table 3)
- O Wrigley & Schofield Life Tables (Wrigley and Schofield, 1981; p.230, Table 7.15)
- ● Females from Coale and Demeny's model "North" family - a stationary population. (Coale and Demeny,1983)
- \+ 1% per annum natural population increase
- × 2% per annum natural population increase
- ◇ 3% per annum natural population increase.

} assuming females from model "North" family. (ibid)

(I would like to thank Dr. R.I.Woods for his help in compiling this diagram.)

of death would remain a relatively constant proportion from census to census.

If the application of one figure to data measured at four different time points is a dubious practice, then so too is lack of differentiation between different occupational or social classes. Ranger's report indicated that different areas within Keighley had varying mortality experiences and therefore some spatial differentiation should also be made. However, the data required to do so was simply not available and therefore, reluctantly, the one figure had to suffice; some estimate of the mortality amongst infants and young children had to be made and previous work (e.g. Hinde, 1985) appears to indicate that 1.3 is not an unreasonable mortality inflation factor. Even so it must be remembered that this figure does not include miscarriages and probably omits a large proportion of still births so even yet we do not have a full picture of total fertility.

Before moving on to Section 5.6, a final few points should perhaps be made here about the measures discussed in the preceding two sections.

Firstly, Grabill & Cho (1965) indicate that some allowance ought to be made for the number of women who have died in the 5 years preceding the census. However, this study was looking at the marital fertility of those couples who had survived, as a unit, until the census date. Those couples where the husband had died or was missing were not included and, therefore, neither were those couples where the wife had died or was missing. Admittedly, in a very few cases it is possible that remarriage has taken place following the death of a previous wife. Where the new spouse brings no differently surnamed children with her such an event is virtually untraceable. Nominal record linkage can show where re-marriage has taken place but at this

stage in the analysis a few women have probably been included in the ratios against another woman's children. Secondly, the measures we are looking at were taken at four discrete points in time; census night in four separate decades. The women whose fertility we are considering are those who have survived to the census and who have moved into or remained within the study area since the previous census. We can tell nothing about those women who have died nor about those women who have moved away during the previous decade. If a particular class or occupational group is more prone to mortality or migration than another then the figures may not be strictly comparable. Observations made possible by nominal record linkage on such topics are reported in Chapter 6.

Section 5.6: The Marital Fertility Behaviour of Occupational Groups in Keighley 1851-1881

Once the two correction factors designed to 'inflate' the number of observed children to an approximation of the actual number of births had been calculated they were inserted into the FERTILITY programme along with the age specific child-woman ratios of whichever group was having its marital fertility monitored. The computer then calculated the age specific marital fertility rates (ASMFRs) for each of the six age-of wife groups within the observed population, the total marital fertility rate (TMFR) and the values of M, m and MSE against both the Coale-Trussell (CT) and British (BS) Standard Schedules.

By comparing the various fertility measures across different occupational groups and over the four censuses it was hoped that movement towards the uptake of birth control, if any, could be monitored. If movement was observed then it might also be possible to ascertain

whether particular sectors of the community had initiated this shift in behaviour.

It was to become clear, however, that when measuring a longitudinal phenomenon, such as fertility, using point-in-time data sources and population subdivisions which might be selective of stage in the life cycle, any interpretation of the resultant figures had to be undertaken with caution. Indeed, questions had to be raised concerning the measures and their calculation.

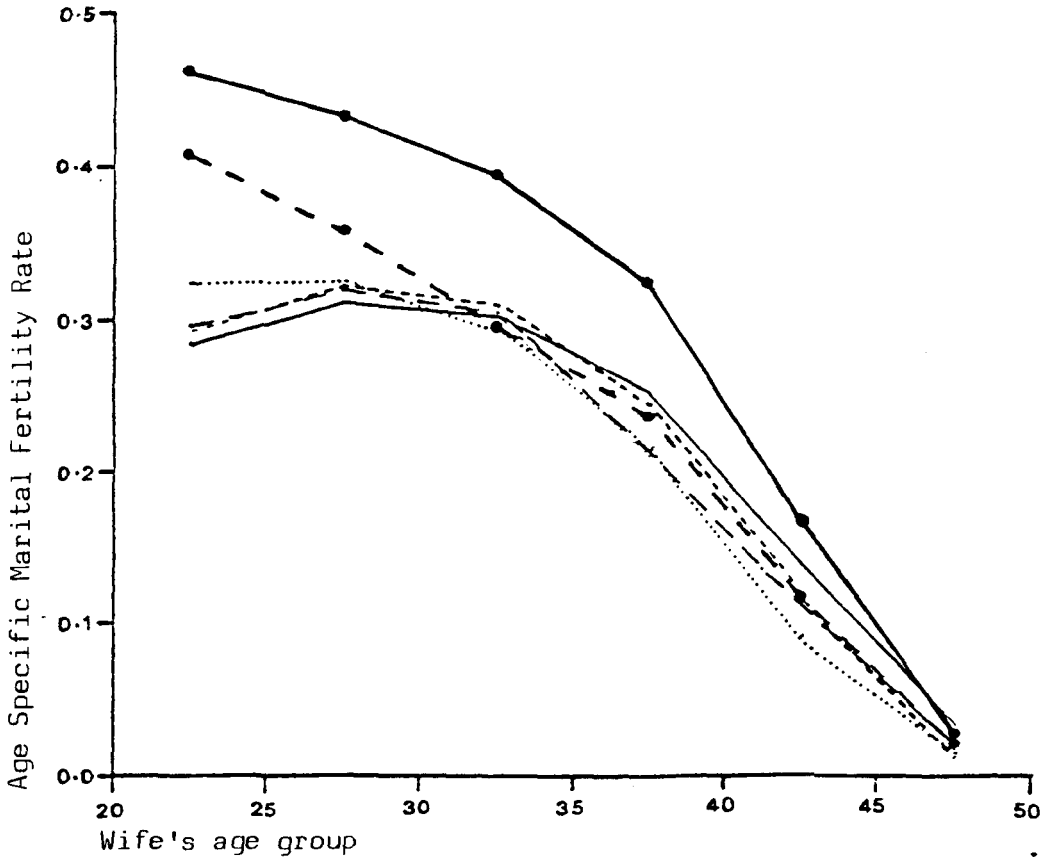
Section 5.6A below reports and discusses the measures M, m and MSE while section 5.6B concentrates on the TMFRs.

Section 5.6A: M, m and MSE

The measures M and m developed by Coale & Trussell were designed to assess whether or not couples within a population were limiting their fertility, as described above in Section 5.3. Although M and m provide quantitative measures of marital fertility behaviour the fertility patterns which they represent are often most easily comprehended if displayed graphically as ASMFR curves. In Figure 5.6 the ASMFR curves for the overall population of the Keighley study area at each census are plotted against the two standard fertility schedules. As Hinde & Woods predicted (1984) the Coale-Trussell Standard lies at a far higher level than the curves of the nineteenth century town. The difference is particularly marked in the younger age groups. The British Standard certainly fits more closely to the Keighley curves, but it too expects considerably higher fertility levels amongst women in their 20s than was evident amongst women of that age in Keighley.

Were a population limiting its fertility in a strictly parity-specific way then the observed ASMFR curves would form a concavity

Figure 5.6 Age Spacific Marital Fertility curves: the Coale-Trussell and British Standards and the fertility observed in Keighley, 1851-1881.



Coale & Trussell Standard

British Standard

Keighley 1851

Keighley 1861

Keighley 1871

Keighley 1881

Source of Keighley figures: Census enumerators' books.

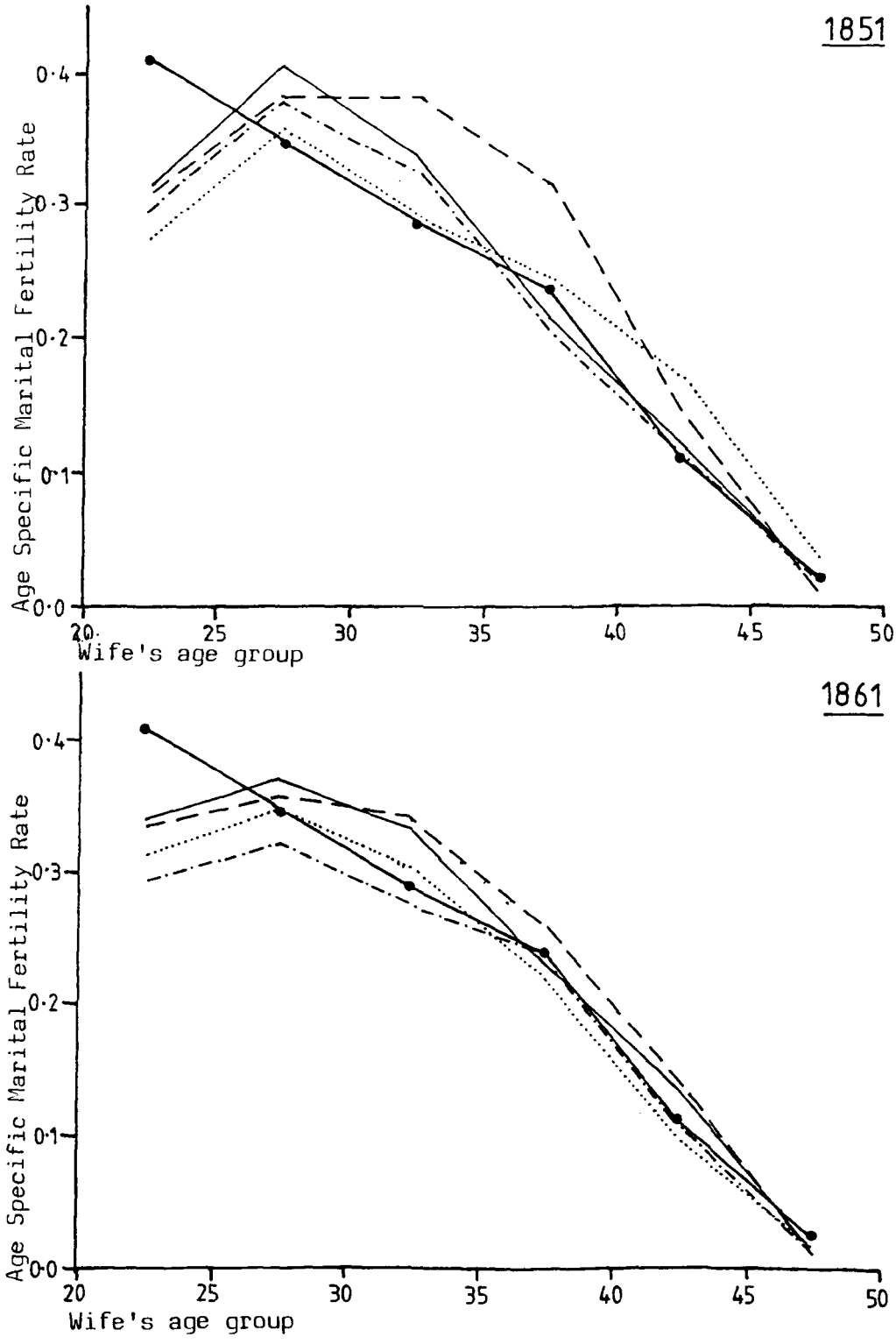
away from the standard curves, as women in the older groups produced considerably fewer children than a population with 'natural' fertility. In Keighley, however, it is the low fertility levels amongst younger women which catch the eye.

In his work on four nineteenth century agricultural populations[9] Hinde also noted levels of marital fertility amongst women aged 20-24 which fell short of that predicted by the British Standard schedule (Hinde, 1985a). The ASMFRs for the 20-24 year olds in 1851; 0.316, 0.311, 0.295 and 0.277 were in a range similar to Keighley's 0.286. However over the succeeding three censuses the gap between the British Standard schedule and the ASMFRs of Hinde's 20-24 year old populations slowly closed (Figure 5.7) until in 1881 the latter lay at 0.365, 0.390, 0.350 and 0.348 respectively. In Keighley the increase was far less marked: by 1881 the 20-24 year old ASMFR was 0.322. In contrast to the 20-24 year olds the 25-29 year olds in Hinde's populations experienced a drop in the level of their ASMFRs between 1851 and 1881 (Figure 5.7). In Keighley, however, this age-group had a fertility level well below that of the standard as early as 1851 and it remained low over the next three censuses.

Both the standard schedules were derived from reconstitution studies, or from civil registration and thus from births or baptisms actually registered, whereas the ASMFR figures were calculated from census returns, the possibility that the unexpected shortfall in the fertility of married women in their 20s might result from the method of calculation had to be considered.

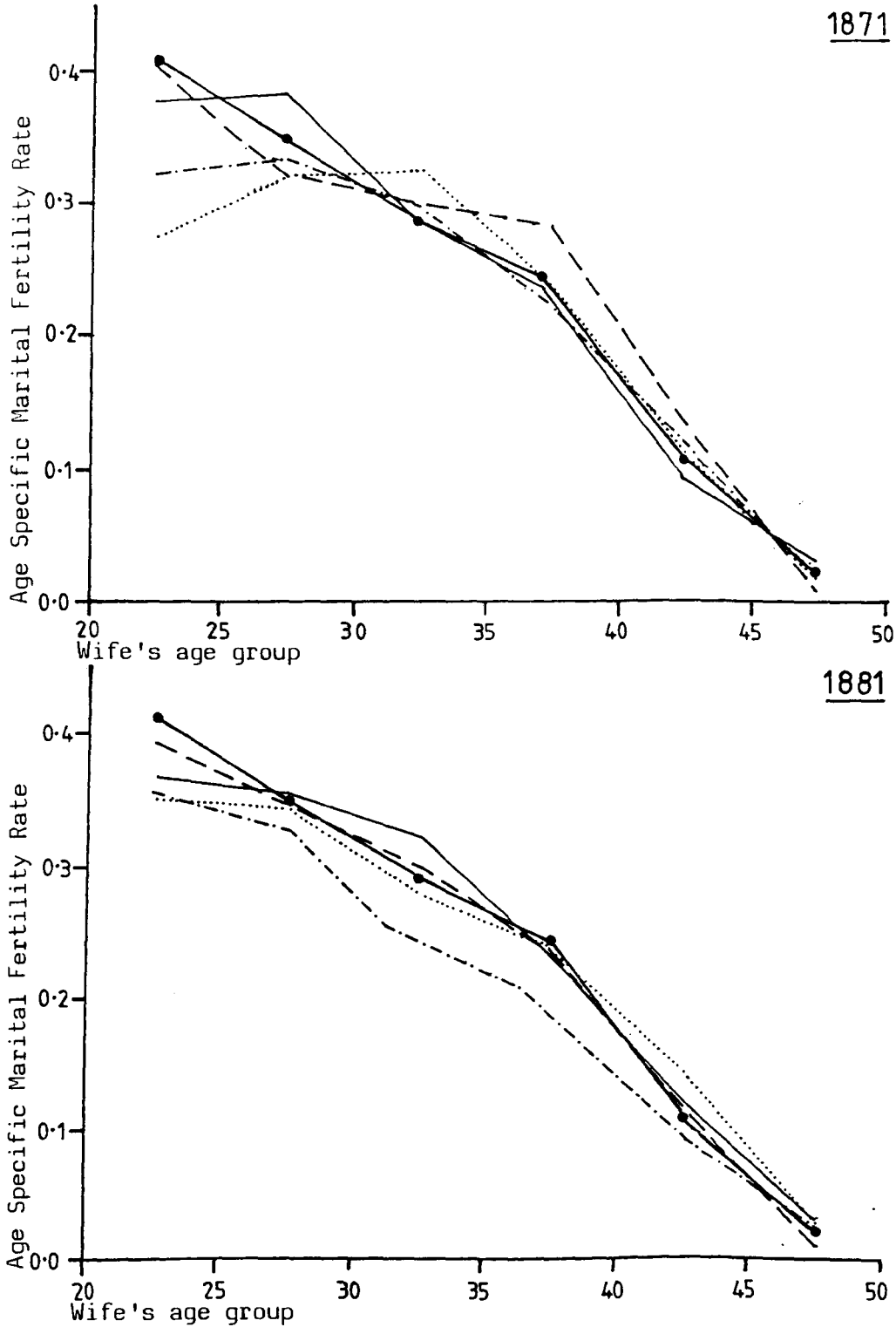
Grabill & Cho demonstrated in their 1965 paper that Sprague's Osculatory Interpolation Formula consistently underestimated the birth rates of 20-24 year old women. The range of this underestimation was

Figure 5.7 The Age Specific Marital Fertility Rate curves for Hinde's four rural study populations at each census 1851-1881.



/contd...

Figure 5.7 Continued.....



Source: Hinde, P.R.A. (1985a) Table C1. p.487

put at "much less than 10 per cent" (Grabill and Cho, 1965). However those remarks refer to a mid-twentieth century, white, American population with a mean age at marriage probably considerably lower than that in Keighley in the third quarter of the nineteenth century. Thus Grabill & Cho's comment that

> "...real populations are affected by characteristic patterns of age at marriage and other factors that create somewhat different trends within the five-year age groups, especially at ages under 20..."
>
> Grabill & Cho, 1965)

may apply to the 20-24 year olds in the Keighley population,[10] so an underestimation of 10 per cent or perhaps even more might be expected in their fertility rates. Grabill and Cho do suggest that it is possible, via further indices, to allow for the effect of "continuing accessions to the population of women ever married for successive ages within each five-year age group". In Keighley, however, as in Hinde's agricultural populations (Hinde, 1985a) pre-nuptial conceptions would appear to have been high (see Chapter 6) and therefore, even were a wife's age at marriage given in the census, further calculations would be necessary to allow for "time at risk of conception previous to marriage", a factor which would be practically impossible to calculate. As pre-nuptial sexual experience goes some way to reducing the effects of late age at marriage it may be considered that the use of unaltered Sprague Co-efficients as provided by Grabill & Cho is not contributing in any but a very small degree to the low fertility rates observed amongst 20-24 year old wives in the Keighley population.

Further, the underestimation is somewhat reduced through the exclusion of the 15-19 age group from the Keighley calculations due to the very small number of couples where the wife was in this age group

(see Section 5.5). The child-woman ratios for 15-19 year olds, for the calculations undertaken by the FERTILITY programme, were therefore set to zero (0). This implies that no woman aged 15-19 could have any children and consequently that all women in the 20-24 age range had all their children since their 20th birthdays. The birth rate of 20-24 year olds is therefore overestimated to a degree determined by the accuracy of the assumption concerning the number of children born to mothers aged 15-19 at the birth. Had the child-woman ratios for women aged 15-19 at census (R15-19) been included then average annual birth rate per 1000 women aged 20-24 at the time of birth (B20-24) would have been reduced by: R_{15-19} X (-0·0365). This is unlikely to be a large number given the late age at marriage in Keighley but its inclusion would nevertheless serve to increase the gap between the observed levels of fertility and the standard curves for the 20-24 year olds. We may say, then, that an ASMFR some 10 per cent below that of the standard schedule could <u>not</u> be deemed as an unexpectedly low level of fertility amongst 20-24 year old married women; the figures for Keighley, however, fell well below this level. The value of the ASMFR for 20-24 year olds on the British Standard Schedule is 0.409. Reduced by 10 per cent this gives a level of 0.368, by 20 per cent a level of 0.327, and by 30 per cent a level of 0.286. Thus for 1851-1881 the fertility level of 20-24 year olds in Keighley lay between 20 and 30 per cent below the standard schedule which fitted so well to the marital fertility levels displayed by women in the town in their 30s and 40s. Compared with Hinde's four agricultural populations (Table 5.12) it can be seen that those figures fall into a range similar to those of Atcham and even Mitford, but are decidedly lower than those for Bakewell and Pateley Bridge.

Table 5.12 The age specific marital fertility rates for couples with wife aged 20-24 expressed as percentages of the ASMFR for equivalent couples in the British Standard Schedule of fertility; Hinde's four rural study areas and Keighley, 1851-1881.

Area	r(20-24)/n(20-24)x100			
	1851	1861	1871	1881
Bakewell	77.0	82.1	92.1	89.4
Pateley Bridge	76.0	82.1	98.3	95.4
Mitford	72.1	71.4	78.5	85.6
Atcham	67.7	72.1	67.5	85.1
Keighley	69.9	72.4	71.9	79.0

Sources:

1. Hinde, P.R.A. (1985a) "The Fertility Transition in Rural England" (unpublished Ph.D. thesis, University of Sheffield.)

2. Census enumerators' books.

Hinde's populations marry as late, if not later than the population of Keighley, as Table 5.13, listing the singulate mean age at marriage (SMAM) for the five areas, shows. Atcham and Mitford do not have obvious similarities in female SMAM levels, nor do theirs contrast sharply with the SMAM levels of Pateley Bridge and Bakewell. There is thus little obvious relationship between female SMAM and levels of fertility amongst 20-24 year olds which encourages us to look for alternative explanations for differences amongst the latter; we cannot discount, for instance, that differentials in age-specific infant mortality were responsible.

It is of note that in all four areas the 1851 figures seem lower than those for succeeding censuses which may indicate enumeration problems, which tallies with a higher number of "missing" children in Keighley in 1851 than in either 1861 or 1871. It has not been possible to ascertain from work done so far (see Chapter 5, Section 5A) whether there was a greater possibility that the children of young mothers would be missing than the children of older women. Certainly in Keighley where younger wives were more likely to be out at work it is possible that their young children were looked after in the homes of relatives or friends and be enumerated there or else not be enumerated at all, parent and guardian each believing that the child would be enumerated in the house of the other. Older women as well as being less likely to have been in the labour force may also have had older children to help look after young siblings, or who could be sent away to stay with relatives to leave more room for their 'baby' brothers and sisters thus increasing the chances of an infant being enumerated with an older mother.

Another reason for a child's non-appearance in the census could be

Table 5.13 Singulate mean age at first marriage for males and females; Hinde's four rural study areas and Keighley, 1851-1881

Area	Male SMAM			
	1851	1861	1871	1881
Bakewell	26.7	28.3	25.4	27.4
Pateley Bridge	28.0	28.0	27.4	28.0
Mitford	26.8	26.9	25.8	26.5
Atcham	30.8	29.4	28.9	30.1
Keighley	26.5	26.0	25.9	25.7
	Female SMAM			
	1851	1861	1871	1881
Bakewell	25.5	26.1	26.1	26.0
Pateley Bridge	26.6	25.9	26.0	25.2
Mitford	25.5	24.9	26.0	25.2
Atcham	28.4	28.4	27.0	27.9
Keighley	27.1	26.8	25.6	25.8

Sources:

1. Hinde, P.R.A. (1985a) "The Fertility Transition in Rural England" (unpublished Ph.D. thesis, University of Sheffield)

2. Census enumerators' books.

that he or she had succumbed to an early death. The textile districts were notorious for their high levels of infant mortality (see Chapter 3). It has been assumed so far in the calculations that mothers of all ages stood an equal chance of losing their young children. However, modern evidence shows (World Health Organisation, 1978) that first born babies are at substantially higher risk than their second, third or fourth born siblings. Thus it is possible that young mothers, a high proportion of whom were having their first offspring, would show higher levels of infant mortality than their older sisters who were further on in their family building. It might be suggested, as contemporary moralists did, that mothers working in the factories were less able to care for their infants adequately and therefore lost greater numbers of children, or else that factory work reduced their ability to conceive or carry a baby to term. When the women left the factory they were able to devote more time and care to their live born infants and were less likely to suffer miscarriages or still births.

If any of the above scenarios were in operation then the two "correction" factors in the calculation of the marital fertility measures should be adjusted to account for age specific differentials in under-enumeration or infant mortality. Unfortunately the volume of work entailed in detailed analysis of the vital registers and censuses to ascertain the existence and the dimensions of those differences puts such exercises outside the scope of the present study, and leaves us uncertain at this point of the potential influence of those factors.

Finally, we could accept that Figure 5.6 does in fact indicate that young married women in Keighley were having fewer offspring than their peers in the standard schedule. If this were so, was this because the young women were choosing to have fewer children and

deliberately limiting their fertility, spacing their children well apart or not beginning family building until well into marriage? Why then would older women opt to have their 'standard' quota of children when presumably they knew how to control their fertility? If on the other hand, younger women were more susceptible to miscarriage or sub-fecundity, providing physiological reasons for low levels of fertility, why should older women find their fertility levels on a par with the standard population?

It had been hoped to answer such questions by reference to the fertility measures themselves but care had to be taken as low levels of fertility amongst married women in their early 20s in Keighley, be they actual or estimated, somewhat undermine the interpretation of the fertility measures of M and m as the least squares regression method used in their calculation assumes that there is no fertility limitation amongst women aged 20-24, i.e. that V(20-24) is 0.000 (see Section 5.3 above). Consequent to this assumption, and following from the knowledge that a woman's fecundability declines with age, the model assumes that the fertility levels of 25-29 year old women will be less than that of 20-24 year olds. In a population where this is not the case, such as Keighley, the model may well underestimate the level of fertility in older age groups and thus yield a measure of m greater than the actual fertility patterns justify. M, too, will tend to be overestimated. Such discrepancies will be signalled by a large MSE x 10^3, calculated in order to gauge the "goodness of the fit" of the model to the observed fertility behaviour. It is likely that, in some cases, "goodness of fit" could be improved by measuring the relationship $^{r(a)}/n(a)$ at the 25-29 age group and assuming that V(25-29) was 0.000. This avenue remains to be explored.

Another reason for poor "goodness of fit" lies in the fact that:

> "...(T)he stochastic nature of human reproduction...sets a minimum number to the maternity histories used in any analysis of fertility..."
>
> (Wilson, 1984).

and therefore the "goodness of fit" of the model to the observed fertility patterns may be poor if the few members of a particular age group display "abnormal" fertility levels. Also where an age group has few members the assumptions underlying Sprague's Osculatory Interpolation formula are less likely to hold and therefore the ASMFRs calculated may not fit well to those predicted by the model. The minimum number of couples from which the fertility measures should be calculated has not, however, been strictly defined.

The FERTILITY programme used to calculate fertility measures for this study would only work for population groups with 45 or more member couples, with at least 1 couple in each of the six age groups. However, such small numbers meant that some age groups fertility would be calculated on the experience of only one or two couples and therefore there was a high chance that the MSE x 10^3 would be large. One answer to this problem would be to set a minimum number of couples required per age group in the first five age groups. (Calculation of MSE does not take the fertility of 45-49 year olds into consideration, see Chapter 5, Section 3). If 15 was taken as the minimum figure required per age group then 76 couples were needed in toto; if 20, 101, but even with those numbers it was unlikely that an even spread of couples across the age groups would occur & many groups with well over 100 members would have to be discounted from the analysis. This raised the question of the aims of the fertility measures. If only those groups

whose fertility behaviour patterns conformed to those predicted by the models were to be discussed, then those groups whose fertility behaviour was believed to be exceptional would be dismissed and the reasons for their deviation from "the norm" left unexplored. The groups involved, it is worth stressing, were not subject to the vagaries of sampling, each group comprising a complete "population" which had been shaped by historic, economic and social events into the form "snapped" by the census. Thus reasons why an age group was very poorly represented within a certain population group may have direct bearing on their fertility behaviour and therefore deserved attention. As a compromise the results of all population groups with over 45 couples in them are displayed in Tables 5.14 to 5.19 but those groups with more than 100 members are picked out in bold print. Even amongst those latter groups some contain age groups which are represented by fewer than 10 couples: of the 105 wool combers whose wives were housewives in 1861, for example, only 2 of the couples had wives in the 20-24 age group; of the 128 "miscellaneous" workers in 1871, the wife's occupation not being considered, only 9 of the wives were aged 20-24, and at the other extreme; of the 113 weavers whose husbands were metal-mechanical workers in 1871, only 8 were aged 40-44.

While omitting the groups with fewer than 100 member couples does go someway to reduce the number of very large MSE x 10^3s it can be seen that a wide diversity of values still remains, the bulk of them falling well above 10, the figure which Coale and Trussell designated as a "terrible fit". We can, however, be more magnanimous in our expectation of "goodness of fit" because as has been shown above, the Keighley population does not follow the fertility models in having the fertility of 20-24 year olds higher than that of 25-29 year olds.

Table 5.14 Fertility Measures: results for husband's occupational groups; wife's occupation not considered, Keighley 1851-1881.

Husband's Occ.	M Coale-Trussell				M British Standard				m Coale- Trussell				m British Standard			
	1851	1861	1871	1881	1851	1861	1871	1881	1851	1861	1871	1881	1851	1861	1871	1881
All	**.65**	**.69**	**.70**	**.77**	**.74**	**.79**	**.80**	**.88**	**-0.18**	**-0.02**	**-0.03**	**0.19**	**-0.78**	**-0.43**	**-0.46**	**0.02**
Prof	.51	.94	.92	.83	.58	1.09	1.05	.95	-0.26	0.12	0.18	0.13	-0.97	-0.59	0.02	-0.08
W C		.52	1.10	**.71**		.59	1.28	**.81**		-0.56	1.40	**0.18**		-1.60	2.60	**0.01**
Shopkpr	**.92**	**.85**	**.62**	**.72**	**1.05**	**.97**	**.70**	**.88**	**0.25**	**0.28**	**-0.12**	**0.02**	**0.14**	**0.24**	**-0.67**	**-0.34**
Trans		.55	.45	**.81**		.62	.50	**.93**		-0.41	-0.57	**0.30**		-1.30	-1.70	**0.26**
Cloth	**.76**	**.76**	**.48**	**.98**	**.86**	**.87**	**.55**	**1.10**	**-0.05**	**-0.07**	**-0.45**	**0.54**	**-0.49**	**-0.55**	**-1.40**	**0.79**
Misc	.55	.72	**.75**	**.74**	.61	.83	**.85**	**.85**	-0.57	0.54	**0.14**	**0.12**	-1.60	0.82	**-0.09**	**-0.10**
Hous	**.57**	**.59**	**.69**	**.78**	**.64**	**.66**	**.79**	**.90**	**-0.42**	**-0.45**	**-0.10**	**0.14**	**-1.30**	**-1.40**	**-0.60**	**-0.08**
Agri	**.80**	**.66**	.93	1.20	**.91**	**.75**	1.05	1.40	**0.10**	**-0.23**	0.15	1.08	**-0.17**	**-0.90**	-0.80	1.95
TETMM	**.69**	**.67**	**.62**	**.80**	**.79**	**.77**	**.76**	**.92**	**-0.17**	**-0.17**	**-0.16**	**0.21**	**-0.75**	**-0.76**	**-0.70**	**0.11**
Met-mech	**.61**	**.75**	**.75**	**.79**	**.70**	**.81**	**.85**	**.92**	**-0.08**	**0.04**	**0.04**	**0.23**	**-0.58**	**-0.28**	**-0.31**	**0.08**
Text	**.64**	**.71**	**.73**	**.71**	**.72**	**.81**	**.83**	**.82**	**-0.19**	**0.04**	**0.10**	**0.39**	**-0.80**	**-0.08**	**-0.18**	**0.47**
Overlkr	.69	**.91**	**.91**	**.69**	.78	**1.05**	**1.04**	**.80**	0.06	**0.37**	**0.52**	**0.57**	-0.27	**0.43**	**0.74**	**0.85**
Sorter	.51	.62	1.07	.69	.57	.71	1.23	.79	-0.66	0.40	1.10	0.29	-1.80	0.47	2.02	0.25
Warpdrsr		.88	.53	.61		1.00	.60	.71		0.32	-0.41	0.24		0.32	-1.30	0.17
Comber	**.61**	**.55**			**.69**	**.66**			**-0.23**	**-0.12**			**-0.89**	**-0.65**		
Weaver	.57	**.71**	.64			.65	**.83**	.72	-0.31	**0.40**	-0.16		-1.00	**0.53**	-0.76	
Spec.Tex		.87	.50	1.19		.99	.56	1.38		-0.05	-0.36	1.40		-0.51	-1.20	2.61
HST	**.73**	**.81**	**.82**	**.65**	**.83**	**.93**	**.93**	**.75**	**0.14**	**0.37**	**0.38**	**0.27**	**-0.08**	**0.34**	**0.43**	**0.22**
LST	**.62**	**.65**	**.60**	**.94**	**.70**	**.75**	**.68**	**1.07**	**-0.19**	**0.03**	**-0.20**	**0.79**	**-0.80**	**-0.30**	**-0.84**	**1.30**

	$MSE \times 10^3$ Coale Trussell				$MSE \times 10^3$ British Standard			
	1851	1861	1871	1881	1851	1861	1871	1881
All	**4.2**	**4.5**	**5.5**	**6.3**	**5.7**	**7.5**	**7.7**	**9.2**
Prof	5.7	56.0	7.6	72.0	**3.2**	65.0	9.7	75.0
W C		15.0	477.0	**14.0**		14.0	516.0	**18.0**
Shopkpr	**49.0**	**4.6**	**26.0**	**2.0**	**54.0**	**76.0**	**30.0**	**0.5**
Trans		48.0	87.0	**12.0**		59.0	516.0	**18.0**
Cloth	**14.0**	**12.0**	**8.7**	**37.0**	**19.0**	**15.0**	**7.7**	**46.0**
Misc	7.5	16.0	**16.0**	**31.0**	9.9	17.0	**21.0**	**33.0**
Hous	**1.1**	**1.2**	**5.7**	**9.5**	**1.6**	**0.7**	**5.5**	**12.0**
Agri	**33.0**	**17.0**	97.0	238.0	**41.0**	**22.0**	103.0	262.0
TETMM	**3.0**	**4.0**	**1.9**	**5.0**	**5.8**	**6.0**	**2.6**	**9.1**
Met-mech	**9.1**	**20.0**	**12.0**	**9.0**	**7.6**	**21.0**	**14.0**	**8.1**
Text	**0.2**	**11.0**	**17.0**	**16.0**	**0.3**	**16.0**	**21.0**	**22.0**
Overlkr	58.0	**3.0**	**44.0**	**109.0**	58.0	**5.4**	**54.0**	**120.0**
Sorter	66.0	49.0	235.0	3.6	60.0	57.0	257.0	3.7
Warpdrsr		30.0	3.2	159.0		38.0	4.0	175.0
Comber	**0.3**	**1.2**			**0.3**	**1.2**		
Weaver	10.0	**80.0**	63.0			13.0	**89.0**	58.0
Spec.Tex		51.0	7.2	542.0		60.0	10.0	580.0
HST	**15.0**	**15.0**	**44.0**	**14.0**	**15.0**	**20.0**	**52.0**	**19.0**
LST	**0.4**	**12.0**	**7.3**	**125.0**	**1.8**	**17.0**	**6.9**	**139.0**

Source: Census Enumerators' books

Notes: The full rendering of the abbreviated husband's occupations can be found in Table 5.2
A blank indicates that the group contains < 45 couples and the fertility measures cannot be calculated (see text). **Bold** text indicates groups of at least 100 couples.

^{3}All $MSE \times 10^3$ s > 10 have been rounded to whole numbers

Table 5.15 Fertility Measures: results for husband's occupational groups; wives housewives, Keighley 1851-1881.

Husband's Occ.	M Coale-Trussell				M British Standard				m Coale- Trussell				m British Standard			
	1851	1861	1871	1881	1851	1861	1871	1881	1851	1861	1871	1881	1851	1861	1871	1881
All	.76	.83	.82	.85	.87	.94	.94	.98	-0.12	0.02	0.04	0.22	-0.65	-0.33	-0.30	0.09
Prof		.92	.92	.84		1.06	1.06	.97		-0.21	0.18	0.14		-0.79	0.01	-0.07
W C			1.20	.70			1.40	.79			1.44	0.15			2.74	-0.07
Shopkpr	.88	.86	.61	.79	1.00	.99	.69	.91	0.21	0.26	-0.22	0.04	0.04	0.20	-0.88	-0.30
Trans		.69	.49	.88		.78	.55	1.01		-0.19	-0.47	0.25		-0.80	-1.40	0.22
Cloth	.91	.73	.61	1.05	1.05	.83	.69	1.21	0.07	-0.24	-0.22	0.49	-0.21	-0.93	-0.86	0.69
Misc	.65	.80	.84	.79	.73	.93	.96	.91	-0.50	0.59	0.14	0.19	-1.50	0.92	-0.09	0.06
Hous	.62	.79	.79	.88	.71	.89	.90	1.00	-0.39	-0.23	-0.02	0.19	-1.20	-0.89	-0.43	0.05
Agri	.95	.76	1.09	1.16	1.08	.86	1.23	1.33	0.19	-0.15	0.09	1.01	0.02	-0.71	-0.20	1.78
TETMM	.76	.74	.75	.88	.86	.84	.86	1.00	-0.16	-0.12	-0.09	0.24	-0.73	-0.65	-0.58	0.14
Met-mech	.65	.78	.90	.88	.74	.89	1.03	1.01	-0.02	0.08	0.10	0.24	-0.42	-0.20	-0.17	0.15
Text	.77	1.02	.85	.85	.88	1.18	.97	.98	-0.16	0.23	0.08	0.42	-0.72	0.14	-0.22	0.52
Overlkr	.78	1.08	.95	.79	.89	1.25	1.08	.91	0.06	0.33	0.42	0.47	-0.27	0.37	0.52	0.65
Sorter	.62		1.44	1.01	.71		1.67	1.17	-0.50		1.57	0.46	-1.50		3.00	0.63
Warpdrsr			.62	.64			.70	.73			-0.39	0.09			-1.20	-0.18
Comber Weaver	.74	.67			.84	.76			-0.24	-0.14			-0.91	-0.68		
Spec.Tex			.73	1.47			.83	1.70			-0.18	1.55			-0.77	2.95
HST	.77	1.10	.92	.78	.88	1.29	1.05	.90	-0.12	0.45	0.40	0.29	-0.64	0.64	0.47	0.25
LST	.77	.91	.82	1.18	.86	1.04	.93	1.37	-0.70	0.03	-0.16	0.97	-0.72	-0.29	-0.72	1.72

$MSE \times 10^3$

	Coale Trussell				British Standard			
	1851	1861	1871	1881	1851	1861	1871	1881
All	0.3	3.6	3.1	5.3	1.3	6.4	4.4	8.0
Prof		66.0	5.6	70.0		75.0	7.9	0.7
W C			497.0	27.0			535.0	33.3
Shopkpr	62.0	6.2	20.0	2.2	69.0	8.4	24.0	0.7
Trans		90.0	75.0	9.8	104.0	77.0	13.0	
Cloth	23.0	6.4	18.0	24.0	30.0	8.5	14.0	31.0
Misc	3.5	7.1	22.0	39.0	5.8	8.8	27.0	42.0
Hous	3.3	0.6	2.0	7.7	2.3	0.3	2.6	10.0
Agri	23.0	27.0	45.0	307.0	29.0	33.0	47.0	335.0
TETMM	6.5	5.5	1.0	5.0	9.9	8.5	2.1	8.1
Met-mech	17.0	15.0	5.0	8.3	12.0	19.0	5.3	10.0
Text	2.5	3.0	16.0	33.0	1.7	4.0	18.0	38.0
Overlkr	34.0	9.3	51.0	58.0	34.0	8.4	61.0	64.0
Sorter	78.0		391.0	4.3	72.0		432.0	5.0
Warpdrsr			7.1	32.0			4.8	35.0
Comber Weaver	0.7	13.0			1.0	8.9		
Spec.Tex			3.9	527.0			2.6	567.0
HST	10.0	5.1	47.0	12.0	7.4	7.3	54.0	16.0
LST	1.3	2.4	4.4	120.0	1.4	3.7	5.8	135.0

Source: Census Enumerators' books

Notes: See notes for Table 5.14

Table 5.16 Fertility Measures: results for husband's "class"; wife's occupation not considered Keighley 1851-1881.

Husband's Class	M Coale-Trussell				M British Standard				m Coale- Trussell				m British Standard			
	1851	**1861**	**1871**	**1881**	**1851**	**1861**	**1871**	**1881**	**1851**	**1861**	**1871**	**1881**	**1851**	**1861**	**1871**	**1881**
I.	.51	.94	.92	.83	.58	1.09	1.05	.95	-0.26	-0.12	0.18	0.13	-0.97	-0.59	0.02	-0.68
II.	**.92**	**.75**	**.66**	**.74**	**1.05**	**.86**	**.75**	**.84**	**0.22**	**0.05**	**0.01**	**0.04**	**0.08**	**-0.27**	**-0.38**	**-0.30**
III.	**.72**	**.65**	**.67**	**.79**	**.82**	**.74**	**.76**	**.90**	**-0.24**	**-0.17**	**-0.02**	**0.19**	**-0.89**	**-0.76**	**-0.43**	**0.03**
IV.	**.59**	**.69**	**.73**	**.81**	**.67**	**.79**	**.83**	**.93**	**-0.25**	**-0.03**	**-0.03**	**0.21**	**-0.93**	**-0.45**	**-0.45**	**0.08**
V.	**.63**	**.69**	**.65**	**.69**	**.71**	**.79**	**.74**	**.79**	**-0.16**	**-0.04**	**-0.16**	**0.13**	**-0.76**	**-0.46**	**-0.74**	**-0.09**
VI.	**.64**	**.71**	**.73**	**.71**	**.72**	**.81**	**.83**	**.82**	**-0.19**	**0.14**	**0.10**	**0.39**	**-0.80**	**-0.08**	**-0.18**	**0.47**

	$MSE \times 10^3$ Coale Trussell				$MSE \times 10^3$ British Standard			
	1851	**1861**	**1871**	**1881**	**1851**	**1861**	**1871**	**1881**
I.	5.7	56.0	7.6	72.0	3.2	60.0	9.7	75.0
II.	**13.0**	**0.5**	**32.0**	**0.9**	**10.0**	**1.9**	**37.0**	**1.2**
III.	**2.5**	**10.0**	**22.0**	**3.6**	**2.5**	**14.0**	**27.0**	**5.8**
IV.	**3.6**	**3.7**	**1.9**	**5.1**	**3.2**	**5.7**	**2.6**	**8.4**
V.	**35.0**	**6.3**	**7.7**	**14.0**	**41.0**	**8.2**	**9.1**	**18.0**
VI.	**0.2**	**11.0**	**17.0**	**16.0**	**0.3**	**16.0**	**21.0**	**22.0**

Source: Census Enumerators' books

Notes: Class I. - Professional/Managerial
Class II. - Lower Middle Class
Class III. - Skilled Workers
Class IV. - Semi-skilled Workers
Class V. - Un-skilled Workers
Class VI. - Textile workers

^{3}
All $MSE \times 10^3$ s > 10 have been rounded to whole figures

Bold type indicates groups of at least 100 couples.

Table 5.17 Fertility Measures: results for husband's "class"; wives housewives, Keighley 1851-1881.

Husband's Class	M Coale-Trussell				M British Standard				m Coale- Trussell				m British Standard			
	1851	1861	1871	1881	1851	1861	1871	1881	1851	1861	1871	1881	1851	1861	1871	1881
I.		.92	.92	.84		1.06	1.06	1.00		-0.21	0.18	0.14		-0.79	0.01	-0.07
II.	.96	.78	.70	.75	1.10	.89	.79	.85	0.25	0.05	0.01	0.04	0.15	-0.27	-0.37	-0.31
III.	.81	.74	.81	.88	.93	.84	.93	1.01	-0.19	-0.06	0.12	0.24	-0.78	-0.52	-0.13	-0.14
IV.	.64	.82	.85	.88	.73	.94	.97	1.00	-0.23	0.07	0.04	0.21	-0.89	-0.22	-0.30	0.09
V.	.77	.89	.77	.85	.87	1.02	.88	.97	-0.07	0.10	-0.13	0.27	-0.54	-0.16	-0.67	0.21
VI.	.77	1.02	.85	.85	.88	1.18	.97	.98	-0.16	0.23	0.08	0.42	-0.73	0.14	-0.22	0.52

	$MSE_3 \times 10$ Coale Trussell				$MSE_3 \times 10$ British Standard			
	1851	1861	1871	1881	1851	1861	1871	1881
I.		66.0	5.6	70.0		75.0	7.9	72.0
II.	20.0	1.8	26.0	2.0	24.0	2.7	31.0	3.0
III	15.0	12.0	17.0	1.4	15.0	17.0	21.0	2.5
IV.	8.1	9.1	0.8	7.3	9.5	13.0	0.8	11.0
V.	26.0	2.3	9.7	7.9	31.0	1.9	9.2	11.0
VI.	1.9	3.0	16.0	30.0	1.5	4.0	18.0	40.0

Source: Census Enumerators' books

Notes: The definition of the classes can be found in Table 5.16

A blank indicates that the group contains < 45 couples and the fertility measures cannot be calculated (see text).

Bold type indicates groups of at least 100 couples.

All $MSE_3 \times 10$ s > 10 have been rounded to whole figures

Table 5.18 Fertility Measures: results for husband's "class"; wives in textiles, Keighley 1851-1881.

Husband's Class	M Coale-Trussell				M British Standard				m Coale- Trussell				m British Standard			
	1851	1861	1871	1881	1851	1861	1871	1881	1851	1861	1871	1881	1851	1861	1871	1881
III.			.21	.41			.23	.49			-0.69	1.06			-1.90	2.03
IV.	**	.38	.43	.61	**	.44	.52	.71	**	0.04	0.35	0.81	**	-0.28	0.37	1.40
V.		.92	.62	.58		1.06	.72	.66		1.27	0.41	0.42		2.36	0.52	0.53
VI.	.57	.51	.61	.91	.66	.59	.70	1.07	0.35	0.37	0.75	2.70	0.39	0.45	1.25	5.40

^{3}MSEx10

	Coale Trussell				British Standard			
	1851	1861	1871	1881	1851	1861	1871	1881
III			40.0	655.0			46.0	651.0
IV.	**	48.0	23.0	19.0	**	40.0	29.0	23.0
V.		465.0	54.0	64.0		496.0	62.0	46.0
VI.	22.0	43.0	44.0	1260.0	26.0	51.0	54.0	1368.0

Source: Census Enumerators' books

Note: The definition of the classes may be found in Table 5.16

Classes I and II included too few couples where the wife worked in textiles to allow the fertility measures to be computed.

A blank indicates that a group contains < 45 couples and the fertility measures could not be calculated (see text).

Bold type indicates groups of at least 100 couples.

** Certain age groups had no women in them and therefore the fertility measures could not be calculated.

All $MSE \times 10^3$ s > 10 have been rounded to whole numbers

Table 5.19 Fertility Measures: results for wife's occupational group, husbands occupation as noted, Keighley 1851-1881

Couple's Occs.	M Coale-Trussell				M British Standard				m Coale- Trussell				m British Standard			
	1851	1861	1871	1881	1851	1861	1871	1881	1851	1861	1871	1881	1851	1861	1871	1881
H:ONC Wife's Occ.:																
All	.63	.69	.70	.77	.71	.79	.80	.88	-0.22	-0.02	-0.03	0.19	-0.87	-0.43	-0.44	0.02
Housewf	.76	.83	.82	.85	.87	.94	.94	.98	-0.12	0.02	0.04	0.22	-0.65	-0.33	-0.30	0.09
Text	.60	.48	.48	.54	.69	.55	.55	.62	0.53	0.14	0.27	0.54	0.76	-0.05	0.19	0.80
Weaver	.58	.46	.41	.68	.68	.53	.46	.79	0.98	0.11	0.13	1.25	1.80	-0.12	-0.10	2.30
Spinner			.57	.31			.64	.34			0.09	-1.20			-0.20	-3.00
Spec.Tex		.70	.72	.58		.81	.83	.69		0.74	1.10	1.00		1.20	1.90	1.90
EBNIT	.53	.53	.51	.33	.62	.61	.68	.39	0.87	0.12	0.18	0.36	1.50	-0.12	0.02	0.47
Clothing	.50	.58	.42	.58	.57	.67	.47	.67	-0.14	-0.01	-0.24	0.33	-0.68	-0.39	-0.95	0.34
Wife: Weaver Husband's Occ.:																
Weaver	.42	.49			.49	.58			-0.28	0.31			-0.93	0.42		
Comber	.72	.52			.85	.61			1.48	0.50			2.85	0.77		
LST	.65	.53	.53			.76	.63	.62		0.93	0.50	0.65		1.66	0.76	1.08
Met-mech		**	.58	.72		**	.67	.84		**	1.13	1.39		**	2.07	2.67
TETMM	**	**	.21	.54	**	**	.24	.62	**	**	0.66	0.58	**	**	-1.80	0.86

$MSEx10^3$

	Coale Trussell				British Standard			
	1851	1861	1871	1881	1851	1861	1871	1881
H:ONC Wife's Occ.:								
All	4.2	4.5	5.5	6.3	5.7	7.5	7.7	9.2
Housewf	0.3	3.3	3.1	5.3	1.3	6.4	4.4	8.0
Text	54.0	10.0	30.0	6.8	64.0	15.0	37.0	11.0
Weaver	75.0	12.0	5.7	168.0	84.0	15.0	7.1	186.0
Spinner			111.0	143.0			121.0	127.0
Spec.Tex		102.0	537.0	185.0		115.0	574.0	189.0
EBNIT	695.0	223.0	57.0	92.0	700.0	205.0	61.0	85.0
Clothing	7.7	11.0	60.0	3.3	9.6	9.8	64.0	5.8
Wife: Weaver Husband's Occ.:								
Weaver	182.0	627.0			191.0	637.0		
Comber	119.0	46.0				142.0	43.0	
LST	64.0	123.0	157.0			75.0	128.0	159.0
Met-mech		**	259.0	156.0		**	287.0	169.0
TETMM	**	**	157.0	68.0	**	**	145.0	63.0

Source: Census Enumerators' books

Notes: For notes on blanks, **, **bold** type and $MSEx10^3$ s see Table 5.18
H = Husband ONC = Occupation not considered Housewf = Housewife
EBNIT = Employed but not in textiles
For explanation of abbreviated occupations see Table 5.2

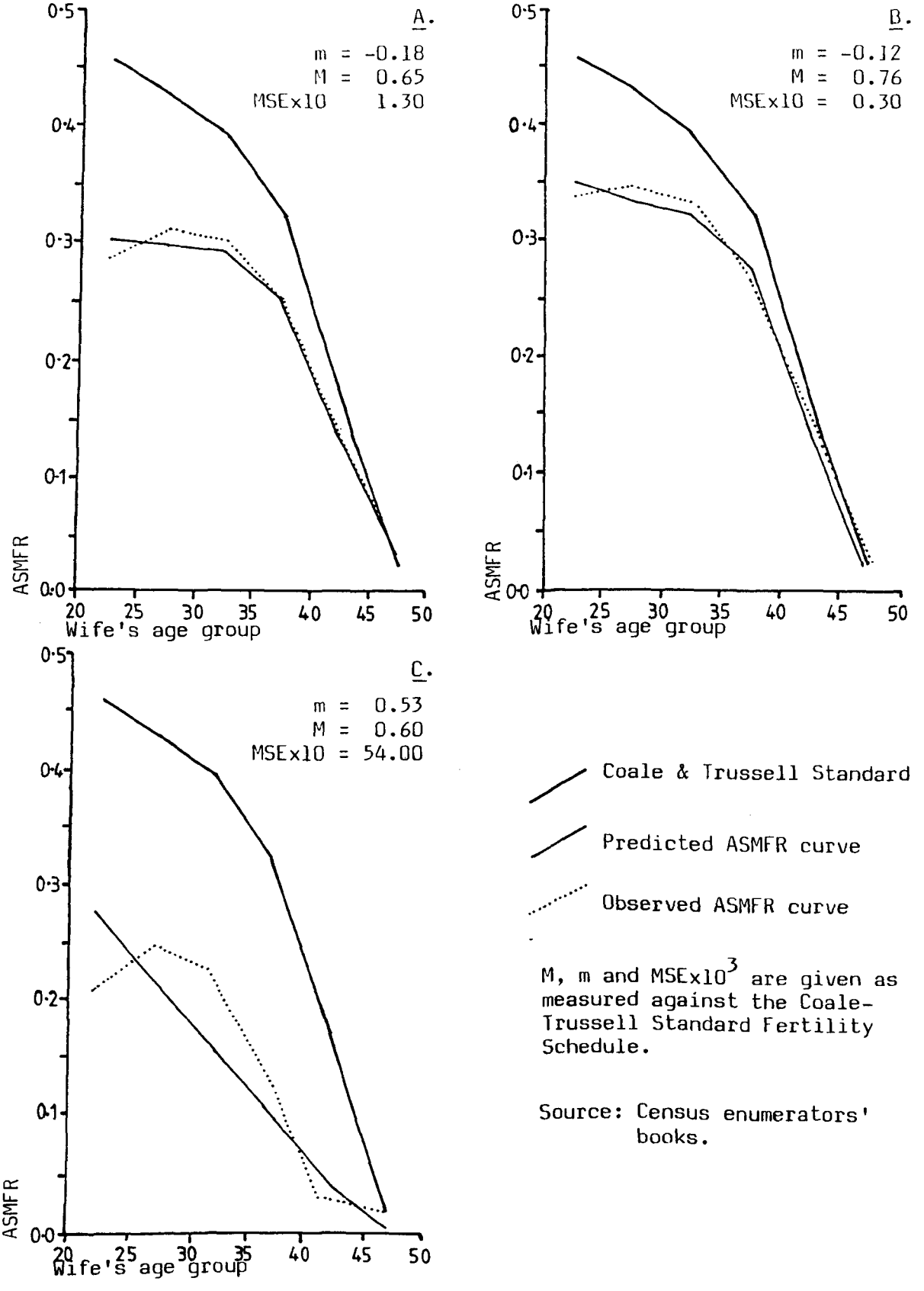
We would not therefore expect the model to be a perfect fit so rather than Coale and Trussell's '0.5' "good fit" (in terms of MSE x 10^3) '5-10' mediocre fit and 'greater than 10' terrible fit it might be allowed, in the case of Keighley, that 'less than 5' is a "very good fit"; '5-10',"a good fit"; '10-50', "a mediocre fit'; '50-100', "a bad fit" and 'over 100', "a terrible fit".

To recap, in Keighley we appear to be dealing with a population where young married women were considerably less fertile than envisaged by the fertility modellers, Coale and Trussell or Hinde and Woods. This will have affected the calculation and interpretation of the fertility measures M, m and MSE x 10^3 in some cases and in several ways;

> M tends to be overestimated.
>
> Where the overestimation of M is great and low fertility is apparent amongst the older age groups, m can also be somewhat overestimated.
>
> The above problems are "flagged" by a high accompanying MSE x 10^3 value. The very strict limits set on the interpretation of MSE values by Coale and Trussell can probably be relaxed in populations such as that of Keighley.

Figure 5.8 illustrates those points further. The ASMFRs predicted by the Coale-Trussell model (thin solid line) are graphed against the observed ASMFRs (dotted line) and the Coale-Trussell Standard Curve (heavy solid line) for (A) all couples in 1851, for (B) couples where the wife was a housewife in 1851 and for (C) couples where the wife was a textile worker in 1851. M expresses the "starting level" of the predicted curve as a proportion of the "starting level" of the standard curve, while m measures the amount of concavity between the standard curve and the predicted curve. The MSE x 10^3 value indicates how close the predicted curve is to the observed curve, and therefore to what extent M and m can be said to apply to the population whose

Figure 5.8 Predicted and observed Age Specific Marital Fertility Rate curves, for (A) all couples, (B) couples where the wife was a housewife and (C) couples where the wife was a textile worker; Keighley 1851.



M, m and MSEx10^3 are given as measured against the Coale-Trussell Standard Fertility Schedule.

Source: Census enumerators' books.

fertility behaviour they are supposed to represent. The observed housewives' ASMFR curve (Figure 5.8B) conforms exceptionally well (by Keighley standards) to the curve predicted for it by the model while the fit of the "all wives" curve is only slightly worse. Certainly in the later age groups in both graphs observed and predicted curves lie very close together so that the measure of m is probably a good representation of the level of parity specific control in the groups. The slightly poorer fit in the "all couples" graph (Figure 5.8A) is created by the low value of fertility amongst the 20-24 year olds, the regression equation overestimating M, the ASMFR for 25-29 year olds being slightly underestimated. For the textile workers in Figure 5.8C, however, the MSE x 10^3 lies at 54. The low ASMFR in the 20-24 age group, and again in the 40-45 age group, results in a predicted curve which greatly overestimates M (placing it on a par with that of the "all couples" graph) and subsequently underestimating the levels of ASMFR in the succeeding 3 age groups, giving a value of m much higher than the shape of the observed curve would actually warrant. A high value of MSE x 10^3 is, therefore, a good indicator that the M and m should be interpreted with great caution although the actual dimensions of the problem are not obvious until the ASMFR curves are drawn up.

In addition to the problems discussed above, Knodel and Wilson comment on a further intricacy of the interpretation of M and m:

> "... in Coale and Trussell's model, voluntary control has been defined in the more narrow sense of parity dependent behaviour; voluntary efforts to extend birth intervals but which are not dependent on the number of children already born can complicate the interpretation of both M and m. Since m is not sensitive to the deliberate spacing of births when they are independent

> of parity, it can seriously underestimate the extent of voluntary control of fertility in the more general sense which would include birth spacing and stopping attempts. In addition, the presence of deliberate birth spacing will depress the level of M and thus lower the estimate of the underlying level of natural fertility".
>
> (Knodel & Wilson, 1981, p. 56)

Returning to Figure 5.6, it would appear that the over 30s display fertility levels very close to those deemed 'natural' by Hinde and Wood's British Standard. If anything their fertility seems a little higher than that of the standard population, a fact confirmed by the negative values of m displayed for the "All couples" group in Table 5.14. The low level of fertility amongst those in the 20-29 year age groups still remains intriguing.

1851-1871 the level of M for the "All couples" group rises very slowly (as does r(20-24)), but 1871-1881 there is a sudden jump (whether measured by the CT or BS standards) in its value. The measure m for the group also follows this pattern; a slow increase 1851-1871 and then a marked rise 1871-1881. Although by neither standards is widespread fertility limitation achieved (see Section 5.4), between 1871 and 1881 m values swing from the negative into the positive; a gentle movement towards fertility limitation appears to gain considerable momentum over the latter decade.

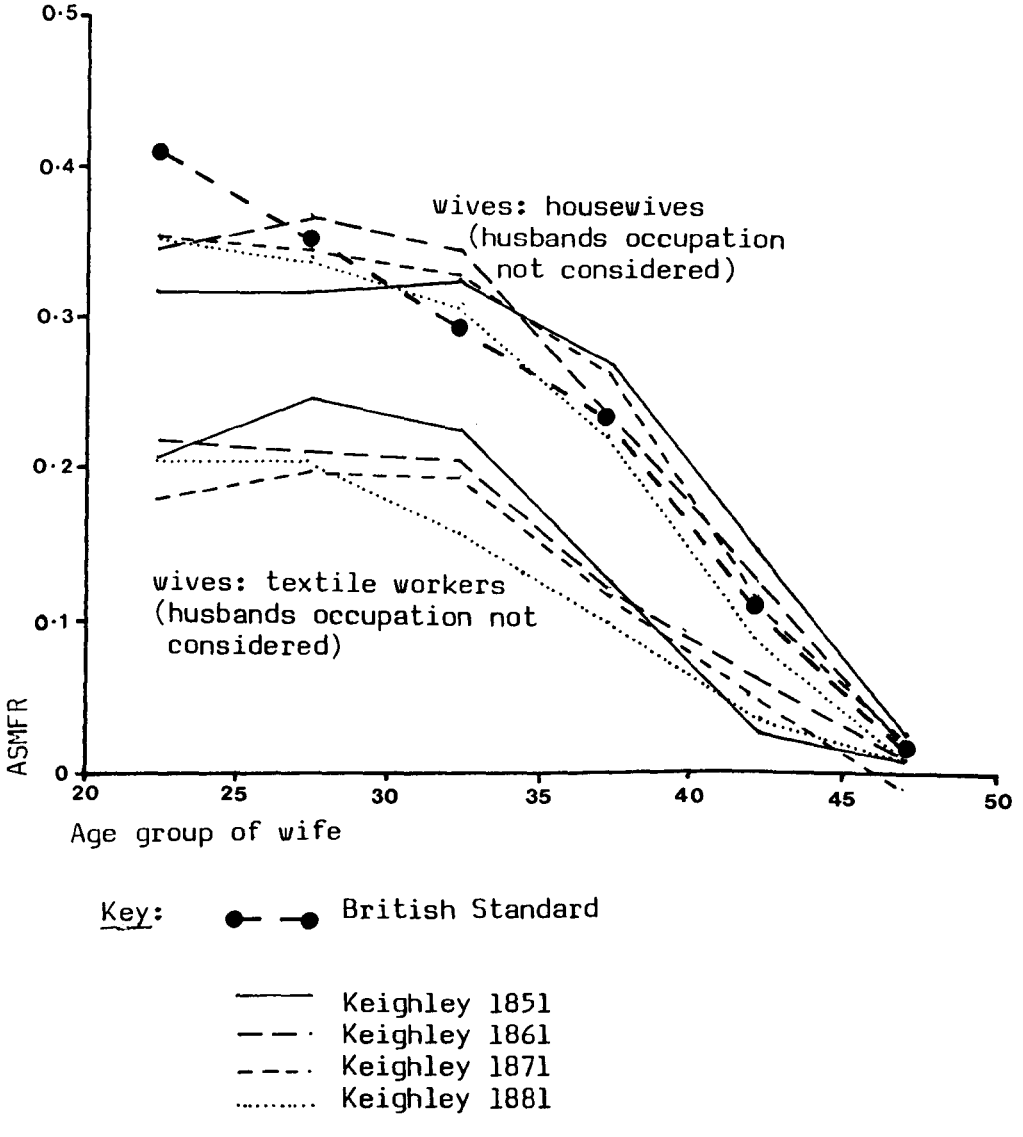
Knodel and Wilson expected that:

> "...if attempts to space births became more common as attempts to limit family size through stopping behaviour increase, we would expect declining values of M to coincide with rising values of m even when there was no genuine change in the underlying level of natural fertility.
>
> (ibid, p. 56)

However, in their study of couples married 1750-1899 in 14 German villages, the authors observed trends also observable in Keighley 1851-1881; a move towards higher fertility among younger married women, particularly those aged 20-24, and towards lower fertility among older women, especially those in their forties (Knodel & Wilson, 1981), i.e. while m was increasing M was also rising. In keeping with their long study period Knodel & Wilson considered long term changes, including increasing fecundity and a rising evidence of pre-nuptial pregnancy, to underlie the substantial increase in M amongst their study populations. While those factors may well be at work in Keighley, we might ask if changing economic conditions, or attitudes towards work, were not encouraging young women to have more children earlier in their marriage and then fewer later on. If this were true we must then enquire by what means the young women had previously kept their fertility low. Alternatively, improvements in enumeration or increased chances of infant survival could have been at work to increase observed levels of fertility amongst young wives. While SMAM for women decreased 1851-1871 in Keighley it remained almost static 1871-1881 and therefore it seems unlikely that decreasing age at marriage contributed to the upward jump of fertility amongst 20-24 year olds over the 1870s.

With those questions and possibilities in mind, the next step was to differentiate between two sets of married women: those who were housewives at census and those who were textile workers. Figure 5.9 displays the ASMFR curves calculated from each census for all the couples where the wife was a housewife and for all those where she was a textile worker. This allows visual comparison of the values for M and m for the two groups which are given in Table 5.19. As it has

Figure 5.9 Age Specific Marital Fertility curves for those couples where the wife was a housewife and for those couples where the wife was a textile worker: Keighley 1851-1881.



Source of Keighley figures: Census enumerators' books

been shown that the British Standard was, visually, much closer to the levels of fertility experienced in Keighley, it has been drawn on the diagram for comparison purposes. The low level of fertility amongst 20-29 year olds in Figure 5.6 is shown to be the result of very low levels of fertility amongst textile working wives, reflected in the extremely low values of M. The housewives' curve lies very close to that of the Standard, the small discrepancy in the 20-24 age group being low enough to attribute to the Sprague equation, but the very low level of M amongst textile working wives is undeniably the result of very low fertility amongst women in their 20s.

The convexity of the 1851-71 housewives' curves in relation to the British Standard (BS) schedule is obvious in the graph and is reflected in the levels of m in the BS columns of Table 5.17. Only in 1881 does a slight concavity appear and m become positive.

The textile curves illustrate the relationship between M and m; it is not the level of the standard schedule which dictates m but its shape. Thus, were a schedule "parallel" to the standard brought down to an M level on a par with that of the "textile" curves, it can be imagined that the 1851, 1871 and 1881 curves would be concave to it, but the 1861 curve might be slightly convex to it. This is indeed what the m figures in Table 5.19 show with the 1851 and 1881 curves giving m values highly indicative of successful attempts at parity specific family limitation.

The textile group's MSE x 10^3 values for 1851 and 1881 are, however, quite different: 54.0(CT)/64.0(BS) in 1851 indicating a "bad" fit in Keighley terms while 6.8(CT)/11.0(BS) in 1881 indicates a "good" fit. As explained above (see Figure 5.8 and accompanying text), however, the low value of r(20-24) amongst textile working wives in

1851 will contribute a considerable proportion of the poor fit and the predicted curve will yield a much higher m value than the observed curve truly merits. The good fit of the 1881 curve, and its shape when gauged visually, suggests that there was probably a higher degree of fertility control occurring amongst this group in 1881 than in any of the previous years. We have also seen that in 1851 the level of M amongst textile working wives was considerably overestimated and (as opposed to Table 5.19) Figure 5.9 shows that throughout the study period the r(20-24) for this group lay around 0.5% of n(20-24). Despite this the textile curves are not very dissimilar in shape to those of the housewives. We must draw the conclusion that the low fertility levels were a result of the extensive use of birth spacing or exceptionally low fecundability, rather than to the very widespread and successful use of parity specific limitation which would have produced curves considerably more concave. If, however, the practice of birth control was widespread but rather inefficient "accidents" would occur giving fertility profiles similar to those of couples who were deliberately and successfully spacing their children well apart- we must therefore be cautious in our interpretation and use of the term "birth spacing".

Amongst the four housewives' curves in Figure 5.7 it was noticeable that, for the most part, the lines lie above the level of the standard schedule. The good fits registered by MSE x 10^3 and the dip in the 1881 line below the standard encourage the belief that here again there is evidence for a move towards parity specific birth control 1851-1861 and an accelerated move 1871-1881.

When the two groups in Figure 5.9 are melded to form Figure 5.6 (there being only a tiny minority of married women in Keighley who

were not housewives or textile workers) we can see that the very low level of fertility amongst textile working wives acts on the housewives' curves to reduce them to the "overall" level. It would appear that this influence was strongest amongst the younger age groups and waned as the women grew older. As Table 5.20A shows, textile workers were much more heavily represented in the younger married age groups than the older ones, thus there were sufficient of them for their behaviour to influence the fertility levels of the younger married women quite markedly, but not enough of them in the older age groups to make very great reductions in the overall fertility levels there.

The meaning of Tables 5.14-5.19, therefore, has to be 'diagnosed' rather than interpreted. If we look only at groups of over 100 couples, and allow an MSE x 10^3 value of 50 to be the upper limit of an "acceptable fit", while assuming that any group with an MSE x 10^3 of 10-50 will have an m value rather higher than the observed fertility curve warrants, then we can begin to paint a picture of changing fertility behaviour in Keighley 1851-1881.

Considering first Table 5.14, which refers to groups defined by husband's occupation only, it would appear that certain groups within the population were moving towards parity specific marital fertility control more rapidly than others. Although the population as a whole did not attain quite the 0.2 m value required by Coale & Trussell as an indicator of the widespread use of fertility limitation, certain sectors within the community did. Far fewer groups achieved the 0.25 limitation point set by Hinde & Woods to apply to their British Standard, but some groups did reach the 0.3 level of m which the latter authors believe would indicate fertility limitation when the Coale-Trussell Standard was applied to a nineteenth-century British

population.

It should perhaps be noted here that in all but a very few cases the curve predicted by Coale & Trussell's model fits the observed curve more closely than that predicted by the Hinde & Woods model. The British Standard curve has a "flatter" trajectory and this means that the disparity in shape between the predicted curves and the observed ones, most of which peak in the 25-29 age group, will be somewhat greater using the former. Hinde & Woods have more accurately estimated the level of the 19th century fertility but Coale & Trussell come closer to the actual distribution of that fertility over the childbearing span, at least in the case of Keighley.

The shape of the British Standard (BS) curve also means that a considerably greater degree of concavity is required of an observed curve before it will indicate a positive value of m, while values of M will, of course, be higher; Hinde & Woods n(20-24) being lower than that of Coale & Trussel (CT).

In 1851 there is very little evidence that any form of parity specific birth control was being practised; almost all ms were negative. During 1851-1861 women married to textile workers experienced quite a marked movement towards higher m values. Comparing the high and low status textile workers both groups appear to have contributed to this movement, although the higher status workers began from a higher level, already having a positive m value (CT) in 1851. The wool combers were the only subgroup of textile workers with over 100 members in 1851 and they show emphatically no parity specific control being used in this, and in the following census. By 1861, however, overlookers can be considered and they show CT and BS m values highly indicative of a tendency to limit family size. Their M values were almost double

those of the combers; the latter must have been experiencing very low rates of fertility for reasons other than parity specific control. The only other textile group with over 100 members in 1861 was the weavers, but their MSE x 10^3 is well over 50, and therefore their M and m values are unreliable. The high status textile workers' movement towards the widespread use of birth control continued 1861-71, but at a much reduced rate. Indeed the high MSE x 10^3 values may indicate that 1871 saw less fertility limitation than 1861. Amongst this group there was a definite reduction in m between 1871 and 1881 (although the CT value of m remained over 0.25); and M fell sharply too. In contrast, the lower status textile workers display a very large upward movement in m over the 1870s, having previously shown no tendency towards widespread family limitation practices. Unfortunately, the very large MSE x 10^3 accompanying the 1881 figure suggests that M and m are much exaggerated, but a definite move towards fertility control amongst this group between 1871 and 1881 seems likely. The overall textile figures mirror the experiences of the group's two main subdivisions: a jump in m values 1851-1861, a hiatus and then another leap into values unequivocally indicating the use of parity specific birth control over the 1870s.

The metal-mechanical workers' experience is a much more muted version of the textile workers. A very small rise in m 1851-1861 goes nowhere over the 1861-71 decade but climbs steeply 1871-1881. Amongst the TETMM values there is practically no change in m 1851-1871, but again a marked upward movement 1871-1881, this step being more abrupt in some of the TETMM subgroups than others. Interestingly while both metal-mechanical workers and textile workers saw quite obvious rises in M 1851-1861, the TETMM workers did not experience such a rise until 1871-1881.

Turning to Table 5.15 and considering only those couples where the wife was a housewife, we must first note the decline in the number of groups with 100 or more members. In general m values appear to be fractionally higher than those for the "all couples" groups, suggesting a slightly stronger degree of parity specific limitation, but it is in M that the higher values for the housewives' groups are most striking. Young housewives are much more fertile than young wives in the population as a whole. For a very obvious example, compare the two groups where the husband was a textile worker in 1861: MSE x 10^3 values indicate that housewives' fertility overall is a somewhat better fit to the two models than the "all couples" fertility, however, amongst the subgroups there is no consistent pattern of "better fit" from Table 5.14 to Table 5.15. The three main male occupational groups - TETMM, metal-mechanical workers and textile workers - display similar patterns to those of the same "all couples" groups when only those who have wives at home are considered. The TETMM group, after three slowly rising, but negative values, abruptly yields a CT m of 0.24 in 1881. The other two groups had positive CT m values by 1861, although they too showed major increases in m value over the 1870s. The rise in m over the 1850s amongst the textile/housewife group is more marked than amongst the "textile" population in general because it is followed, 1861-1871, by a much greater drop in value. Both higher and lower status textile working husbands whose wives were housewives experienced the upswing in m 1851-1861 (at which point the higher status group achieved m values highly indicative of mass use of parity specific fertility control), but it was the lower status group who contributed the greater ebb in the value of m 1861-1871.

Young housewives, therefore, appear to have been having considerably more children than young wives in the population as a whole while older ones appear to have been a little more likely than their peers to have been resorting to family limitation methods. Couples with textile working husbands, especially those in higher status positions, appear to have led the way and been the most successful in these practices. The origins of this behaviour would appear to lie in the events or society of the 1850s or even earlier.

With the different experiences of the status divisions amongst textile workers becoming apparent, Tables 5.16 and 5.17 turn the spotlight on couples differentiated by husband's class rather than occupation. Textile workers are treated as a separate class and hence the divisions are not referred to here as "social classes". The Class I group never had over 100 members and has been excluded from the following discussion.

Most groups in the two tables have relatively good MSE x 10^3s; the highest value is no more than 30. Class II merits special mention since its m values decrease noticeably from 1851 to 1861 and then remain relatively static across the next 20 years, in contrast to all the lower class groups who display their lowest points in 1851. Amongst the "all couples" groups of Table 5.16, Class III displays the steadiest progression upwards of m values of all the working class groups. Class IV experienced a rise 1851-1861, but then no rise at all 1861-1871, before the big jump 1871-1881. Class V follow a pattern much like that of the textile workers: a rise in m 1851-61, a decrease 1861-71 and then a big increase 1871-1881. Amongst Class VI, the textile workers, however, m turns positive on the CT scale two decades before any of the other working classes and

is higher than the values of Class II by 1861. There is little to suggest that higher classes could consistently expect their younger wives to produce more children than the "lower orders", although the textile workers when compared with Class V do seem to have had higher, but only slightly higher, values of M across the study period. Where the class divisions were further divided into those who were married to housewives (Table 5.17) the patterns seen in Table 5.16 were repeated, although the values of M were generally higher and it would appear from the m values the movement towards the use of birth control was somewhat earlier, although this may stem from the higher levels of M. In the two "class" tables the upswing of m 1851-1861 is evident amongst all the working class groups. It would seem that the factors affecting the textile workers' fertility were having repercussions throughout the community.

As the class divisions contained, for the most part, much larger numbers of couples than the husband's occupational groups, it was possible to identify the occasions where more than 45 couples within a husband's class group included a wife who worked in textiles. Unfortunately, as Table 5.18 shows, only in the case of Class V and the textile class VI did the numbers of such couples exceed 100. The high MSE x 10^3s, ranging from the merely mediocre to the truly abominable, warn that the Ms and ms are not easily interpretable but the general impression is of low Ms and high ms, especially when compared to the housewives' figures in Table 5.17.

Women's work appears to have been suppressing fertility amongst young and old alike, or women of all ages were suppressing their fertility in order to work, or only women who were not fertile could work.

These three options were further explored by using population divisions based on the wife's occupation rather than that of the husband. The contrast between the housewives' row of Table 5.19 and those of the working wives is very clear, despite the high MSE x 10^3s and consequent unreliability of certain of the figures. Neither the CT nor the BS models of fertility predict well the fertility for groups where the wife is working; even some of the groups with over 100 members have MSE x 10^3s well over 100. Why is this?

If the ASMFRs for the groups included in Table 5.19 are drawn up the women in some of them would appear to have virtually stopped child-bearing by their late 30s or early 40s. This could show very efficient use of family limitation. However, as Table 5.19 demonstrates, some groups where the wives were working had certain age groups where there were no member samples. This suggests that either those occupations were age selective or else fertility selective: only those free from the ties of child care could do the work, only those with low fertility would appear amongst the "working wives" population. This is certainly consistent with the low levels of M and of overall fertility amongst working wives. But were women in the older age groups limiting their fertility in order to work? Were they working because they had reached menopause early? Or because they had limited their fertility for some other reason? Or perhaps they needed the additional wages and their family were old enough to cope with the mother's absence from home?

Working women's fertility may be difficult to predict because a longitudinal phenomenon (a woman's fertility) is being measured against a "point-in-time" snapshot of another phenomenon (a woman's occupation at census). As the plot of a "movie" is difficult to interpret from a "still" so the snapshot of fertility behaviour may be misinterpreted

if due caution is not exercised. "Changing circumstances over time" is a recurring problem in an established population: one census's woolcomber is the next's mechanic, one decade's weaver the next housewife. If such changes are age-, fertility- or circumstance-specific then the levels of ASMFR for affected groups will not be a true reflection of fertility behaviour per se, but rather of a kaleidoscope of factors which bring couples into focus in a particular configuration as the "snapshot" is taken of their ever-changing lives within the constantly evolving community of which they are a part.

Thus certain assumptions made by Coale and Trussell are not always met when their model is applied to the subdivisions of a population. In the 1974 paper they speak of:

> "The basic assumption upon which the model (fertility) schedules are calculated is that fertility conforms to the structure by age created by multiplying together two model schedules: a sequence of model proportions ever married at each age and a model schedule of marital fertility. Thus, if the proportion ever married at age a in the model schedule of nuptiality is G(a), and the proportion of married women at age a experiencing a live birth in the model schedule of marital fertility is r(a), age specific fertility is f(a) = G(a). r(a). This construction applies exactly to a hypothetical population in which there is no fertility outside marriage, and no dissolution of marriage before the end of the childbearing span of ages". (my emphasis).
>
> (Coale & Trussell, 1974, p. 186)

In a population where women begin their married lives as factory workers, but later leave the mills to become housewives any measure of fertility taken amongst the working wives will be confronted with a situation comparable to widespread marital termination.

Coale and Trussell further note that:

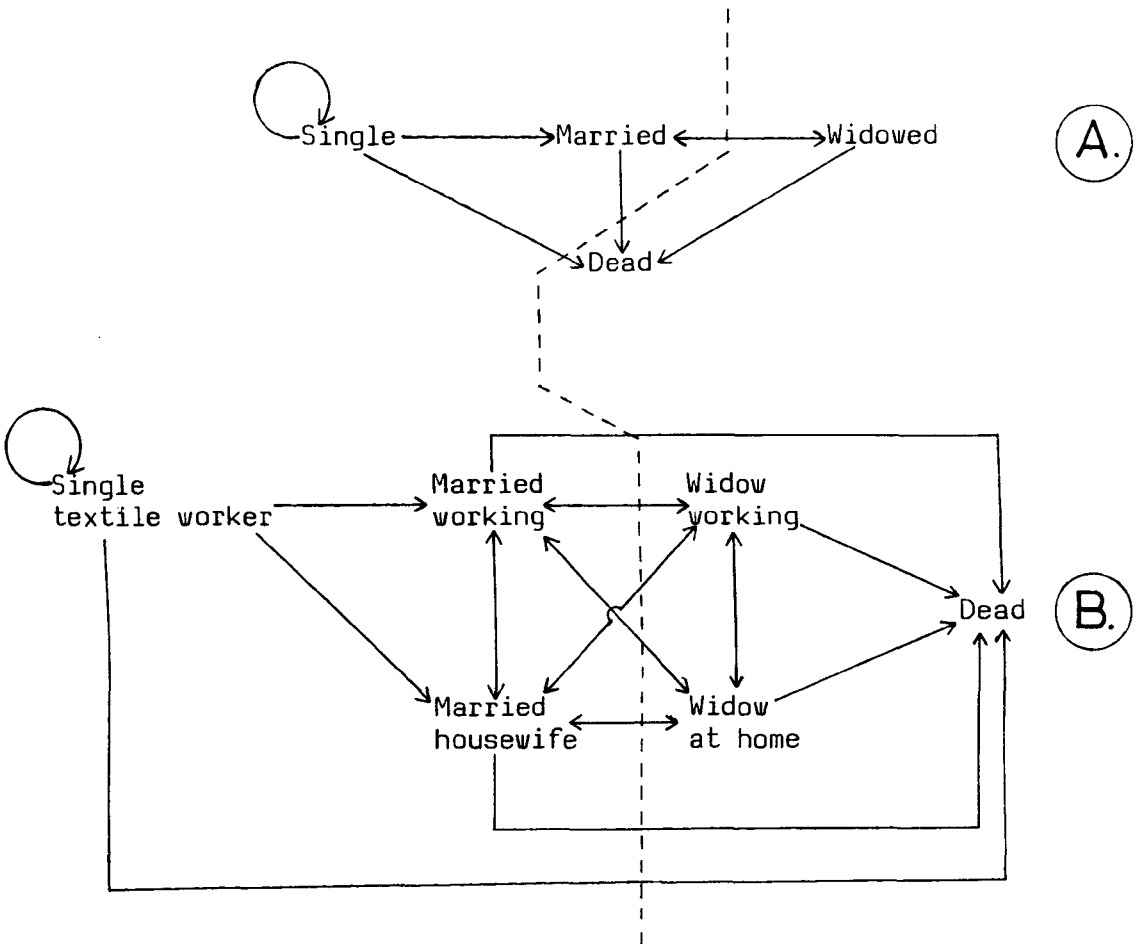
> "One of the two basic components of the model fertility schedules - the standard schedule of first marriage frequencies - logically fits the experience of a cohort as it moves through life; it cannot match the proportion ever married by age in a cross section during a period of rapid change in nuptiality...the parameters (a_o, k and m)[11] that in periods of constant nuptiality approximately specify the age pattern of entry into cohabitation and the departure of marital fertility from the "natural" pattern cannot be so interpreted in a period of rapid change.
>
> (Coale and Trussell, 1974, p. 193)

In the case of working women changing rates of remaining in the labour force on marriage and length of stay at work after marriage may well act to bring about apparent rapid changes in nuptiality, i.e. entry into the marital groups whose fertility is to be measured, thus affecting the validity of M. Those problems arise from the fact that a woman in Keighley had, potentially, a more complex life path than the "unmarried-married-housewife" path assumed in Coale & Trussell's model; for various sub-groups of the population M and m reflect not only reproductive behaviour, but labour market participation levels as well.

Figure 5.10A illustrates the Coale-Trussell life path for women: once married the only way out is by widowhood or death. The model, in fact, considers neither of those states as it assumes there is no marital dissolution (by death or divorce) before the age of 50 (Coale & Trussell, 1974); a woman in the 15-49 age group is therefore either single or she is married.

Figure 5.10B represents a situation closer to that operating in mid-Victorian Keighley, although it has been assumed that all single women were textile workers, for simplicity's sake. As there is a problem in the present study identifying women under the age of 50

Figure 5.10 Flow diagrams representing life paths for women: (A) as implied by Coale and Trussell's model schedules of marital fertility, and (B) as found in Keighley.



who have remarried once widowed, and although their numbers will be proportionately small, this source of married women has been included for completeness sake in Figure 5.10B.

In each of the diagrams, if a woman is found to the right of the dotted line at census she will not be included in the measurements of fertility. Her circumstances, if found to the left of the line, will dictate whether or not she is to be included. It is easy to see the permutations when a population is being studied as a whole are far fewer than those when it is to be subdivided. The measures of M and m for various occupational groups will depend very much on the rate at which the wives in those groups progress along the lines shown on the left hand side of Figure 5.10B, i.e. in what proportions and at what rates they marry; how many of them stay at work after marriage, and for how long they do so; how many return to work at some point after their marriage, and so on. If we then recall that those diagrams deal with only half the marriage partnership and that in each case the husband may also be moving from occupation to occupation then the large MSE x 10^3s in Table 5.19 are easily understood. Different job requirements may mean that a particular "type" of individual is usually found doing a particular type of work. Figure 5.11 shows how skill requirements might make a male job age-specific thus resulting in a work force composed of men from a roughly similar age band, which would in turn lead to their wives also being concentrated in certain age bands assuming that there is on average only a few years age difference between spouses], which would, as we have seen, affect fertility measures.

Selectivity may well underlie the high levels of M amongst the housewives group (Table 5.19). As Table 5.3 has shown, the Singulate Mean Age at Marriage for women in Keighley lay at each of the four

Figure 5.11 How job requirements can lead to age-specific employment amongst men.

Job requirement	Men's age bracket.			
	Youth	Prime	Middle age	Old age
Dexterity	X			
Skill		X	X	X
Strength		X		
Authority		X	X	
None	X	X	X	X

censuses, within the 25-29 age group. Thus the average woman would have had little, if any, time between marriage and her 25th birthday to produce several children. However, those women who married in their teens or early 20s some years before the census and had borne children were more likely to have been housewives at census, as by then they would be tied to the house by the duties of motherhood.

This again raises the question of textile working wives' fertility. If a woman had to be fertile to become a housewife did some textile workers delay marriage, and therefore childbearing, in order that they could remain at work? Did others marry as early as the housewives, but remain childless longer, thus yielding lower fertility levels, and if so was this a voluntary or involuntary occurrence? This question will be investigated further in Chapter 6.

To summarise: In this section we have observed that there does appear to have been a move towards the widespread use of parity specific fertility limitation amongst Keighley's married population over the 30 years between 1851 and 1881. The trend, as measured by m, was not a steady one, stagnating or receding over the 1860s, but the upward movement became most pronounced between 1871 and 1881, the decade in which the birth rate for England and Wales as a whole began to decline. Within Keighley's working class population textile workers and their wives appear to have led the change in behaviour, with the higher status textile workers in the vanguard.

Women's work appears to be very closely linked to fertility levels in Keighley; the contrast in fertility levels between working wives and housewives suggesting that women with children found it difficult to hold down a factory job, and the varying proportion of wives working in the male occupational groups affecting their fertility levels.

The high values of m amongst working women were almost certainly the result of women leaving the labour force rather than of deliberate family limitation per se. The differences in fertility between working and non-working women are particularly marked in the younger age groups, M being much lower amongst working wives. The mechanisms underlying this state of affairs is, as yet, unclear.

Having examined the Ms, ms and MSE x 10^3s for the study population we have shown that, while the assumptions made by Coale & Trussell (and later Hinde and Woods) hold for overall populations, their validity became increasingly questionable the further one proceeds to subdivide the population. In those cases interpretation of M and m is much more difficult. In addition, while we can gauge the relative levels of M and m between groups, the overall fertility level of each group is only reflected by those measures and not explicitly stated. To examine the relative levels of overall fertility and to understand how they are produced we must turn to the Total Marital Fertility Rates.

Section 5.6B: Total Marital Fertility Rates

The method of calculating TMFRs is outlined in footnote 4 for Chapter 5. Again, due to the stochastic nature of human reproduction and the vagaries of Sprague's Osculatory Interpolation equation, the level of the TMFR can be influenced by age groups with small numbers of members returning uncharacteristic age specific marital fertility rates (ASMFRs). Thus, in this section, remarks will again be confined to groups of over 100 couples, although, as we are dealing with populations, the TMFR is a measure of the behaviour and idiosyncrasies within each group even below this figure. The advantages of the TMFR over M and m are that, firstly, the overall level of

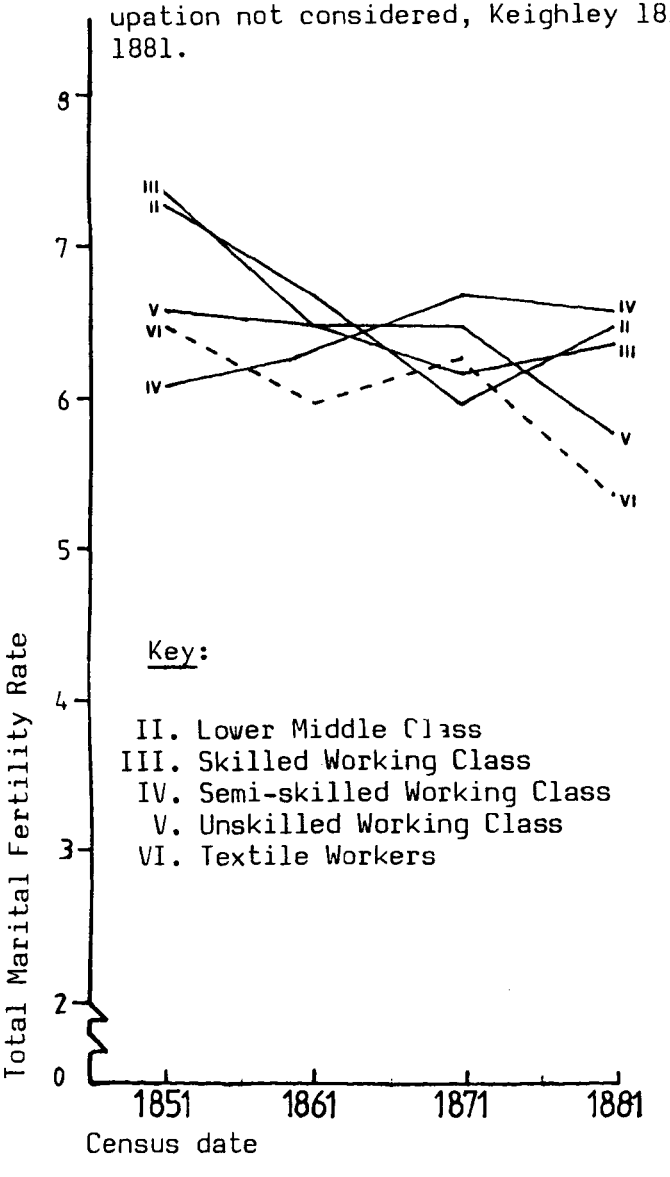
fertility within a group is represented and, secondly, that this is calculated directly from the observed data rather than via models of fertility, however, it also has several disadvantages.

Figure 5.12 "redraws" Figure 1.2, showing TMFRs for the study population rather than for that of England and Wales as a whole. As in the report on the 1911 "Fertility" census only the husbands' occupations are considered. The accompanying figures are given in Table 5.20A. Since the Class I group never exceeds 100 couples it has not been included in Figure 5.12. The two figures, 5.12 and 1.2, are not strictly comparable as the latter records the fertility of different marriage cohorts some 25 years after the last marriage, while the former consists of points estimated from the fertility of women still within the childbearing age span at the relevant census. It is perhaps not surprising, therefore, that Figure 5.12 does not show the steady downturn evident in the lines of Figure 1.2, although a downward trend is discernable.

That the lines in Figure 1.2 are more widely spread and neatly graded by class serves as a reminder that in the calculation of the fertility measures it was assumed that child and infant mortality rates were uniform throughout Keighley over the study period (see Chapter 5, Section 5B). The problem of maternal-age-specific infant and child mortality rates has already been discussed in Section 5.6A above. Here, however, the main concern is class specific differences in child and infant mortality.

In his study of fertility in Sheffield from 1851-1871 Smith estimated class-specific infant and child mortality inflation factors (K) to be used in the calculation of fertility measures, from the Sheffield Municipal Cemetery records for 1860-62. His methods are

Figure 5.12 Total Marital Fertility Rates by the husband's "class"; wife's occupation not considered, Keighley 1851-1881.



Source: Census enumerators books.

Figure 5.13 TMFRs by husband's "class" when (A) the wife was a housewife and (B) when she was a textile worker, Keighley 1851-1881.

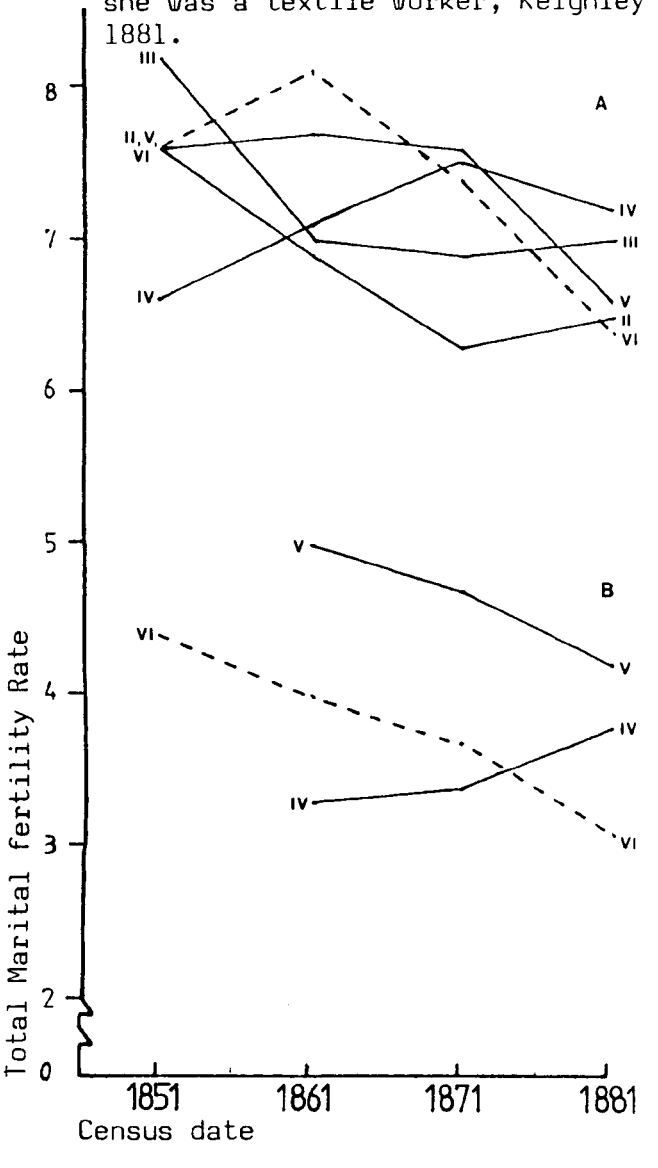


Table 5.20 The Total Marital Fertility Rate for couples in each of the husband's "class" groups when [A] the wife's occupation is not considered, [B] the wife is a housewife, and [C] the wife is employed in textiles, Keighley 1851-1881.

Husband's Class	Wife's Occupation											
	A				B				C			
	1851	1861	1871	1881	1851	1861	1871	1881	1851	1861	1871	1881
I. Professional	5.5	9.8	7.6	7.1		10.3	7.7	7.1				
II. Lower Middle Class	**7.3**	**6.7**	**6.0**	**6.5**	**7.6**	**6.9**	**6.3**	**6.5**				
III. Skilled	**7.4**	**6.5**	**6.2**	**6.4**	**8.2**	**7.0**	**6.9**	**7.0**			2.8	2.5
IV. Semi-skilled	**6.1**	**6.3**	**6.7**	**6.6**	**6.6**	**7.1**	**7.5**	**7.2**	**	**3.3**	**3.4**	**3.8**
V. Un-skilled	**6.6**	**6.5**	**6.5**	**5.8**	**7.6**	**7.7**	**7.6**	**6.6**		**5.0**	**4.7**	**4.2**
VI. Textiles	**6.5**	**6.0**	**6.3**	**5.4**	**7.6**	**8.1**	**7.4**	**6.4**	**4.4**	**4.0**	**3.7**	**3.1**

Source: Census Enumerators' books

Notes: A blank indicates that a group consisted of fewer than 45 couples and therefore the fertility measures could not be calculated (see text).

Bold type indicates groups of at least 100 couples.

** indicates that although a group comprised 45 couples or over one , or more, of the age groups contained no women and therefore the fertility measures could not be calculated (see text).

laid out in Woods & Smith (1983). Keighley's Municipal Cemetery records did not record the occupation of a child's father, nor of a married woman's husband and therefore Smith's calculations could not be reworked for Keighley. Smith's values for K could have been used in calculating Keighley's fertility measures, but there are six arguments against following this course. First, the numbers from which Smith derived certain of his class-specific mortality figures were very small (Smith, C., 1982) and thus their accuracy must be suspect. The complicated set of demographic assumptions necessary to make the mortality estimates would further limit the reliability of those figures. Second, Sheffield was a very different town from Keighley, being much larger and encompassing clearer-cut spatial divisions between the social classes. It was doubted that Keighley's mortality differentials would be as marked as those of Sheffield.[12] Third, while part of the work on Keighley involved class divisions, the main groupings were by occupation and within each of those several classes would be represented. It would be very difficult to devise occupation-specific K factors. Fourth, Smith calculated class-specific mortality on the basis of male occupations. In Keighley women's occupations were also to be considered; there were no guide-lines as to whether housewives' children were more likely to die than those of a textile worker. Nor was there any way of telling what the mother's occupation had been at the time of the infant's birth and thus how the latter's life chances were affected. Fifth, in the Keighley study male textile workers were being considered as a separate class group. In almost every other aspect they lay in status between Classes IV and V. Smith had calculated that the latter two groups should have the same value of K applied to them. This raised the

question of whether textile workers should be given the same K value or whether they should have an even higher one, notorious as they were for their high infant and child mortality rates. If this were done it would amount to saying that textile workers' low fertility was a result of high infant mortality when, according to the 1911 "Fertility" census report their low fertility was due to the small number of children ever born to couples in the "textile" class. Sixth, if Smith's K values were used they would have to be assumed to be constant over time, just as the 1.3 value had to be held constant (see Section 5.5B). In this case the K values would serve only to alter the level of one group's TMFRs in relation to those of another group. Within a group the relationship of the TMFRs over time would not alter; i.e. the shape of line joining the group's TMFR values would not change.(13) If this is acknowledged, and there is some uncertainty as to the values which K should take, it would appear simpler to ascribe the one K value to all classes with interpretation of the TMFRs taking this into account. The decision not to apply Smith's inflation factors, and the inability to accurately calculate similar figures for Keighley, means that interpretation of the TMFRs for class groups in Figure 5.12 and Table 5.20 is restricted to the shape of the individual time-path lines; no comment can be made about their relative levels. It is likely that in Figure 5.12 Class II TMFRs lie somewhat too high while those of the lower classes are too low. It must also be remembered that compositional changes within a group, shifts in nuptiality or shifts in mortality may effect as big a change in TMFR as actual alterations in fertility behaviour.

Let us look first at the relationship between TMFR, M and m. Classes II and III have very similar shaped curves but as the decline

in fertility amongst its younger members (M shows a steady decline - Table 5.16) while the older members seem to have increased their fertility (m drops), especially over the 1850s; so the decline in Class III's fertility appears to be due mainly to declining fertility amongst the older couples, although again over the 1850s the younger couples were reducing their fertility. The rise in Class II's fertility over the 1870s appears to be almost solely the result of increasing fertility in the younger age groups whereas the modest rise in fertility amongst Class III occurs despite a marked rise in m thanks to a noticeable increase in M.

In contrast to the above groups, the Class IV line shows a marked upward slope between the 1851 and 1871 points. Over the 1850s this can be ascribed to a combined rise in M and m but the 1860s saw no change in m and only a modest rise in M yet there was a steeper rise in TMFR than over the previous decade; more children appeared to have survived to be enumerated in 1871 than in 1861. Between 1871 and 1881 Class IV's TMFR dropped a little; despite a jump in M, a large increase in m reduced the total number of children born per woman.

Class V's TMFR remained relatively stable over the 1850s and 1860s with only small fluctuations in M and an oscillating m. Between 1870 and 1880 m made a dramatic leap from -0.16 to +0.13, and this is reflected in the sharp downturn in TMFR over this decade.

The textile workers of Class VI have the greatest fluctuation in their TMFR values. A rise in the value of M 1851-1861 is counteracted by a very large rise in m and TMFR dropped. Over the 1860s there was a small increase in M and a small decrease in m. The consequent increase in TMFR, however, seems relatively large for the amount of change in the two other parameters and, as in the case of Class IV,

an additional factor appears to be at work in determining the level of TMFR. Between 1871 and 1881 the dominant force in reducing the textile workers' overall fertility levels was a pronounced upward shift in m, taking it well above the "widespread parity specific control" threshold.

As has been, and will be, shown TMFRs are not solely dependent on levels of M and m and therefore comparisons between different groups are not strictly possible. Comparison within groups would appear more legitimate as it might be expected that intra-group differences would be smaller than inter-group ones. Figure 5.13 divides the classes in Figure 5.12 into couples where the wife is a housewife (5.13A) and those where she was a textile worker (5.13B). Again only those instances where a group includes 100 or more couples are shown. The accompanying figures can be found in Table 5.20B and C. Comparisons can now be carried out between the three lines for each of the husbands' class groups, and within the 'housewives' group and the 'working wives' group.

If, first, we compare Figures 5.13A with 5.12 it can be seen that while the general shape of the graphs remain the same, for all but the textile class VI, their spacing has altered quite dramatically. The intra-group differences amongst 'housewives' could well be ascribed to differing levels of mortality experienced by the various classes; certainly the average difference between the points on Figure 5.12 and those on Figure 5.13A increase as class decreases, being o.2 for Class II and 1.02 for Class V. However commonsense, and the change in shape as well as level of the Class VI TMFR line between Figures 5.12 and 5.13A, would indicate that other factors were at work. If mortality were expected to be higher amongst the lower

classes then working women married to Class V men would be expected to have lower TMFRs than those of working women married to Class IV men, if not of textile working women married to textile workers (textile/textile couples). As Figure 5.13B shows, however, this was not the case in Keighley; Class V/textile couples had TMFRs of a considerably higher level than Class IV/textile couples - but this does not disprove the mortality differential theory. Tables 5.5A and B and Figure 3.14 indicate that Class V husbands had the highest proportion of working wives of all the class groups; in this class a woman's extra income was needed over and above, or even in place of, that of her husband's in order to make ends meet in a great number of cases. As a corollary of this a woman would remain out at work, even when the couple had a young family at home demanding attention.

It could be argued that the children of Class V/textile couples were more likely to survive than those of the two other groups shown in Figure 5.13B, but this seems unlikely in the face of evidence already presented that in practically all other facets of Keighley life those in Class V had the worst experience of all the groups. Whether the children of Class V men and working wives had a better survival rate than the children of similar men whose wives were housewives is a question not easily resolved. The extra care and supervision which a mother at home could give a child might perhaps lessen the risks of accident or illness and a non-working mother might be better rested and nourished thus reducing her chances of miscarriage or of having a weak, sickly child. On the other hand, amongst the very poor where the mother's wages were needed for survival, a non-working mother could be equally damaging to a child's health and well being. Again by

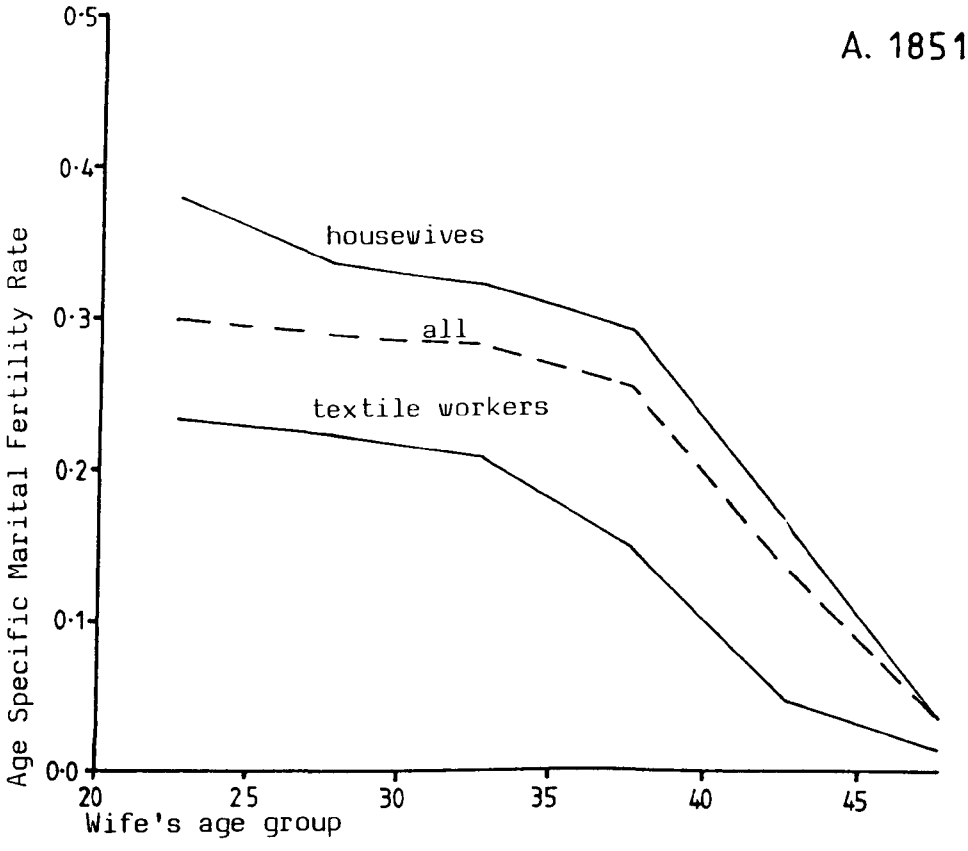
looking at "point-in-time" census data we only have an idea of the mother's (and the father's) occupation at census we therefore cannot gauge survival rates by parent's occupation at the birth of a child. The pattern is less acute when father's occupation is being considered as it is unlikely that any change in his occupation would be as directly linked to the birth of a child as that of his wife might be.

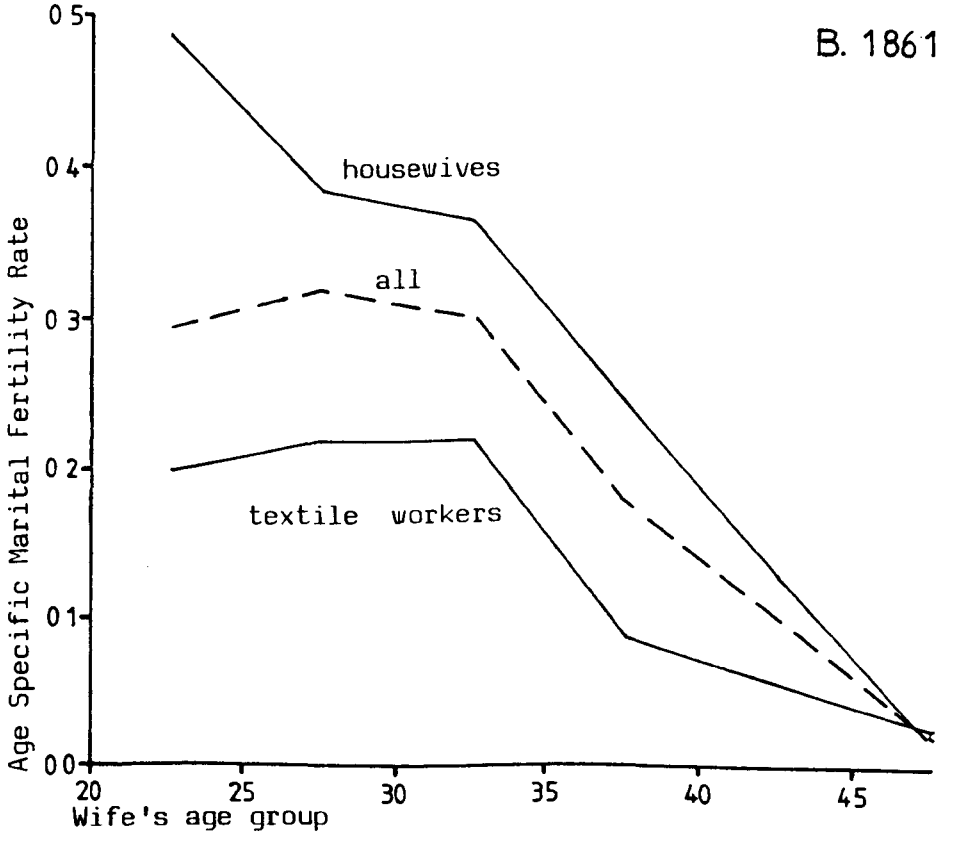
If we assume that couples in the same class group have similar chances of losing a child, no matter what the wife's occupation then it is possible to comment on the differences between Figure 5.13A and B. Unfortunately, only the textile Class VI had over 100 of their women working in textiles in 1851; neither Class II nor Class III had 100 wives working in textiles in any of the four censuses.

The most prominent feature of Figure 5.13 is the fact that the two textile lines follow very different paths from 1851 to 1861; the "housewives" line rising while the 'textile wives' line falls. Looking across to Figure 5.12 we also see that between 1861 and 1871 the textile line rises while in Figure 5.13 the two lines fall over this decade. According to Table 5.17 the rise in the textile/housewife couples' TMFR (1851-1861) is attributable to a very large increase in M counterbalancing an increase in m, resulting in an increase in TMFR of 0.5 of a child. Amongst the textile/textile couples over the same decade, however, a drop of 0.3 of a child occurred yet was only accompanied by a small decrease in M and a minimal downward shift in m. Something more than the workings of M and m was therefore producing the TMFRs observed.

Figure 5.14 illustrates the differences between the ASMFRs curves of the three textile groups in Figures 5.12 and 5.13 for 1851 and 1861. Compared to the 1851 housewife curves the 1861 curve

Figure 5.14 Age Specific Marital Fertility Rate curves for couples where the husbands were textile workers, by wife's occupation; Keighley 1851 (A) and 1861 (B).





Source: Census enumerators' books.

indicates much higher fertility amongst women aged less than 35, particularly amongst the 20-24 year olds. Those above the age of 35 in 1861, however, are shown to have considerably fewer children than their counterparts in 1851. Amongst the textile working wives only those aged 35-39 showed a marked decline in ASMFR between 1851 and 1861, although the under 35s experienced a small drop, which was most apparent amongst the 20-24 age group. As Figure 3.4 and Table 5.5 indicated 1861 saw a large upsurge in the number of Class VI men whose wives were working in the mills and this is reflected in the greater gap between the housewives and all couples ASMFR curves in 1861. The gap was particularly wide amongst the youngest wives, 54.3 per cent of whom worked in the mills in 1851; by 1861 this figure had risen to 75.4 per cent. In 1851 the proportion of textile workers' wives who were also working in the textile mills by age group were: 25-29:41.2 per cent; 30-34:36.6 per cent; 35-39:27.9 per cent; 40-44:19.9 per cent and 45-49:7.5 per cent. In 1861 these percentages were 50.0, 45.8, 41.9, 38.8, and 24.7 respectively. Thus when more hands were needed in the mills it was the very young wives and those over the age of 35 who responded, women aged 25-35 were less likely to leave their homes presumably because they were more likely to have very young children to look after.

Between 1851 and 1861 a further change occurred. While 37.0 per cent of the textile men were married to women aged less than 30 in 1851, only 26.0 per cent had wives in this age group in 1861. The textile population appears, therefore, to have been delaying marriage. This impression might also be given, however, if a large number of young couples left the town in search of employment elsewhere, or if young men were finding employment in other industries.(14)

The very high fertility amongst those textile/housewife couples where the wife was aged 20-24 in 1861 suggests that only the most fertile women in this age group were at home - almost all of their peers who were unburdened by children were out at work in the mills. The slightly lower ASMFRs amongst young textile/textile couples in 1861 relative to 1851 combined with the reduced proportion in this age group and the higher proportion of 20-24 year olds working in the mills suggests that by getting married at a slightly later age the couples were reducing the length of time the bride would have in the 20-24 age group therefore reducing her chances of bearing a child before her 25th birthday and increasing the likelihood that she would still be out at work in the mills when enumerated in the census. This scenario is compatible with high fertility amongst housewives if, with the delay in marriage, pre-nuptial pregnancy was increasingly the reason for marriage in the 20-24 age group thus boosting fertility amongst housewives for reasons discussed in Section 5.6A above.

Alternatively in 1861 a large number of women wanted to remain at work in the mills for a longer period so they were delaying their childbearing or else many women who would have left work immediately upon marriage, thus reducing the fertility of housewives and increasing that of the textile workers, were remaining at work longer. These options are not quite so compatible with the reduction in the number of young wives, however.

It would appear that older male textile workers were finding times hard in the 1860s; many more of their wives were going out to work and those who remained at home seem to have been limiting the number of their children. A flood of those older women with few young children into the textile mills might reduce the ASMFRs

of the housewives.. As the 1861 curves in Figure 5.14 show this did not happen; housewives in their late 30s and 40s were having fewer children than in 1851.

The combination of the low fertility amongst textile workers and the very high proportion of the wives of Class VI who were working in the mills in 1861 served to reduce the overall TMFR of Class VI men (Figure 5.12). However, the rise in housewives' fertility between 1851 and 1861 (Figure 5.13A) disguises the fact that a substantial number of textile/housewife couples appear to have been limiting their fertility during the 1850s, that the textile population was 'losing' young couples, and that many more women seemed to be free of the ties of a young family and able to go out to work. There could be several reasons for this latter situation. It is possible that quite a high proportion of women in 1851 with few or no children had opted not to go out to work, but in the changed economic climate of the early 1860s women in a similar position had chosen to go to work in the mills. It could also be that newly married textile workers were delaying starting a family for longer or spacing their children more widely, than they would have done in 1851 with the result that more of them were still at work in 1861 than they would have been at the same stage in their marriage a decade previously. It is also possible that the chicken may have come before the egg; because the women had to go out to work for financial reasons, or were attracted into the mills during the boom period, their fertility was reduced as the extra work meant that intercourse, and therefore pregnancy, was less frequent. Finally with greater numbers of women out at work the incidence of stillbirth and miscarriage may have risen, accompanied by a greater number of premature births and sickly infants with

consequences for the infant mortality rate. In what combination those scenarios were operating over the 1851-1861 period is at present unclear.

In contrast to the 1851-1861 lines in Figures 5.12 and 13, over the 1861-71 period the 'overall textile' TMFR rose (Figure 5.12) while both the textile/housewife and textile/textile TMFRs declined (Figure 5.13). The reason for this apparent contradiction lies in the fact that between 1861 and 1871 the proportion of Class VI men whose wives worked in textiles dropped from 43.8 per cent to 27.1 per cent, thus the "pull down" effect of the textile workers' low fertility in 1871 was not as great as that exercised by their greater numbers a decade earlier. In detail: the overall Class VI group saw only a very small rise in M over the 1860s. Amongst textile/housewife couples, however, M dropped dramatically. The textile/textile couples on the other hand saw a quite large rise in M. The latter group still represented 56.8 per cent of the 20-24 age group in the overall textile population and therefore their influence stabilised the overall value of M. In the case of m the opposite happened. The textile/textile couples saw more than a doubling in the value of m, whereas the textile/housewife group saw a fall in m. The older age groups were far less well represented amongst the textile/textile population in 1871 than they had been in 1861 therefore their large m value had little impact on the overall textile m which dropped slightly. Thus the large decrease in M amongst textile/housewife couples sent their TMFR downwards over the 1860s, the large increase in m sent the TMFR of the textile/textile couples in a similar direction but the two in combination, along with the changing age distribution of working wives, resulted in the overall

textile TMFR rising. The decrease in M amongst the housewives and the increase amongst textile workers can be read as indicating that women were once again choosing to leave work upon marriage, rather then awaiting the arrival of children thus decreasing the number of childless married women in the textile workforce and increasing their numbers amongst housewives. In the older age groups only the women with very few or no young children were going out to work thus giving the impression of increased fertility amongst housewives and decreased fertility amongst textile workers. It is thus unclear whether some housewives in the older age groups were actually limiting their fertility. By 1881 there is little doubt the wives of textile workers were using parity specific methods of birth control as all three lines in Figure 5.12 and 5.13 were moving downward due to large upward swings in m, although the very large MSE x 10^3s of the textile/textile couples in 1881 put the very high values of M and m under suspicion.

Class IV and Class V men also had a peak number of their wives working in textiles in 1861, and both also seem to have a smaller percentage of wives in their early 20s at census. It seems likely, therefore, that age at marriage was being somewhat delayed, as, had young textile workers been moving into alternative occupations, they would be most likely to fall into either Class IV or Class V and boost their population. The increase in the proportion of working wives amongst men in the two classes in 1861 did not appear, on the surface at least, to greatly influence the relationship between the respective levels of the 'housewife' and 'all couples' TMFRs. The relatively high proportions of Class V husbands with working wives (see Table 5.5) and the high TMFR returned by Class V/textile couples

suggests that the wives in this group stayed out at work much longer after marriage and despite childbearing and rearing. High MSE x 10^3 makes the values of M and m difficult to interpret for Class V/textile couples, but it would seem that the large increase in m which reduced the overall Class V TMFR between 1871 and 1881 was mainly contributed by the Class V/housewife group. Amongst the Class IV/textile group M increased steadily 1861-1881 while m also increased. That the TMFR of this group rose over the two decades suggests, therefore, that an increasing proportion of the textile working wives were in the 20-24 age group and thus M was playing the greatest part in raising TMFR over time. In this case more women in the older age groups who, in 1861, might have been textile workers because of their low fertility were by 1871 returned as housewives thus increasing the value of m. Over the 1870s, however, the downward movement in m amongst housewives is too strong to be attributed solely to this factor: Class IV/housewife couples were increasingly limiting their fertility in a parity specific manner, and only the upward movement in Class IV/textile TMFR 1871-1881 prevented the overall Class IV graph from taking a more markedly downward path over the 1870s.

We have seen how the changing proportion of married women in employment and the changing age structure of employed women could affect the fertility measures of various male oriented classes. Table 5.21 indicates that the rise in women's employment between 1851 and 1861 was particularly pronounced amongst married and widowed women of all ages; the proportion of textile-employed single women rose only a very small amount over the decade.(15) Between 1861 and 1871 the proportion of single women employed in textiles did not change at all, while that of married women fell. Widows saw a much

Table 5.21 Changes in women's employment in textiles by marital status, Keighley, 1851-1881.

	Total Number	Total Number in Textiles	% of total in textiles
1851			
All women	7568	2611	34.5
Married women	2379	446	18.7
Single women	4740	2102	44.3
Widowed women	449	63	14.0
1861			
All women	8577	3164	36.9
Married women	2872	696	24.2
Single women	5186	2364	45.6
Widowed women	519	104	20.0
1871			
All women	11059	3834	34.7
Married women	3749	682	18.2
Single women	6646	3030	45.6
Widowed women	664	122	18.4
1881			
All women	14378	3900	27.1
Married women	4843	633	13.1
Single women	8597	3143	36.5
Widowed women	938	124	13.2

Source: Census enumerators' books, Keighley 1851-1881.

smaller decrease in employment. Over the 1870s the proportion of ever married women in textiles continued to drop, and with the introduction, and enforcing, of the Elementary Education Act (see Chapter 3) the percentage of single women working in the mills underwent a sizeable decrease.

Table 5.22 lists the proportion of married women between the ages of 20 and 49 in different employment spheres. It can be seen that when those women left the mills they were not moving into other sectors of the labour market; they were moving into the home. Whether this was due to changing attitudes towards women's work or to a decline in job opportunities for women as the worsted industry in Keighley was hit, first, by changing fashions which put the heavy worsteds which were the town's speciality into disfavour and, second, by the "Great Depression" (Johnstone, 1976) after a particularly brisk period of trade, 1861-1866 (Jenkins and Ponting, 1982) is not entirely clear. Certainly when women left the mills during the 1860s it was the married women who left first, just as they had been the ones to be taken on as extra hands when the demand for labour was at its height and few single girls remained outside the mills. From the figures above it is likely that of the married women leaving the industry those with young children were the first to go. Thus in Keighley it was not women so much as married women who acted as a reserve army of labour. They always had alternative employment as housewives and thus may well have been unwilling to work for what they saw as low wages, believing that they could be of greater benefit to their families by staying at home. Wages for power loom weavers, a major area of married women's employment, were relatively high in the 1870s, averaging over £3 per month (Johnstone, 1976). A decade later the

Table 5.22 The percentage of married women aged 20-49 used in the measures of fertility in different occupations; Keighley 1851-1881.

Occupation of Women	1851		1861		1871		1881	
	N	%	N	%	N	%	N	%
Housewife	1256	71.6	1359	67.6	2143	76.6	2922	81.4
Textiles	357	20.4	531	26.4	533	19.0	483	13.4
EBNIT	138	7.9	122	6.1	123	4.9	186	5.2
Total	1753		2011		2799		3591	

Source: Census enumerators' books.

Note: EBNIT = employed but not in textiles.

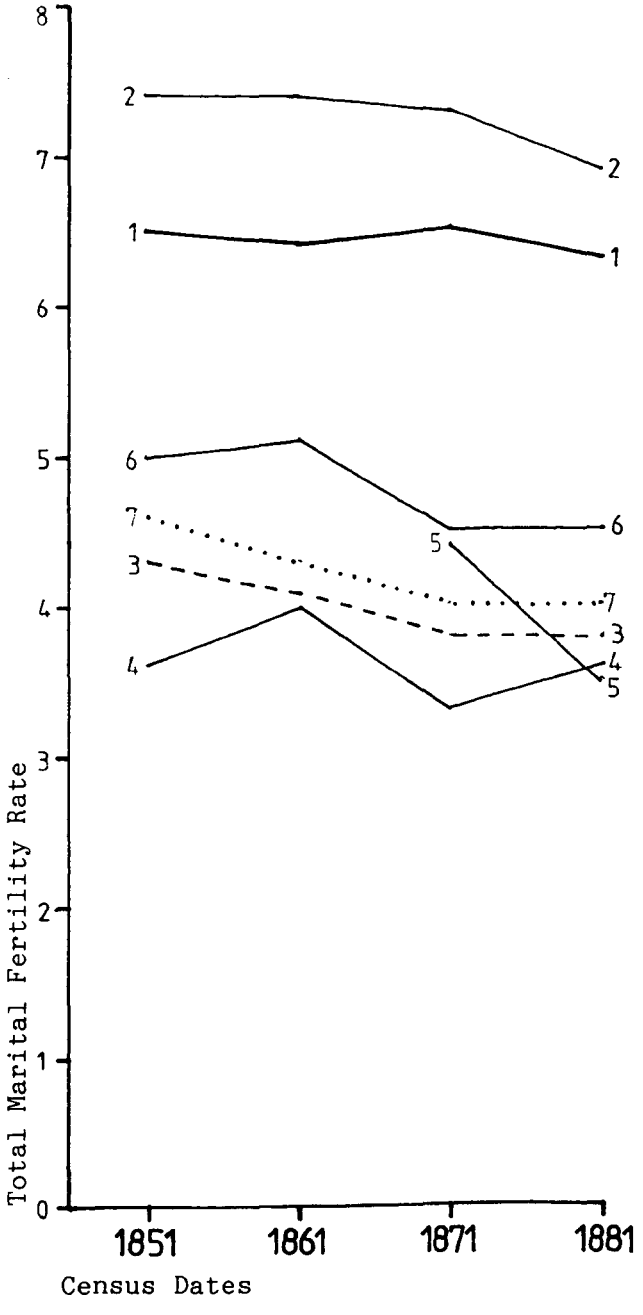
1. In 1851 the occupations of two women were illegible in the census returns, in 1861 one such entry was found. In these cases the women could not be assigned to an occupation category, but they were included in the total.

average wage had fallen to around £2 per month: a sum too small to tempt large numbers of married women away from their homes and families. In 1861 wages had been around the £2 mark too but at that period combers' wages were so low that the £2 would have seemed a relatively much greater amount.

Figure 5.15 shows the TMFRs for certain groups of women from 1851-1881 when their husbands' occupation is not considered. (The accompanying figures are given in Table 5.23). The four main lines; all couples" housewives, "textile workers" and "employed but not in textiles" (EBNIT) show far less dramatic changes than those of the husbands' class groups. This, of course, is not surprising given that each women's group will include women married to men from almost all the classes, although the working women are more likely to be married to working class men. Lines 4, 5 and 6 show that subgroups within the main women's groups were experiencing greater fluctuations in TMFR than the groups as a whole. We must also remember that the fertility measures for working women are liable to have large MSE x 10^3s attached to them and therefore must be treated with caution. The question of infant mortality differentials between housewives and working wives has been discussed above. Here we will assume that women working in textiles and EBNIT had similar levels of infant mortality.

The very gentle decline in fertility levels amongst employed women suggests that what we are seeing is a threshold of fertility above which it was very difficult to combine household duties and full time employment, and that this threshold shrank slightly over time. We might expect that women textile workers would have a slightly lower threshold than women in other forms of employment,

Figure 5.15 Total Marital Fertility Rate by wife's occupation, husband's occupation not considered; Keighley 1851-1881.



Source: Census enumerators' books.

Key: 1. All wives
2. Wives: housewives
3. " : textile workers (incl. 4 & 5)
4. " : weavers
5. " : special textile workers
6. " : employed but not in textiles
7. All couples where the wife was working.

Table 5.23 The Total Marital Fertility Rate for wife's employment groups with husband employed in various occupations, Keighley 1851 - 1881.
(For groups where the wife is a housewife see Table 5.24)

Wife's Occupation	Husband's Occupation	TMFR			
		1851	1861	1871	1881
Textiles	Not considered	**4.3**	**4.1**	**3.8**	**3.8**
Weaver	Not considered	**3.6**	**4.0**	**3.3**	**3.6**
Weaver	Weaver	5.4	4.9		
Weaver	Comber	**3.4**	3.8		
Weaver	Lower status textiles	**4.0**	**4.0**	3.6	
Weaver	Metal-mechanical		**	**3.1**	3.4
Weaver	TETMM	**	**	2.7	3.6
Spinner	Not considered			5.1	5.8
Special textiles	Not considered		4.5	**4.4**	**3.5**
Employed but not in textiles	Not considered	**5.0**	**5.1**	**4.5**	**4.5**
Clothing	Not considered	4.0	4.6	4.2	2.7
Occupied outside the home	Not considerd	**4.6**	**4.3**	**4.0**	**4.0**

Source: Census Enumerators' books

Note: TETMM = Trades other than textiles or metal-mechanical work

A blank indicates that there were fewer than 45 couples in the group and therefore the fertility measures could not be calculated (see text).

** indicates that although there were 45 couples or more in the group one, or more, of the wife's age groups contained no couples and therefore the fertility measures could not be calculated (see text).

Bold type indicates groups of at least 100 couples.

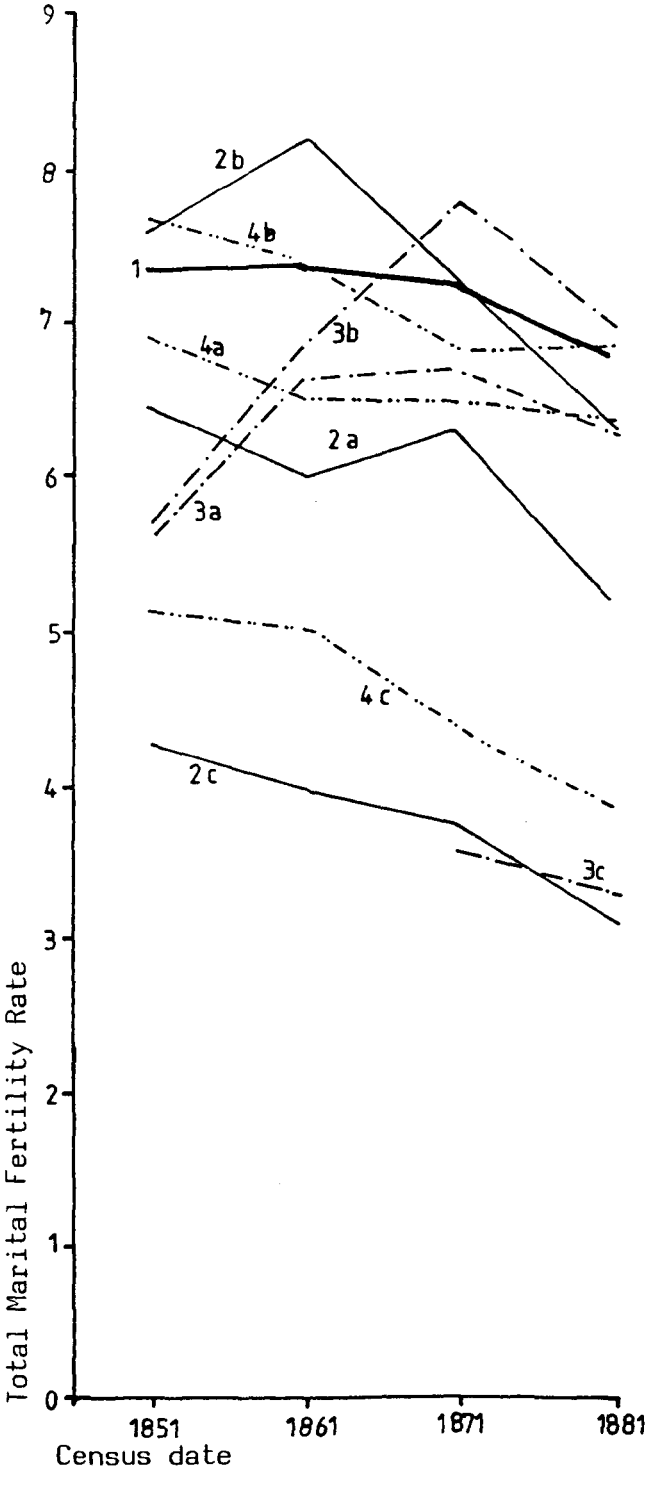
some of whom would be able to work at home and therefore cope with the care of more children than those mothers who had to answer the call of the factory bell. The housewives' TMFR line also shows a smooth profile, just beginning to dip downwards over the 1870s when m values rose emphatically throughout the community. The small fluctuations in the 'all couples' line can therefore be ascribed to changes in the relative numbers of housewives and working wives acting and reacting to produce the overall fertility levels. Similar mechanisms may well have been at work within the industrial sectors too, smoothing out fluctuations in fertility caused by ebbs and flows in the fortunes of the sectors and the accompanying movements of personnel.

A puzzle which still remains is how, when large numbers of women were moving into employment, as in 1851-1861, they kept, or forced, their fertility below the threshold level shown in Figure 5.15?

In Table 5.24 we return to male occupational groups, this time defined by industrial sector rather than by class. All the TMFRs calculated are listed, those for groups with over 100 members being picked out in bold print. In the following discussion, however, comments will be restricted to the three main occupational groups: TETMM, metal-mechanical work and textiles. As each of those three groups contains a spectrum of classes within its workforce (textiles encompassing "high" and "low" status workers rather than class divisions) it was felt that this would minimise differences created by mortality differentials in that some attempt at inter-group comparison could be made.

Figure 5.16 shows, for each of the three main occupational groups, the TMFRs for all couples (a), for men married to housewives (b), and

Figure 5.16 Total Marital Fertility Rates for various occupational groups: Keighley 1851-1881.



Key:
1 ——— All couples
2 ———— Husband: textile worker
3 — · — Husband: metal-mechanical worker
4 — · · — Husband: Trade other than textiles or metal-mechanical work
a Wife's occupation not considered
b Wife: housewife
c Wife: working

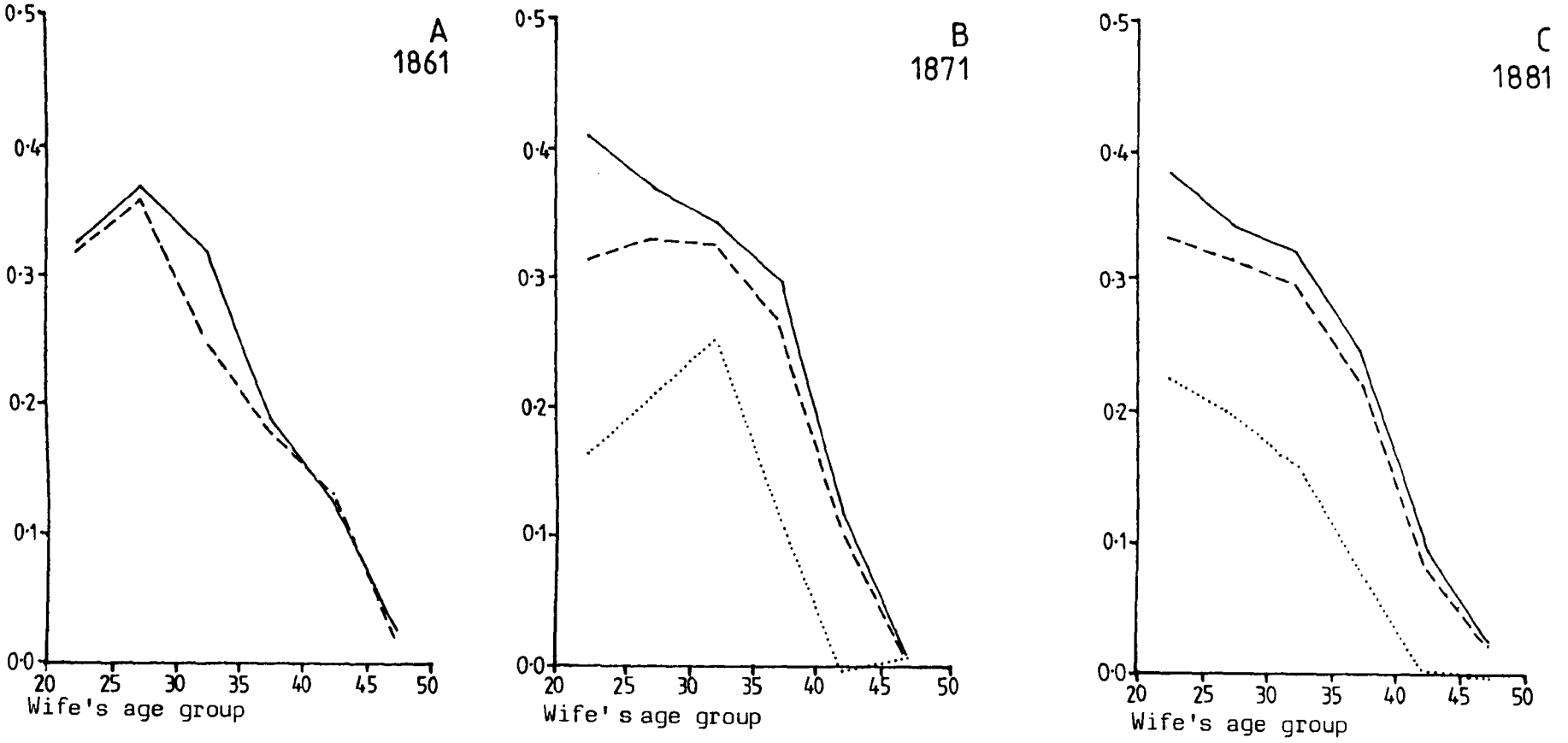
Source: Census enumerators' books

for men who had working wives (c). The latter group were not restricted to textile working wives as this would have reduced even more of the groups beneath the 100 couple mark.(15)

Interpretation of Figure 5.16 is not easy. Not only do the male occupational groups have different proportions of their wives out at work as shown in Table 5.3 but with each group encompassing men from several status groups the changing social mix of a sector of the industrial workforce might well effect changes in the level of TMFR. The fact that lines 2c and 4c, the 'working wives' lines for textile workers and TETMM show a downward trend in fertility far more marked than that in the working wives lines in Figure 5.15 suggests that the age or social structure of the working class population was changing, otherwise it would seem odd that the fertility of married working women was not falling when the bulk of women who work, i.e. the employed wives of men in the working class occupations, show such a decrease in their TMFRs. Unfortunately, the TMFRs for the metal-mechanical industry in 1851 and 1861 were not calculable, but we can gather some impression of their level from the very small difference in lines 3a and 3b over those two censuses. Like the other two groups, the metal-mechanical workers experienced an increase in the percentage of their wives in employment over the 1850s, but they did not experience the large decline in this percentage between 1861 and 1871 which the men in textiles and TETMM did. This, it is suggested, was because the metal-mechanical industry was employing increasing numbers of semi- and un-skilled men who were more likely to have wives who were out at work. The period of great expansion which the metal-mechanical industry enjoyed between 1851 and 1861 would, no doubt, engender different attitudes in its workforce than

were to be found in less fortunate industries such as weaving or wool combing. Thus metal-mechanical workers' plans for marriage and family building may well have encouraged greater fertility. Certainly the main reason underlying the very great increase in TMFR between 1851 and 1871 amongst the metal-mechanical/housewife group appears to have been large upward sweeps in M; young women were increasingly falling pregnant soon after marriage or marrying earlier. The metal-mechanical/all couples group also saw a large rise in M 1851-1861 but over the following decade they saw no change in M or m and lines 3a and 3b diverged. The reasons for this must lie with the metal-mechanical/working wife couples but their 1861 fertility measures cannot be calculated as one of the wife's age groups had no members. If, however, we draw up the ASMFR curves for metal-mechanical workers and their sub-divisions by wife's occupation (Figure 5.17) we can readily see that in 1861 the working-wives group could not have had fertility much different from that of the housewives group because, despite an increase in the proportion of wives working 1851-1861, the 'pull-down' effect in Figure 5.17A is minimal. Figure 5.17B, for 1871, tells another story. The proportion of working wives did not alter dramatically over the 1860s, which indicates that a large decrease in fertility amongst working wives 1851-1861 was probably the reason for the decline in the overall level of metal-mechanical workers' fertility. A clue to the possible reason for this may lie in Figure 3.4 which shows changing employment structure amongst males in Keighley. In 1851 metal-mechanical work was mainly undertaken by teenage men in their early 20s. By 1861 the numbers employed in the industry had risen and the employment peak amongst 15-25 year olds had increased in magnitude. In 1871

Figure 5.17 Age Specific Marital Fertility Rate curves for couples where the husband was working in the metal-mechanical trades, by wife's occupation; Keighley 1861,1871 &1881.



Source: Census enumerators books.

Key: - - - all couples
——— wife a housewife
····· wife working

the peak had grown again but it had also changed its shape and position: the highest peak being between the ages of 18 and 25 but a secondary peak appearing between the ages of 25 and 35 or so. This would explain why the proportion of metal-mechanical workers with wives aged 25-29 rose between 1861 and 1871, while the proportion with wives aged 20-24 declined. Over the 1870s the aging process continued so that by 1881 the proportion of metal-mechanical workers' wives aged less than 35 had shrunk while the proportion over this age had grown substantially: a phenomenon shown in the 1881 graph of Figure 3.4. The growth of the metal-mechanical industry as depicted in Figure 3.4 took off first in the 20-30 age group. As the number in this age group grew 1851 to 1861 and then 1861 to 1871, the number of married men would increase but the number of men married for longer would also increase in the 20-24 and 25-29 age group. Thus we might expect that women in those age groups would also have been married for longer; thus the fertility would appear to rise over time. Between 1871 and 1881 the main growth was in the older age groups, the younger age groups did not alter drastically in structure therefore we may presume that changes in the length of marriage amongst wives aged less than 30 did not alter significantly and had little effect on fertility.

In 1871 it would seem that wives in their 20s were leaving work in order to have children whereas women in the older age group were remaining in the mills somewhat longer. Reasons for this remain open to speculation although they may be related to the number of young brides amongst the population. From Figures 5.17B and C it is obvious that post-1870 the wives of metal-mechanical workers did not take on employment after the age of 40 unless they had no children

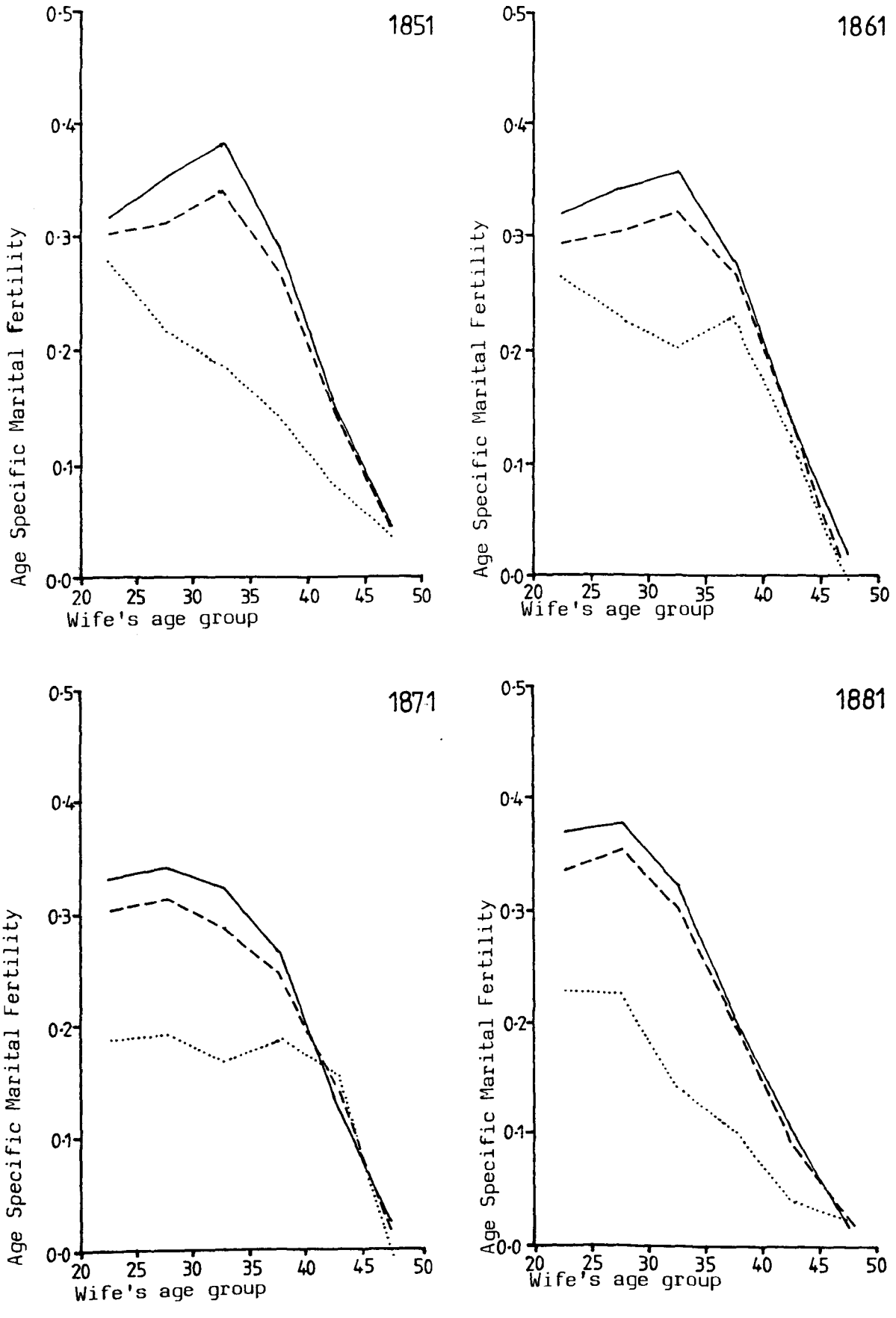
to look after. In 1881 metal-mechanical/housewife couples were less fertile than their counterparts in 1871. This was true at every age group, however, not just in the older age groups, which would suggest children were being spaced out more by younger couples as well as family building being curtailed by couples in the older age groups.

The upward trend in the metal-mechanical TMFR, especially amongst the housewives, is strongly reminiscent of Class IV's TMFR path. The large numbers of semi-skilled men in the metal-mechanical industry and the large part played by this industry in male employment in Keighley suggests that ClassIV fertility was dominated by that of the metal-mechanical workers and vice versa.

The TETMM TMFR lines appear the most straighforward but they are in fact very difficult to interpret as they include so many different industrial occupations as well as different classes. Thus fluctuations in the fertility of one industrial group will be cancelled out by those of another.

Figure 5.18 illustrates the ASMFR curves for TETMM/housewife couples, TETMM/working wife couples and overall TMFR couples at each of the four censuses. Without delving deeply into changes in age, class and occupational structure within the TETMM group the history of their overall fertility between 1851 and 1861 appears initially to be one in which working women had less influence, in the "pull down" sense, than was true amongst the textile and metal-mechanical groups. Looking again, however, we see that housewives in the three youngest age groups seem to have become progressively fertile over the three decades while, equally, the working wives in those age groups seem to have had decreasing fertility over the same period. This suggests

Figure 5.18 Age Specific Marital Fertility Rate curves for men working in trades other than textiles or metal-mechanical work (TETMM), by wife's occupation; Keighley 1851-1881.



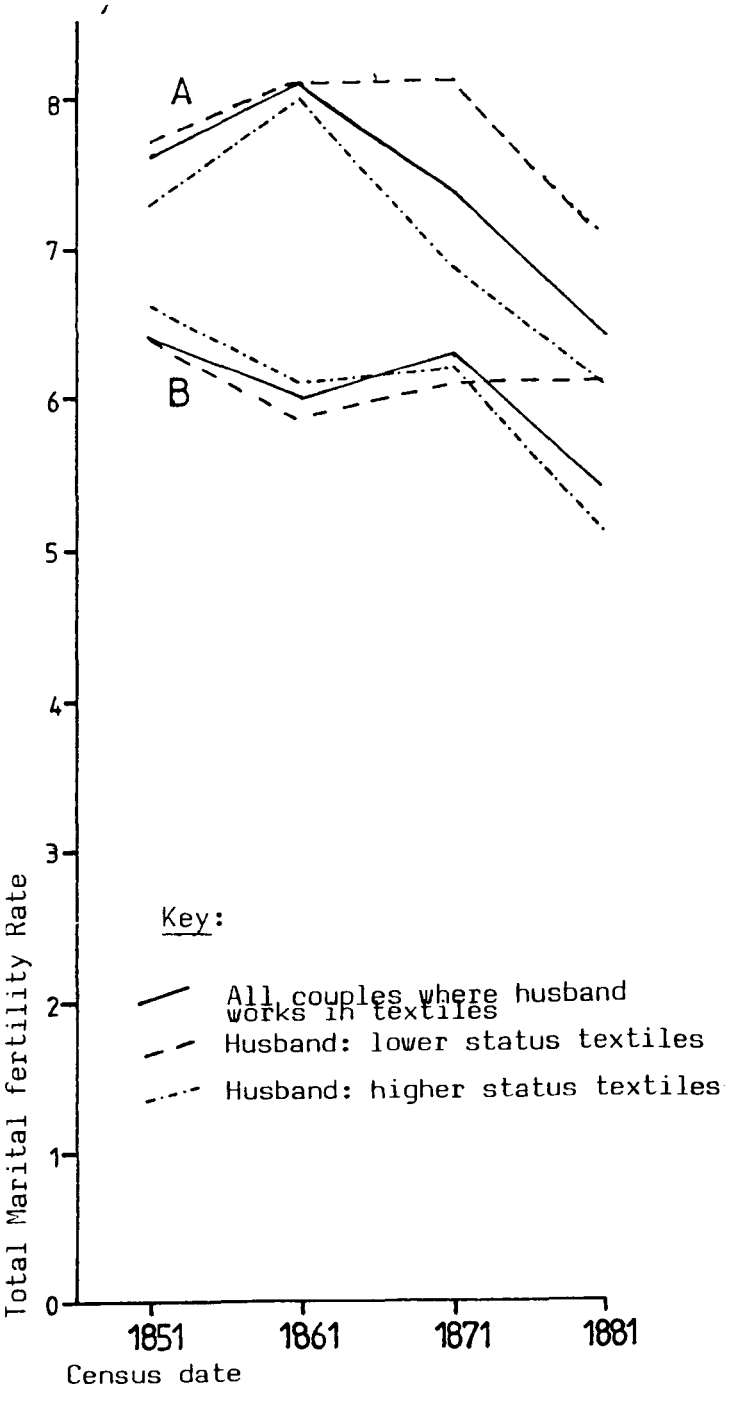
Source: Census enumerators' books

Key: as Figure 5.17.

a transfer of fertility from one group to the other, as working wives moved more rapidly into the home after marriage. This, however, does not emerge from the measures of M amongst the housewives (Table 5.14) and all couples (Table 5.15) groups as r(20-24) changes very little from 1851-1871. Between 1871 and 1881, however, the rise in fertility amongst young housewives appears to be an absolute rise as the fertility of young working wives rises too; M jumps. 1851 to 1871, the value of m changes very little but over the 1870s non-working women over the age of 35 were having decidedly fewer children and this was reflected in the value of m. This decline in fertility does not show in the changing values of TMFR as it was counteracted by increasing fertility amongst the younger wives of the TETMM workers.

To pull the metal-mechanical and TETMM apart into their constituent classes would create groups too small, for the most part, from which to calculate reliable fertility measures. The male textile workers' group can, however, be divided into higher and lower status groups large enough to allow the fertility of those men married to housewives to be compared with that of all couples in each group. Figure 5.19 illustrates the four TMFRs for each group; the accompanying figures can be found in Table 5.24. Of course, within each status group are further subdivisions which would be contributing to the TMFRs. The lower status group consisted of men in wool combing, weaving and 'special textiles' as well as any other individuals who classified themselves simply as "mill worker" or "factory hand". Table 5.25 lists the distribution of those occupations amongst the lower status textile workers at each census. The higher status workers were divided into overlookers, wool sorters and warp dressers whose relative ratio did not alter much from 1851 to 1871, being

Figure 5.19 Total Marital fertility Rates for husbands working in higher and lower textile occupations; (A) when wife is a housewife and (B) when wife's occupation is not considered; Keighley 1851-1881.



Source: Census enumerators' books.

Table 5.24 The Total Marital Fertility Rate for couples in each of the husband's occupational groups at each census when [A] the wife's occupation is not considered, [B] when the wife is a housewife and [C] when the wife is in employment.

Husband's Occupation	Wife's Occupation											
	A				B				C			
	1851	1861	1871	1881	1851	1861	1871	1881	1851	1861	1871	1881
All couples	**6.5**	**6.4**	**6.5**	**6.3**	**7.4**	**7.4**	**7.3**	**6.9**	**4.6**	**4.3**	**4.0**	**4.0**
Professional	5.5	9.8	7.6	7.1		10.3	7.7	7.1				
White Collar		6.9	5.6	**5.8**			6.0	**5.9**				
Shopkeeper	**7.4**	**6.6**	**6.0**	**6.8**	**7.3**	**6.8**	**6.3**	**6.9**				
Transport		6.7	6.2	**6.4**		7.7	6.3	**7.0**				
Clothing	**7.2**	**7.0**	**5.6**	**6.8**	8.2	7.3	6.2	7.4				
Miscellaneous	7.1	4.9	**6.3**	**6.5**	7.8	5.3	7.2	**6.6**				
Housing	**6.7**	**6.8**	**6.5**	**6.5**	**7.2**	**8.0**	**7.1**	**7.1**		3.8	3.8	3.9
Agriculture	**7.5**	**7.0**	7.5	6.8	8.5	7.9	8.9	6.9		5.8		
TETMM	**7.1**	**6.7**	**6.5**	**6.5**	**7.7**	**7.3**	**7.1**	**7.0**	**5.2**	**5.1**	**4.3**	**3.8**
Metal-mechanical	**5.6**	**6.3**	**6.6**	**6.4**	**5.7**	**6.8**	**7.7**	**7.1**		**	**3.6**	**3.3**
Textiles	**6.4**	**6.0**	**6.3**	**5.4**	**7.6**	**8.1**	**7.4**	**6.4**	**4.3**	**4.0**	**3.7**	**3.1**
1.Overlooker	6.3	**6.7**	**6.5**	**5.0**	7.1	8.0	7.1	**5.9**				
2.Woolsorter	6.7	4.7	6.1	5.3	7.4		6.9	7.1				
3.Warpdresser		6.9	6.0	5.1			7.0	5.6				
4.Woolcomber	**6.3**	**5.2**			**7.7**	**6.4**			**4.6**	**4.1**		
5.Weaver	6.5	**5.7**	6.5						4.6	4.8		
6.Special Textiles		8.6	5.9	6.3			7.5	7.2				
Higher Status (1+2+3)	**6.6**	**6.1**	**6.2**	**5.1**	**7.3**	**8.0**	**6.9**	**6.1**	3.9	3.1	3.8	2.3
Lower Status (4+5+6+)	**6.4**	**5.9**	**6.1**	**6.1**	**7.7**	**8.1**	**8.1**	**7.1**	**4.5**	**4.3**	3.5	4.3

Source: Census Enumerators' books

Notes: TETMM = Trades other than textiles or metal-mechanical work

A blank indicates that the group comprised fewer than 45 couples and therefore the fertility measures could not be calculated (see text).

** indicates that although there were 45 couples or over in the group there was one or more of the age groups containing no wives which prevented the fertility measures being calculated (see text).

Bold print indicates groups of at least 100 couples.

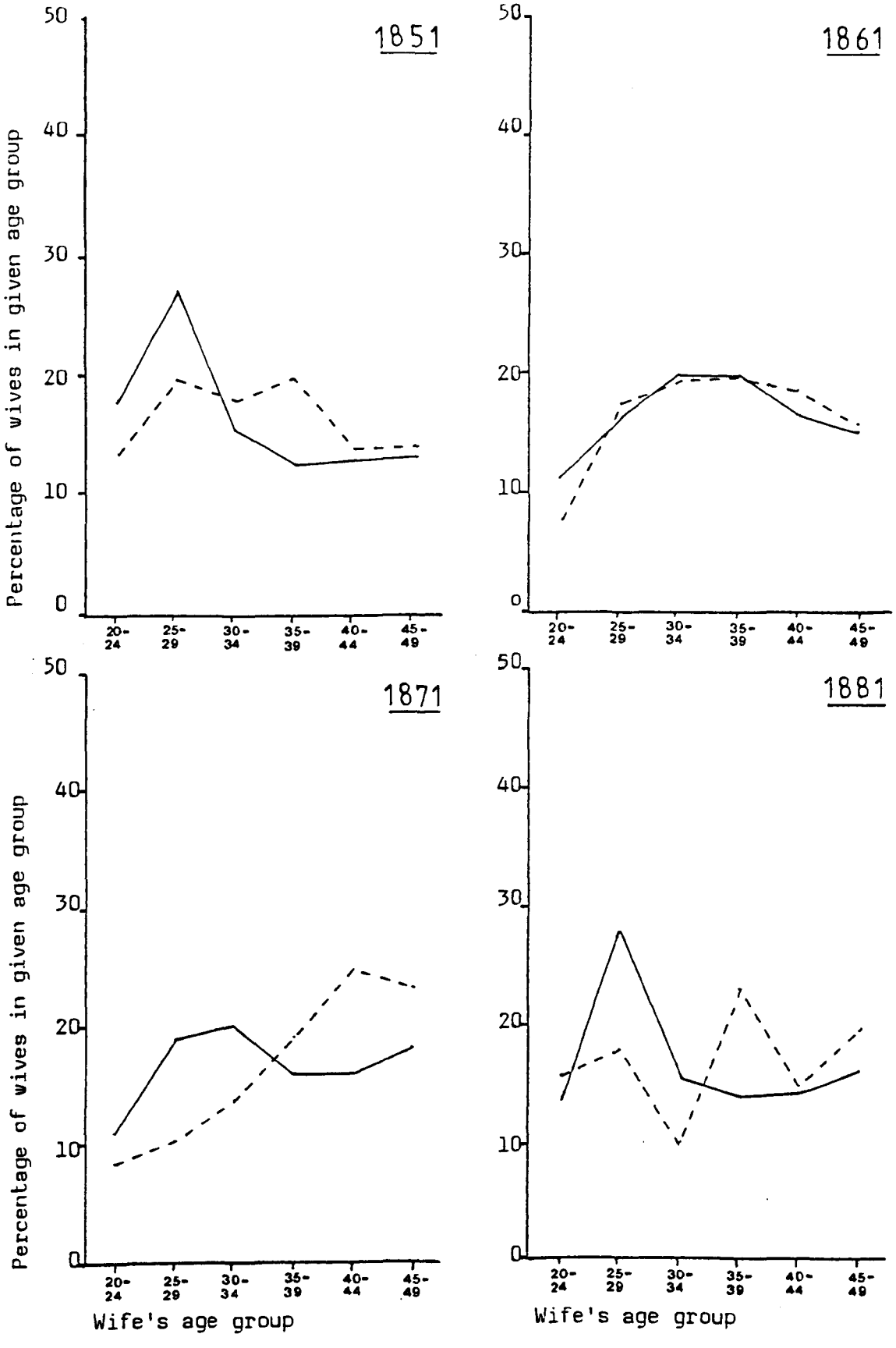
Table 5.25 The changing proportions of lower status textile workers in the constituent occupational groups, Keighley 1851-1881.

Occupation	Percentage of all lower status textile workers			
	1851	1861	1871	1881
Combers	74.4	55.0	16.7	16.0
Weavers	17.2	25.2	27.2	9.6
Special Textiles	6.0	13.0	43.7	53.8
Other low status textiles	2.4	6.8	12.4	20.6
N	563	413	180	156

Source: Census Enumerators' books.

Note: This table refers only to those married male lower status textile workers who were included in the calculations of the groups fertility measures .

Figure 5.20 The age distribution of the wives of (A) higher status textile workers and (B) lower status textile workers; Keighley 1851-1881.



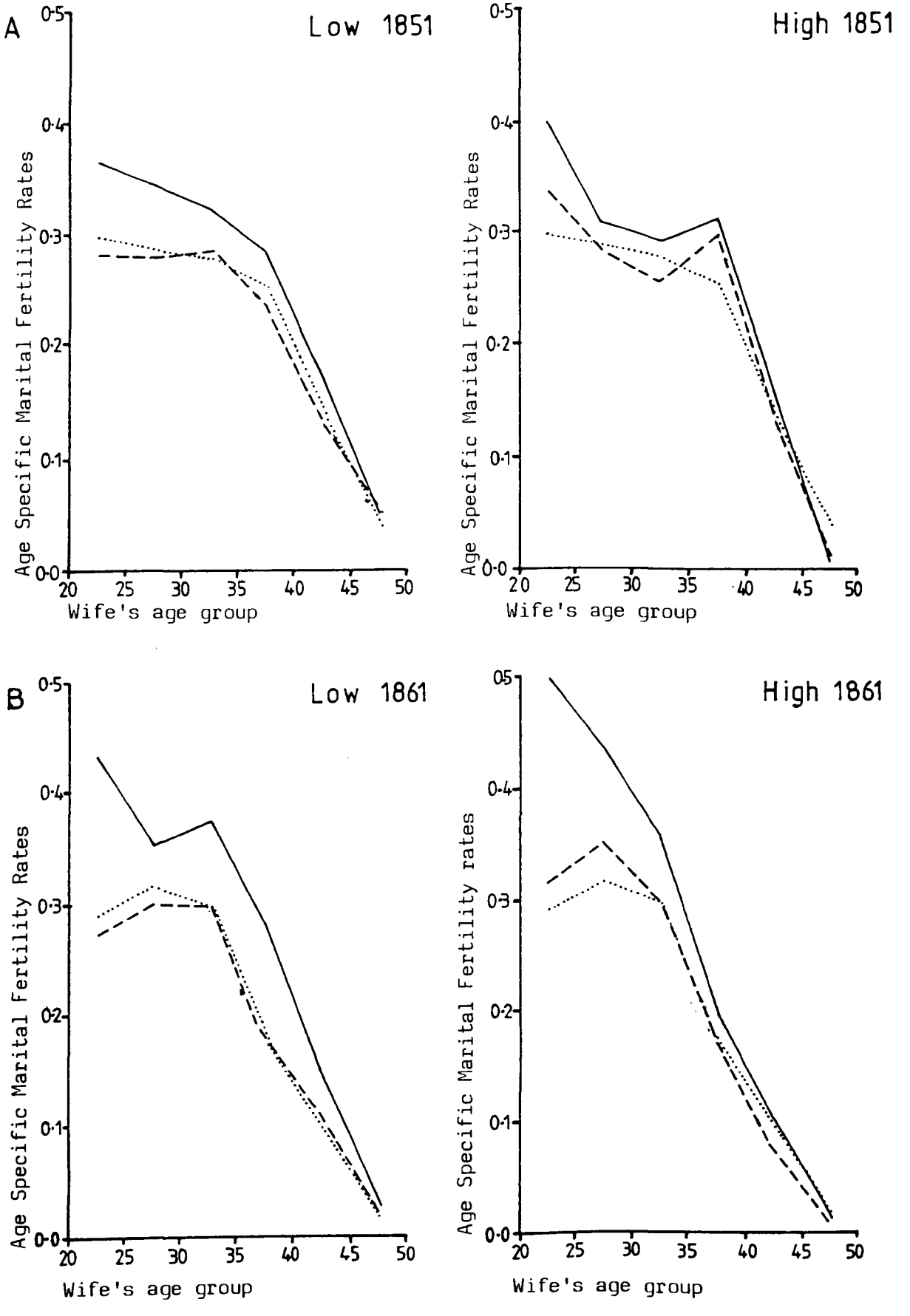
Source: Census enumerators' books

approximately 45:35:20. However, in the 1881 census, overlookers comprised just over 50 per cent of the total higher status group while wool sorters had dropped to about 25 per cent. As the male occupational make up of the two status groups shifted so also did that of their wives. The latter is demonstrated by Table 5.3. Changes were also taking place in the age structures of the two status groups; these are shown in Figure 5.20. We must also remember that there may have been an infant mortality differential between the higher and lower status workers and this should be taken into account. Finally, there is the changing status mix within the textile group: in 1851 the higher status group comprised 25.8 per cent of the whole textile group, in 1861 this proportion was 35.8 per cent, in 1871, 59.4 per cent and in 1881, 66.2 per cent.

Figure 5.21 depicts the ASMFRs which the various permutations of those factors produced for the higher status and lower status textile workers at each census. Each graph shows the 'housewives' and the 'all couples' curve for whichever status group is being considered and to facilitate inter-status group comparison the 'all textile couples' ASMFR for the relevant census has been drawn on the two graphs. The ASMFRs can be related to the TMFRs in Figure 5.19 and Table 5.23 and the accompanying Ms, ms and MSE x 10^3s can be found in Tables 5.14 and 5.15.

The lower status textile workers have much larger gaps between their 'housewives' lines and their 'all couples' lines than do the higher status group which is attributable to the greater number of the lower status workers' wives who are in employment. The gap appears to diminish with age, but does so more rapidly amongst the wives of higher status textile hands, indicating that an overlooker's wife

Figure 5.21 Age Specific Marital Fertility Rates for couples where the husband is (A) a lower status textile worker and (B) a higher status textile worker, by wife's occupation; Keighley 1851-1881.



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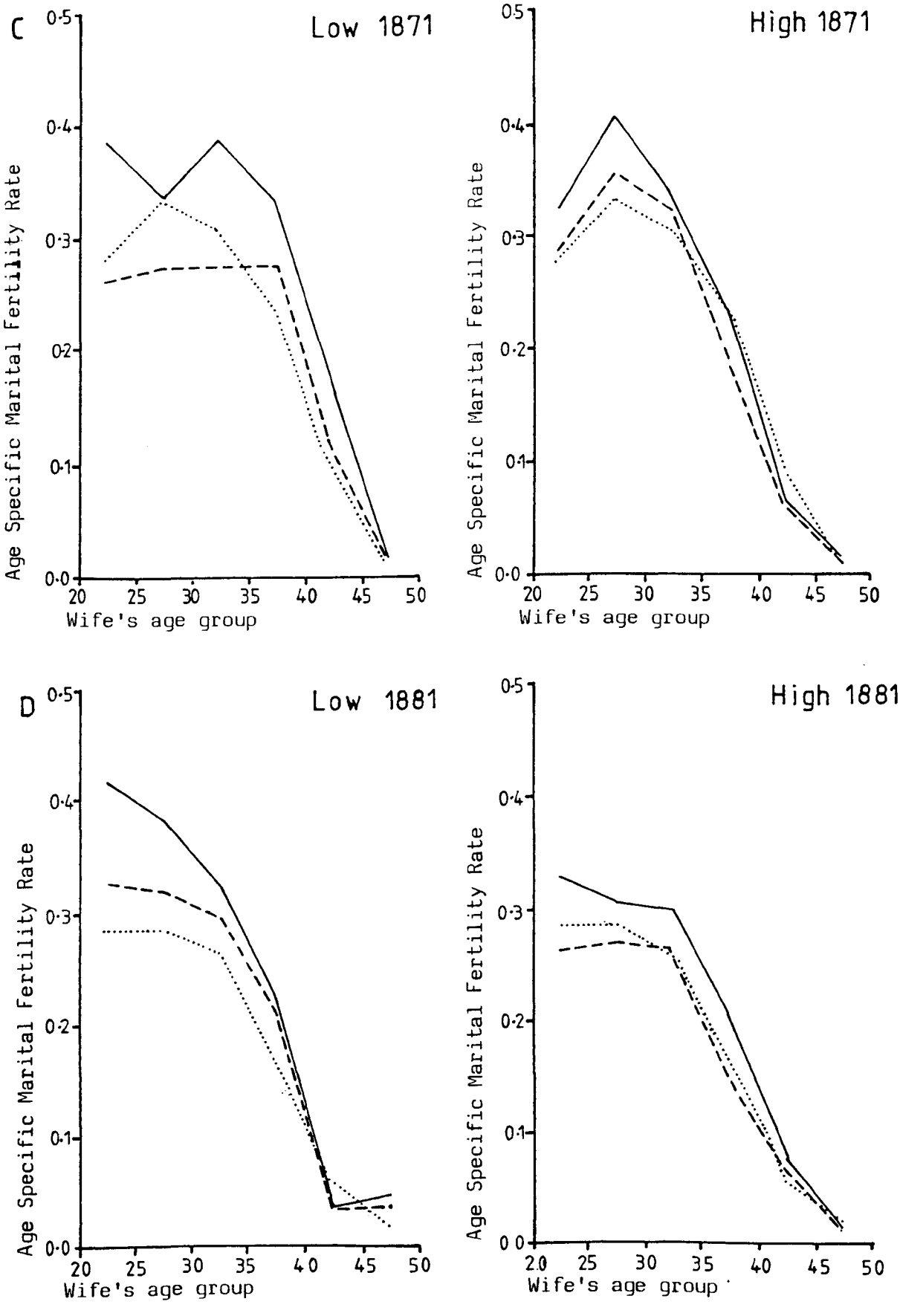


Source: Census enumerators' books

was less likely to be out at work in her 30s and 40s than a comber's wife. After 1861 the size of the gap between 'housewives' and the 'all couples' lines in the older age groups shrank in size amongst the lower status group suggesting that as the proportion of wives in employment fell it was older women who were leaving the mills first, rather than there being an exodus spread evenly across the child-bearing span. In the case of the higher status hands the process seemed to work in reverse with more wives in the older age group out at work in 1881 than at any of the three previous censuses. It could be argued that what the difference between 'housewife' and 'all couples' ASMFR curves indicates is, in fact, changes in the ASMFR of working wives, and we have seen, from footnote 14, Table 5.26, that M and m amongst textile worker/working wife couples did tend to fluctuate, but unless sufficient numbers of wives were out at work their fertility would make little impression on the level of the 'all couples' ASMFR lines.

In both status groups the working wives had greater influence on the ASMFR curves in 1861 when most young married women, and many of the older ones, were in the mills, unless they had children to look after. It is a little surprising that at this census, and in 1851, the 20-24 year old housewife wives of higher status textile workers were more fertile than their lower status counterparts as we know that a greater proportion of the higher status group's wives stayed at home and might expect that those would include a greater number of childless wives thus reducing the ASMFR. Perhaps fewer higher status wives were out working because they were more fertile in the early years of marriage. Possibly higher status workers had a better infant mortality rate so while their fertility looked higher

the lower status workers had had the same, or greater, number of babies but had lost more of them before the census. On the other hand, as Figure 5.20 shows, both status groups had, over the 1850s, undergone a drop in the percentage of their wives who were aged 20-24; indeed the higher status group had seen an even bigger drop amongst women aged 25-29. The very low percentage of wives of lower status workers who belonged to the youngest age group makes it likely that those women had been married a shorter time and had therefore had less time to bear children than their higher class neighbours.

By 1871 the higher status workers' wives who were housewives and aged 20-24 were less fertile than their lower status sisters. Those women were probably leaving work sooner after marriage than their counterparts in 1861 had done and thus once again the housewives' fertility was 'diluted' by childless couples. Amongst the lower status textile group in 1871 a dramatic change in age structure appears to have been having repercussions for fertility. Figure 5.20 shows that between 1861 and 1871 the proportion of lower status workers who had wives aged less than 35 dropped away, while the older wives gained in numbers. The lack of men with young wives coming into the industry, in combination with the changing number of wives working and their distribution, serve to create marked fluctuations in the ASMFRs of the lower status textile/housewife couples but those must have been matched by the lower status textile/working wife group as the lower status 'all couples' ASMFR was surprisingly smooth across the 20-39 age group.

In 1871 the age distributions of the two status groups were such that the majority of 'all textile workers' in the younger age groups were high status while in the older age groups

the majority were low status. Of young couples, the higher status group were more fertile, in the older age groups the lower status group were. Thus when the two status groups are combined to form the 'all textile' group the latter's TMFR is actually higher than that of either of its subdivisions.

In 1881 the age structure of the lower status group was somewhat unorthodox. Young men were once again coming into this branch of the industry, and in the older age groups it is probable that some of the previous decade's higher status workers had had to move into lower status jobs while yet others had moved into the industry from some other occupational sector. The men with wives in the older age groups were certainly less fertile in 1881. Over the three censuses 1851 to 1871, the fertility of lower status textile wives in the 45-49 age group had been decreasing slowly but in 1881 it was the 40-44 year olds who showed the lowest fertility levels. The 20-34 year olds, in contrast, had seen a rise in fertility.

This pattern had developed earlier amongst the higher status textile workers. The great peak in marriages in this group in the 25-29 age group created peculiarities in the ASMFR curve of their wives aged 20-39 years old in 1851. In 1861 the high proportion of working wives was making itself felt; the 'all couples' ASMFR rose in the younger age groups but declined in the over 35 age group. This process continued in 1871, with younger wives becoming more fertile (although not in the youngest age group) while the older ones' ASMFR decreased again. By 1881, not only had the older wives' fertility fallen even further but now the young wives too were displaying very low ASMFRs. This effect may have partly been achieved by the concentrating of higher status textile workers' wives in the

late 20s age group, meaning that more would have been likely to go out to work (there was no decline in the proportion of wives working in the group 1871-1881) and a greater percentage would be newly married, resulting in lowered fertility in the younger age group. However, despite the similarity in age structure of the 1881 high status group to the same group in 1851 the ASMFRs are different: young and old, the wives of higher status textile workers were having fewer children. The older women may have been trying to limit their fertility in order to curtail their family building but it would seem likely that younger women were delaying having children or spacing them wider apart rather than limiting their fertility in a parity specific way, otherwise the 1881 ASMFR curve would be rather more concave than it actually is.

Returning to the lower levels of fertility amongst the under 35 year olds in 1851 we must again ask whether those were the result of child spacing by voluntary or involuntary means. That fertility increased in this age group in 1861 amongst both the higher and lower status textile groups suggests that children were appearing more rapidly in the early years of marriage which suggests a previous regulating mechanism. In 1871, amongst the lower status textile workers' wives, the younger age groups reverted to lower fertility levels. However, 35-44 year olds had mostly returned to the home and their fertility had recovered. We have already seen the next stage in the process with the 1881 figures.

Within the status divisions of the textile industry, therefore, the higher status workers appear to have begun limiting their fertility over the 1850s. This appears to have begun as parity specific control, but by 1881 birth spacing or delaying appears to have been increasingly

common, with young couples too cutting back their fertility. Amongst the lower status workers the picture is rather more confused with the indications that in 1861 couples were delaying fertility in order to go out to work, or were failing to have children because they were out at work. Low fertility amongst younger women was a feature of both 1851 and 1871 and gives rise to speculation that the lower status groups were practising birth spacing as early as 1850 in order to remain at work. The role of infant mortality in freeing women to go out to work must also be considered. As the proportion of working wives fell over the 1870s and younger women entered the home earlier, older women having left the mills over the 1860s, their fertility rose: it was the older women who were now putting an almost total stop to their fertility.

If we compare the level of the 'all textile' ASMFRs with those of the 'all couple' curves in each of the graphs in Figure 5.21 we can see the changing status distribution within the textile industry taking effect. In 1851 and 1861 the lower status group has the greatest influence on the all textile curve but in 1871 and 1881 the higher status group has the upper hand. At each census the 'all textile' ASMFR masks developments in one or other status group's fertility patterns.

As a fertility measure the TMFR is limited in its use. It incorporates many factors without acknowledgement and for this reason is not strictly comparable across groups. Its interpretation requires a great deal of additional data. It does, however, give an idea of how a group's fertility is altering over time, *in toto*, and not just at the extremes of the childbearing span. It does not rely on a model for its calculation but reflects the fertility of a

population no matter what eccentricities the latter might possess. It therefore helps point the way to possible reasons for differences in fertility not otherwise explained by M and m; as we have seen those can include changes in class or occupational structure, changes in age structure, changes in the age of marriage, or of the proportions marrying, changes in mortality and changes in the proportion, age or fertility of women going out to work. Those are often more easily understood if the ASMFR curves for a population group are drawn up and monitored over time, but, with the complex interactions going on, even then a full diagnosis of the changes observed is not always possible.

Section 5.7: Summary and Conclusions

The purpose of this chapter was to establish whether marital fertility behaviour in the town of Keighley altered between 1851 and 1881. If such a change was observed it was then hoped to monitor the dimensions of this change and, if possible, to identify its origins.

The fertility measures M, m and TMFR were used to quantify the population's fertility behaviour. However, as explained in Sections 5.6A and 5.6B each measure has its drawbacks. M and m were measured against two different standard fertility schedules: the Coale-Trussell schedule and the British Standard schedule of Hinde & Woods. The former conforms more neatly to the shape of those ASMFR curves observed in nineteenth century Keighley, but the latter lies at a more comparative level. Both schedules assume, however, that fertility will be greatest amongst women aged 20-24 whereas, because of the late age at marriage in Keighley, and indeed in other areas of late nineteenth

century England and Wales, it was, in fact, the 25-29 year olds who were the most fertile. This presented problems for the calculation of M and m in some cases, which was usually indicated by high values of MSE x 10^3. Because of this known problem, it was possible to be more liberal in our interpretation of the 'goodness of fit' of the fertility models. The question of age-specific differentials in infant and child mortality was raised in connection with the calculation of M and m and it was admitted that while those were important there was no way of calculating such differences for Keighley. Class specific mortality differentials were equally unavailable for the study town and this meant that TMFRs were not strictly comparable, although amongst the other factors influencing TMFR mortality levels were probably one of the more stable. The lack of data on infant mortality in this study is much regretted and future work would aim to correct this deficiency.

Many of the problems with the fertility measures stemmed from the point-in-time nature of the census data used. It was found useful in many cases to take recourse in the use of time sequences of age specific marital rate curves, in order to illuminate interpretation of the other measures.

The 1881 M and m figures for Keighley's overall population gave little evidence of birth control having been widely adopted, as the level of m barely reached the 0.2 value set by Coale & Trussell as indicating the widespread use of parity specific family limitation, and in no way began to approach the 0.25 value preferred by Hinde & Woods on their own standard. However, it would seem from watching the overall population's values of m over time in Keighley that a decisive move was made, over the 1870s, towards widespread parity

specific fertility limitation. Thus Keighley's overall fertility took a downswing no earlier than the population of England and Wales saw the first downturn in their birth rate. The downturn in Keighley's fertility levels was mainly attributable to the decreasing fertility of older wives, and would have been more marked had the fertility of younger wives not been simultaneously increasing. The downward movement was particularly strong amongst those men in Class V and Class VI, the textile class. Amongst occupational groupings textile workers stood out as having low fertility throughout the study period, as the other groups contained a broader range of classes and therefore less marked fluctuations in fertility.

The origins of the textile workers' fertility decline appear to lie in the 1850s or perhaps even earlier, and can therefore be connected to the crises engendered by mechanisation in the weaving and combing industries in the 1840s and 50s. Over the 1850s many married women, who might previously have stayed at home, went out to work in the textile mills, marriage patterns appear to have changed, the structure of the textile workforce altered and fertility declined amongst the older age groups. The momentum of this decline was maintained by the higher status textile workers over the next two decades, making them the least fertile group in Keighley by 1881; even their younger wives had experienced a reduction in fertility as fertility control attempts apparently became increasingly successful.

The low fertility of Keighley's younger wives was apparent from the first and was particularly noticeable amongst lower status textile workers where it was associated with the number of their wives out at work. In 1861 large numbers of older women, married to lower

status textile workers, were out at work and their fertility had dropped from its 1851 levels although the younger wives had, in fact, achieved higher fertility rates. By 1871 many of the older wives had returned to the home and fertility recovered in the older age groups but had fallen again amongst the younger ones. For those low status workers' wives, then, low fertility acted as a passport to work. It was not until 1881, when the number of wives out at work had dwindled considerably, that fertility amongst this group began to fall in earnest. When it did, this was due to housewives in the older age groups who appeared to be very successful in curtailing their fertility, presumably using the same methods of control as the higher status workers must, by then, have been using.

We know that the number of young couples in the textile status groups decreased sharply between 1851 and 1861, and this certainly may have affected fertility in the younger married age groups. The decline was partly caused by delayed marriage but may also have resulted from age differentiated migration out of town, or at least not into textile employment. Figures 3.7 and 3.8 show the loss of men in the 15-34 age group, outstripping the much smaller loss of women in the same age group. In Chapter 3 it was stated that if differential migration was taking place then the singulate mean age at marriage (SMAM) was highly debatable. It is argued here that Keighley's overall SMAM bore very little relationship to the patterns of marriage within the subgroups of the community and that changing average age of marriage and changing rates at which marriages occurred were contributing in some measure to changes in fertility. In 1861 there was a surfeit of women of marriageable age, in 1871 there were almost equal numbers of men and women in those age groups which would

ceteris paribus indicate an increasing opportunity for women to marry young; but this does not appear to have been the case amongst textile workers.

Although parity specific fertility control, as defined by m, appears to have been becoming more common in Keighley over time the main reason for low fertility levels amongst the population in general, and textile workers in particular, was the very low fertility of married female textile workers, and their concentrated presence in the younger childbearing years. The question of why young wives were not achieving their expected fertility potential has been raised several times in this chapter. Were the women reducing their fertility in order to be able to work? Or were they less fertile because they were working? Or were they working because they were less fertile? If they were reducing their fertility, how were they doing so, and were they using methods used by the older women when they decided to have smaller families?

To answer those questions we required longitudinal data. In the next chapter we report on an attempt to gather such data, by linking individuals from census to census, and on the findings which this exercise yielded.

Notes for Chapter 5

1. Although the notes concerning tramping in Hobsbawm's work do not relate directly to the period of study, the author does mention combers' work being suited to tramping and to times of technological redundancy as being "tramping times". There seems little reason to dismiss the conjecture that in times of economic hardship even in periods later than that of the present study, the old tradition of tramping died hard.

2. Many thanks are due to Richard Brown, of the Computing Services Department, University of Sheffield, for his help in designing the programmes to enable these conversions of the four very large census-data files to smaller, more easily handled files. Without his help further analysis would have been impossible.

3. In reading the data from the main file to the PARENTS file, the computer listed males first and then females for each household number. Thus, where more than one married couple lived in a household, the PARENTS file had to be amended to ensure that each husband's record was followed by that of his wife.

4. The TMFR is calculated by taking the Age Specific Child Woman Ratios and applying Sprague's Osculatory Interpolation equation (Shyrock and Siegel, 1976) to them to allow for the varying length of time which women will have been in their censal age group. This will produce estimates of the chance of a woman having a child per year. When the figures for each of the six age groups in a study population are summed and then multiplied by five (each age group covering a five year span) the TMFR is achieved (Woods & Smith, 1983).

5. Anne Oakley (1984) might argue that the grandmother, being the source of instruction on infant welfare for most working class women, might in fact be the person the mother would take a young child to at any time a small crisis arose rather than keep it at home and deal with the problem herself.

6. Six children were found, on returning to the 1851 file, to be living elsewhere in the study area on census night 1851. However, seven remain who were either residing outside the study area on census night or who were omitted altogether from the returns. When linking, only those children aged 11 or over in the second census were counted as being "missing" in the first census as a child reported as aged 10 in the second census may have been born in the census year after the enumeration and had his or her age rounded up at the second census.

7. The figures for life expectancy in each of the registration districts were calculated by Woods from vital statistics on age at death given in the Registrar General's Annual Reports for 1861-63 and from age structures given in the 1861 Population Census of England and Wales. Although the figures themselves remain unpublished, they are graphically represented (for males at least) in Woods' paper on "The Structure of Mortality in Mid-nineteenth Century England and Wales" (Woods, 1982b).

8. Dewhirst, in speaking of mid-nineteenth century Keighley, refers to a life expectancy at Haworth of 25.8 years (Dewhirst, 1974). Unfortunately he gives neither an exact date nor the source of his reference. Mawson refers to an average age of death in Keighley, in 1849, of approximately 19 years (Mawson, 1970-71), a figure which reflects the high level of infant mortality.

9. Hinde's four study areas were Bakewell in Derbyshire, Pately Bridge in the West Riding of Yorkshire, Mitford in Norfolk and Atcham in Shropshire (Hinde, 1985a). The latter two areas, as can be seen in Figure 5.7, tended to have fertility levels more akin to those of Keighley than did the two more northerly districts.

10. Hinde & Woods (1984) graph estimated age specific marital fertility schedules from Henry's work on the Genevan bourgeoisie. They are of a similar shape to those of Keighley although they begin in the 15-19 age group and mostly rise to a peak in the 20-24 age group. Although the graphs are drawn for husbands' marriage cohorts, this goes some way to support the contention that late age at marriage in Keighley (and in some of Hinde's rural study areas) was creating fertility patterns amongst 20-24 year olds akin to the pattern found amongst 15-19 year old newlyweds elsewhere.

11. The parameters a and k come from an equation used by Coale & Trussell to calculate the proportion of a population ever married x years after first marriages begin, given that a standard distribution of first marriage frequencies exists. The age at which first marriages begin is represented by a, k is a scale factor expressing the number of years nuptiality in the given population equivalent to one year in the standard population. (Coale & Trussell, 1974).

12. William Ranger, in his 1855 report to the General Board of Health, listed the causes of death, a breakdown of deaths by age, expenditure on Poor Relief, and the "Ratio of Deaths to the Persons living in each District" for each of the 21 districts in Keighley for the years 1849-1853. Ranger's basis for his divisions is not clear, nor do we have any clear idea what type of social areas those represented. The worst year Ranger noted was 1851 when 354 people (out of a population of 13050) died; 18 from smallpox and 32 from measles, both much more prevalent than usual. 182 of the dead were under the age of 15. District 6; "Holycroft, Damside South, Peel-place, Prospect-Place and west of South Street", had the worst death rates with 1 person in 20.8 dying (18 out of 375). District 17; "Albion, Malvern and Providence-place, Victoria-terrace, Thwaites and Screw-mill" had the healthiest record in that year: only 9 people out of 748 died, i.e. a ratio of 1 in 83.1. There was no consistent pattern of mortality amongst the districts; the lowest mortality area for one year having the highest mortality the following year. Although the numbers of deaths are quite small for any one year this suggests that in Keighley social segregation was not marked and exposure to various environmental hazards and infectious

diseases was similar across the classes. Mortality differentials within the town would therefore tend to be less marked than in the city of Sheffield.

13. If Smith's K values for model A are applied to the observed child woman ratios for Keighley for 1851 to 1881 the results are as given in Table 5.26.

14. Like their sisters a high proportion of Keighley's boys would have spent some years in the mills as textile hands before taking on other employment. Thus almost all of those found in the mills at later ages would have worked their way up the employment ladder within the industry rather than coming in from alternative employment elsewhere.

15. Figure 5.22 shows that in 1861 amongst married women it was in fact the over 25 year olds who were going into the mills in extra numbers. In contrast, the population of single women going out to work rose only slightly 1851-1861. The two sets of graphs illustrate just how high the participation of single women was in textiles, compared to their married sisters. The decline in female participation, whether married or single, in the textile industry is very marked 1871-1881.

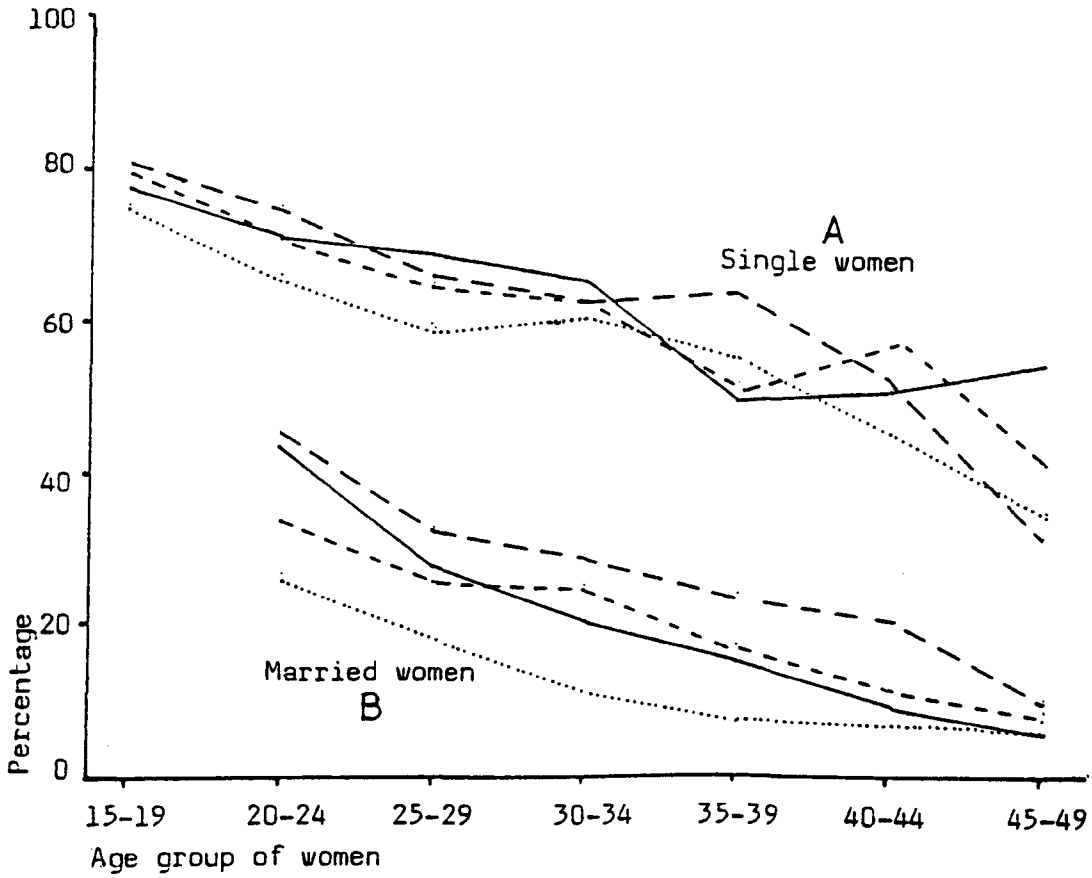
16. The M, m and MSE x 10^3 for couples where the husband was in one of the three main male occupational groups and the wife was in employment are given in Table 5.27.

Table 5.26 Total Marital Fertility Rates calculated for Classes II, III, IV, V and VI in Keighley, 1851-1881, using infant mortality correction factors (K) estimated by Smith for the city of Sheffield in the 1860s.

Class	TMFR			
	1851	1861	1871	1881
II.	7.02	6.81	5.84	6.27
III.	7.87	6.91	6.56	6.82
IV.	6.95	7.20	7.65	7.55
V.	7.52	7.39	7.36	6.62
VI.	7.35	6.84	7.18	6.10

Source: Smith's values for K were taken from :
Woods, R.I. & Smith, C.W. (1983) "The decline of marital fertility in the late Nineteenth Century: the case of England and Wales." Population Studies, 37, pp. 207-225.

Figure 5.22 The proportion of (A) married and (B) single women working in textiles by age group; Keighley 1851-1881.



Key:
1851
1861
1871
1881

Note:
The number of married women aged 15-19 was so small as to make percentage calculations unworthwhile. No figures have been included in the above graph in this age group amongst married women for this reason.

Source: Census enumerators' books.

Table 5.27 Fertility Measures: results for husband's occupational groups; wife in employment, Keighley 1851-1881.

Husband's Occ.	Coale-Trussell M				British Standard M				Coale- Trussell m				British Standard m			
	1851	1861	1871	1881	1851	1861	1871	1881	1851	1861	1871	1881	1851	1861	1871	1881
TETMM	.55	.51	.34	.53	.64	.58	.41	.62	0.14	-0.23	-0.53	0.50	-0.05	-0.90	-1.56	0.72
Met-mech		**	.63	.68		**	.72	.80		**	1.11	1.44		**	2.02	2.77
Text	.59	.48	.58	.72	.68	.55	.68	.85	0.47	0.14	0.74	1.95	0.62	-0.05	1.26	3.87

$MSE \times 10^3$

	Coale Trussell				British Standard			
	1851	1861	1871	1881	1851	1861	1871	1881
TETMM	4.8	9.0	18.6	4.0	3.8	5.6	16.9	5.8
Met-mech		**	358.0	150.0		**	390.0	173.0
Text	44.0	10.0	37.0	446.0	50.0	14.6	46.0	499.0

Source: Census Enumerators' books

Notes: TETMM = Trades other than textiles or metal-mechanical work
Met-mech = Metal-mechanical work

A blank indicates that the group contains < 45 couples and the fertility measures cannot be calculated (see text).

All other groups in this graph consisted of at least 100 couples. In the group marked **, however, one, or more, of the age groups contained no women and therefore the fertility measures could not be calculated (see text).

All $MSE \times 10^3$ s > 10 have been rounded to whole numbers

CHAPTER 6

Nominal Record Linkage - a Magic Lantern for the Census Stills

Section 6.1 Introduction

In the preceding chapter it was shown that textile workers, as a male occupational group, appeared to be less fertile than their peers because more of their wives were textile workers. Female, married, textile workers appear to have been less fertile than women in general but this, it has been hypothesised, was because when their families increased in size they left their work, any further children then being the offspring of a"housewife" rather than "a textile worker".

Owing to the "point-in-time" nature of the data provided by the census records this hypothesis cannot be further explored using this source without recourse to an exercise linking couples from census to census, thus providing a semblance of longitudinal data. It can only be "a semblance" because we can, for the most part, still only view an individual, or individuals, at specific points in time and monitor the changes in their circumstances without reference to the intervening years; years which might have told us more about how the observed changes came about.

Although it was realised early on in the study that use of linkage techniques would enhance the work, it was never intended that a full reconstruction[1] of the community would be undertaken. With more time and increased sophistication of the techniques described below, however, such an exercise would, it is felt, prove neither impossible nor unrewarding.

While the census enumerators' books provided the primary source

of nominal data, other sources, such as the records of baptisms and births, deaths and burials and those of marriages, have also been explored. Their bulk, more than any other factor, precluded their extensive use in the study but the work done using small samples of such data has been reported below to illustrate their potential, were time and funds to permit.

This chapter, therefore, while further exploring the processes of family formation within the context of late nineteenth century Keighley, also reports on "trial runs" of a technique using a small selection of data sources. Computer assisted nominal record linkage would seem to open up the field of longitudinal historical studies both to those with limited computer experience and resources and to those whose interests lie in the towns and larger urban areas of Victorian Britain.

Section 6.2: The Choice of Basic Method

The group of methods now collectively referred to as nominal record linkage (Winchester, 1970; Seaman & Condran, 1980) has long been used by genealogists in their seach for ancestral roots and by social historians and historical demographers in their work of "family reconstitution" (e.g. Wrigley, 1966; Laslett, 1983). Many others, such as "geneticists, computer scientists and airlines" (Winchester, 1970) are also interested in techniques which identify, with as small a margin of error as possible, one individual named in one set of records as being the same individual in another set of records.

Paraphrasing Kelly (Kelly, 1974), any record-linkage strategy assumes that an individual on the first list of names is also in the

second list and, if the individual is present in the latter, then one, and only one, of the entries will be "identical" (allowing for the passage of time and the associated changes in an individual's description) to that given in the first list. Record-linkage techniques reduce the second list until that one "identical" record is isolated or until it is proven that there is no such record in the second file in which case the sought individual is declared "absent" from the second record set.

A major problem for all those using nominal record linkage (NRL) is authenticating a link, i.e. proving beyond dispute that the same individual has been identified in both record sets. The more information concerning an individual given in each record set, the more positive a researcher can be that a "true" link has been achieved. Even today, however, people are not consistent when filling in various forms, giving varying spellings of names, different combinations of initials and a variety of ages. Much of this is accidental but sometimes "deliberate mistakes" occur. How much more scope, then, for variation amongst an historic population with a high illiteracy rate?

This problem can be somewhat reduced if couples or families can be traced, rather than individuals, as the combination of name, ages and relationships can outlast many other changes, can withstand removal of individuals from the group, and stands a much higher chance of being unique even in a large population (Pouyez et al., 1972). The census, of course, facilitates such "group" linkings. Thus, if George and Elizabeth Smith aged 32 and 28 respectively in 1851 have three sons, George (8), Charles (6) and Andrew (4), it is likely that out of three possible entries George Smythe aged 45 will be identified

as a "true" link because he is living with his wife Elizabeth aged 38 in 1861 plus his sons George (18) and Andrew (14), as well as twin 8 year old daughters. It must be admitted that the larger a family in the first set of records, the greater the chances of making a link if they are present in the second set. The combination of migration chances and linkage chances is a complex one that has not been fully explored, but it is likely that young couples with the highest propensity to migrate and the fewest children will exhibit the lowest proportion of "true" links.

"Family" and "community" reconstitution has traditionally been carried out using small, often spatially distinct, communities, usually with relatively stable populations. The main source of nominal records has been the parish registers.[2] With the advent of computers and the release of successive nineteenth century censuses, researchers' sights have been set on increasingly larger populations. Several projects have been devoted to analysing the comparative merits of hand and computer linkage (Winchester, 1970; Seaman & Condran, 1980; Pouyez et al., 1983). Their conclusions are summed up by Winchester who stated that:

> "a computer simulated linkage procedure will be many times faster and much less expensive than a standard hand linkage one."
>
> (Winchester, 1970)

Perhaps, however, this statement should begin: "Once it has been set up...". In correctly linking two sets of records which do not exactly match to one individual, a researcher carrying out hand-linkage "employs a nebulous quality called "experience" or "judgement"" (Winchester, 1970). Such qualities do not translate easily into computer control language.

Those investigators who have worked on computer linkage have adapted several techniques from other sources to programme their machines to "judge" a link "true" or "false". Winchester's use of the SOUNDEX system[3] to standardise surnames and his, and others, use of "weighting" systems to guide the computer in its choice of links (Winchester, 1970; Seaman & Condran, 1980; Nicholl, 1980) took large amounts of time to code and calculate; time which the present researcher did not have. More importantly, there was the question of writing a search-and-link programme for the computer incorporating the decision-making steps which would be taken by a human researcher. Again, although not impossible, this task was prohibited by time constraints. An alternative method of, at least, computer-assisted linkage had to be found for, with the size of the study population and the time available, hand-linkage on its own was out of the question. Doherty and Gibson (1983) suggested the use of FAMULUS, a text-handling, information retrieval system. They had used it for handling nineteenth century census records in a study of migration in Bolton and Blackburn, Lancashire. FAMULUS, however, was not readily available at Sheffield. In discussing its possibilities, however, one of the Sheffield University's Computer Centre programmers, Richard Brown, who had previously been consulted on computing matters (see Chapter 5) became interested in the record linkage problem and offered to concoct a short package of sort, select and search programmes which would act as a linkage aid. While putting much more onus on the researcher to do the actual linkage than those proposed by the authors above, the system Brown devised had the advantage of speeding up the manual searching process, acting as it does rather like an electronic "finger". The combination of speed and judgement sought by the previous researchers

was thus, in some measure, achieved at a cost and time budget which the present project could afford.

Section 6.3: Use of the Brown Computer Assisted Linkage System (BCALS).

Many previous studies have been concerned primarily with the "household" (e.g. Laslett, 1972; Flandrin, 1979) but here the focus was the "reproducing couple" and thus, while the importance of the household as the setting for a couple's activities is acknowledged, and will be discussed briefly below, the prime task was to link couples across the censuses.

All the exercises described below were carried out using Sheffield University's PRIME computer. Once the couples to be linked had been identified in the first census, the first step of the BCALS was to "sort" the file containing the second set of census records on three variables; firstly, alphabetically by surname, then by household number and finally by relationship to the head-of-household.[4] (see Appendix A, for the layout and coding of these variables). Thus a young couple staying with the wife's parents would be sorted under the initial of the husband's surname while his in-laws would be under the father's initial, however any child of the young couple would be directly beneath its parents in the sorted file. The same household number and the correct relationship would identify them as being part of the one "reproductive unit" (hereafter referred to as "a family".)

From the alphabeticised file a direct access (DA) file is then created.[5] Such files, however, use up considerable amounts of storage space in the computer "memory". It is, therefore, advisable to create a DA file out of only a part of the original file.[6] For instance, if one was looking for a certain Smith family then only

those with the surname initial S in the second file need to be converted into a DA file. However, if the family were not found in that small section, the searcher should not then consider the family "absent". Transcription errors (confusing Ss, Ls and Ts, for instance), phonetic spellings, dropped or added aspirates and other quirks make searching in other sections worthwhile; Oldsworths can be found under the Hs as Houldsworths, for example. The SOUNDEX coding system reputedly overcomes such problems but in the present exercise some links were undoubtedly missed due to the rather disjointed nature of the search for a "problem family" and to the researcher's failing to work out all possible alternative forms of the name sought.

Once the DA file has been prepared the search procedure can begin. The husband of each couple to be traced was taken as the starting point of each search. SEARCH11, the FORTRAN77 search and identify programme written by Brown, a copy of which is given in Appendix D, begins by asking for the number identifying the household in which the couple lived in the first census as a reference. It then asks for the surname to be traced, and then for the forename. Identifying all entries with the sought-for surname the computer then proceeds to list one-by-one all those with the supplied forename asking each time whether the searcher wishes to "look at (the) entire household?" If the individual shown was in the age range (age at first census + 10 years) $\pm$ 5 years the searcher responded "yes", the computer proceeded to list all entries with the given surname at the same household number.[7] If the response was "no" the next possible candidate was listed on the computer terminal and the process repeated.

Comparing the members of the family was much the most stringent test of the veracity of a link. Other details concerning an individual

such as occupation, marital status[8] and birthplace[9] could all have changed. If the comparison "proved" that the link was positive, the computer was instructed to transfer the records of the family identified in the second set of records to a "FOUND" file for later listing as hard copy. If the link was not "proven" the search procedure was continued until all the possibilities were exhausted. If the husband could not be found, the forename of his wife was then substituted, allowing for his death or absence, and if she could not be found then selecting and finding the most unusually named child could indicate the death or removal of both parents, or the remarriage of the mother. At each stage alternative spellings of both family and forenames were tried and if the family still could not be identified they were considered "untraceable". This procedure is summarised in Figure 6.1.

It cannot be denied that the task of searching can grow a little tedious but, compared with hand-searching, it is far speedier and a practised user can process many families per hour. Also, once the alphabetically sorted file has been created, the setting up of the DA file is the work of moments allowing the searcher to stop and resume the searching at his or her convenience. It has to be admitted that when the mainframe computer is being heavily used, and is consequently making heavy weather of more complex tasks, and the list of names to be searched is short, linkage by eye using printed copies of the two files being linked is often an easier option. However, when several entries with the same surname are sought, entailing the repeated searching through a surname list, or when the surname sought is particularly common ("Smith" springs particularly to mind!) the BCALS comes into its own, making sure that a flagging searcher misses none of the possible options. Figures 6.2A and B show the results of

Figure 6.1 Steps taken to identify a family from one set of census records in a succeeding set of census records using Brown's Computer Assisted Linkage System.

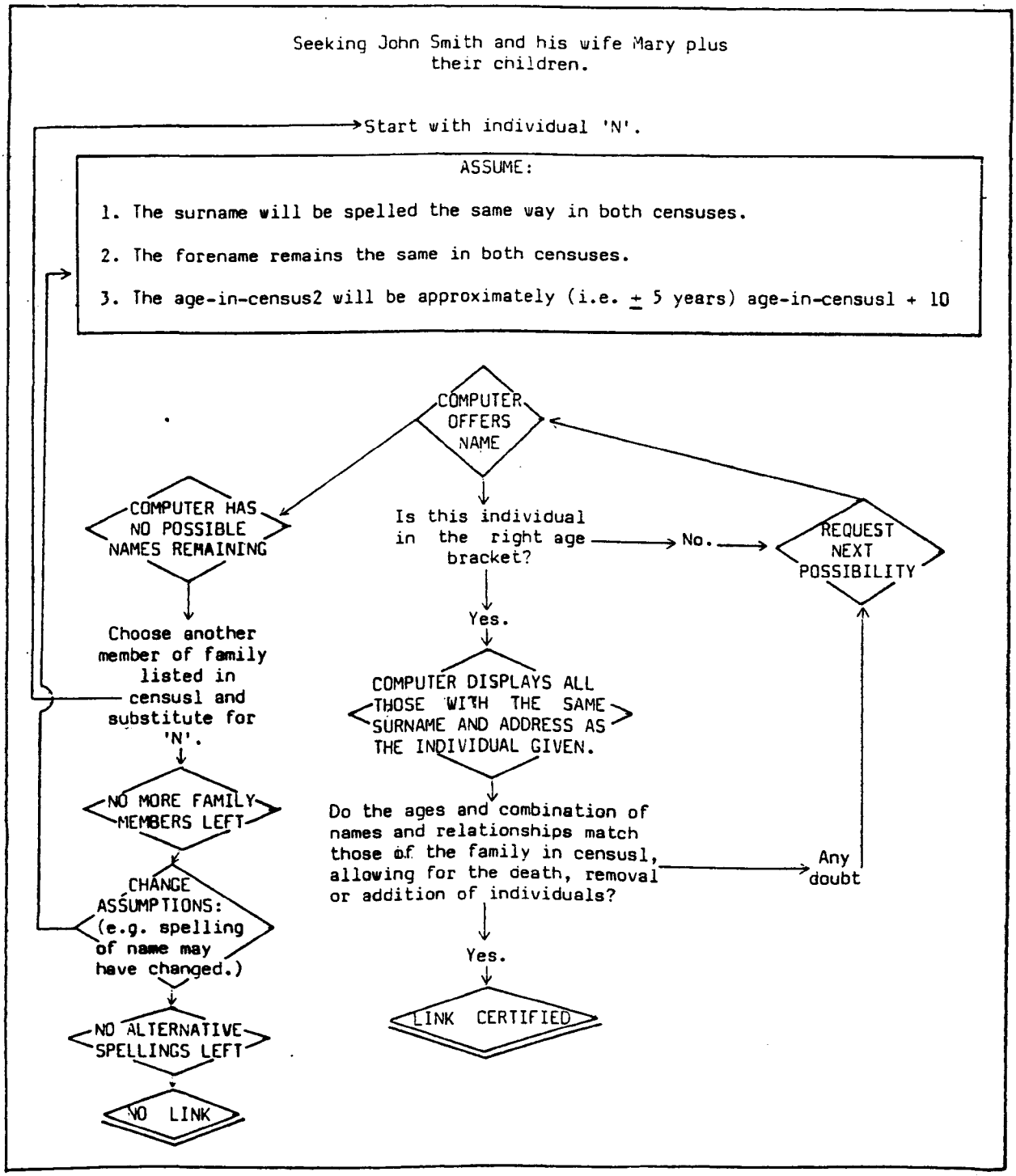


Figure 6.2.A Household 50108030: tracing the Greenwoods and the Laycocks from 1851-1881; linkage across time and record types.

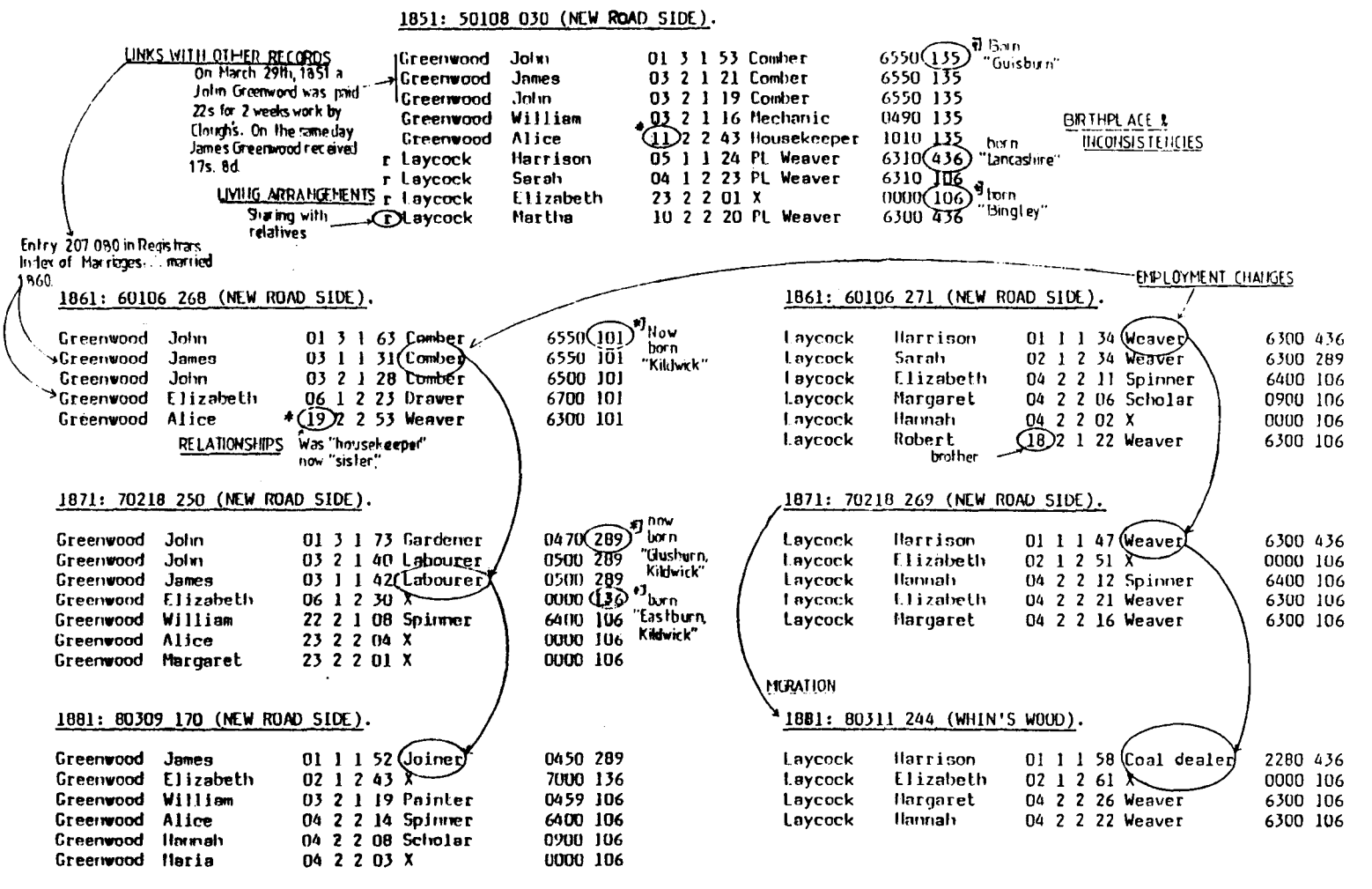
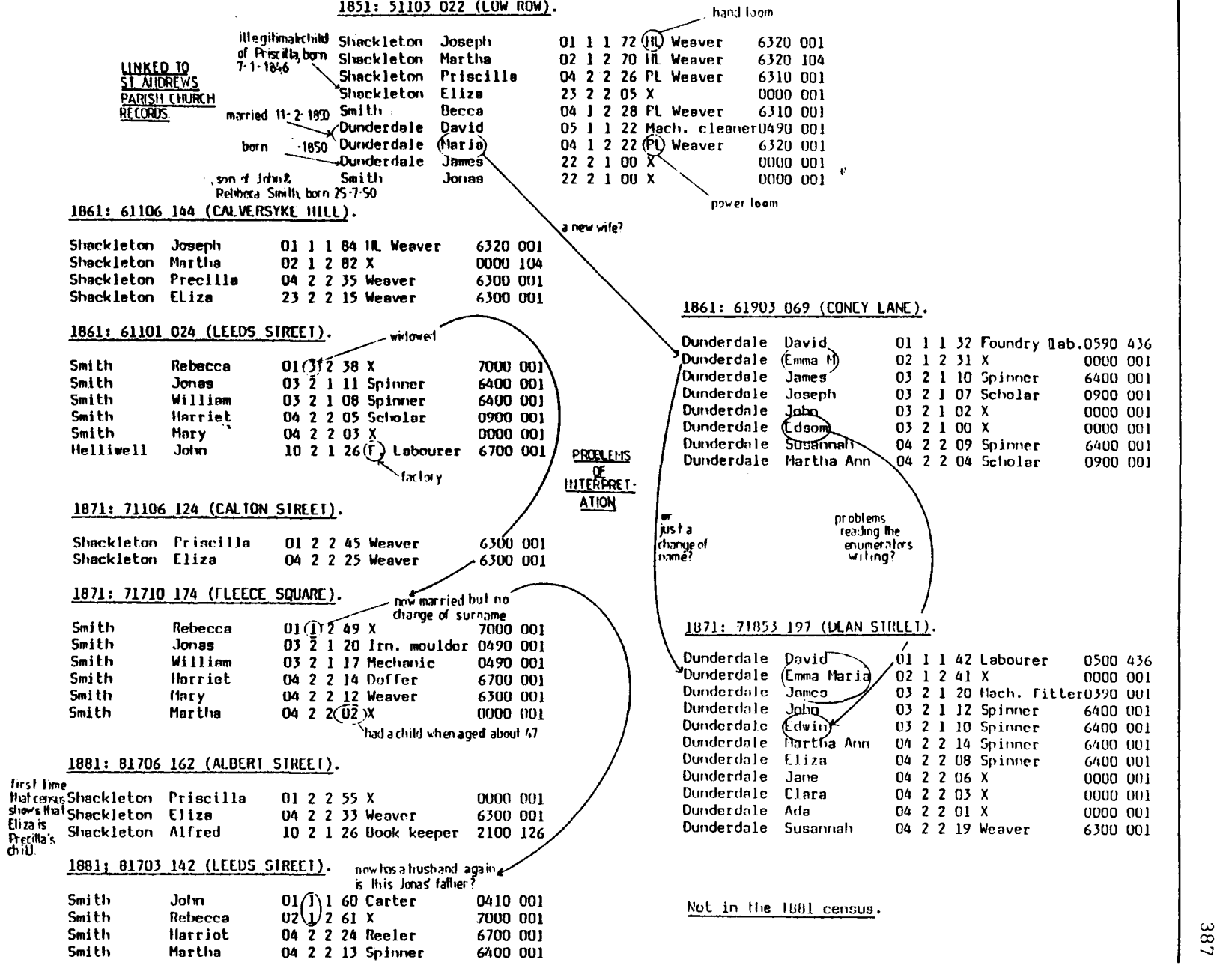


Figure 6.2.B

Household 51103022: tracing the Shackletons, the Smiths and the Dunderdales from 1851-1881 in the census enumerators' books for the study area: the type of information which can be gleaned and some of the problems of interpretation.



linkage on two households in the 1851 census, indicating what types of information can be uncovered. Further details can be added by using the BCALS to link other sorts of records to the census entries, as these Figures indicate.

In conclusion, then, while this system is no competition for the sophisticated data management systems now available to commerce, it allowed the searching of a population numbered in tens of thousands, while its implementation conformed to the constraints of this study.

The remainder of this chapter outlines the information concerning fertility related behaviour in Keighley (the somewhat experimental nature of the linkage injects some hesitancy into calling such data "results") gleaned from the linkage of various nominal records across the study period.

Section 6.4: The Choice of Who Was to be Linked

Ideally, to study the fertility behaviour underlying the measurements computed in the previous chapter, all the couples involved would be traced from census to census to enable their circumstances and fertility histories to be monitored. Even with the BCALS, however, time constraints made this an impractical proposition. The fertility measures had indicated that in Keighley over the study period the behaviour of couples where the wife was aged less than 30 had peculiarities worthy of further attention, for it was amongst this group that the greatest shortfall in births took place. If the longitudinal data derived from the linkage exercises could shed further light on this phenomenon, the study would benefit enormously. The decision was therefore taken to attempt to trace all couples where both partners were present on census night and the wife was aged less than 25.

As very few people in Keighley at this time appeared to marry before the age of 20, this meant that all the couples involved would have been married since the previous census and the majority would have been married only a few years thus giving an impression of the family formation strategies of "newly wed" young couples. With those couples where the wife was aged 25-29 observing "newly married" fertility behaviour was a more complex exercise as the average length of marriage would be several years longer and some women might be well past their first years of family formation. With the later-than-average age at marriage (see Chapter 3, Table 3.1) a proportion would have been married only a few years or even months on census night. As a compromise it was decided to include only those couples from this group, where there were no children aged 5 or over recorded as belonging to the couple. This, of course, raises difficulties where marriages of longer than five years standing have proven barren, or where children have died. Occasionally, the linkage exercise revealed that a child aged 5 or over was alive at the first census but had not been enumerated with his or her parents. In such cases the couple concerned were dropped from the ensuing analysis. Had dates of, and ages at, marriage been available for all couples this would have made a far more stringent delineating factor but, in their absence, age of children made a less satisfactory substitute. (Section 6.7 below discusses work done when marriage dates were available). Before proceeding further a few general points should be made. Firstly, it became clear as work progressed that the two groups, those couples where the wife was aged less than 25, and those where the wife was aged 25-29 with no children aged 5 or over present (hereafter referred to as the 25-29 year olds), showed quite distinct

differences in their composition and behaviour. Many of the following tables, therefore, report the results obtained from the two groups separately.

Secondly, as remarked in previous chapters, occupational coding is not always as straightforward as could be wished. The work reported here was carried out in several phases and in the intervals some occupational codes, especially the industrial sector component, have "floated". Where discrepancies occur in the following tables this can be attributed to re-allocation of occupations. From experience this appears to occur rather more in the later censuses, as occupational terminology becomes more complex, and amongst male occupations more than female ones, the latter being far less numerous. Thirdly, the age of the wife was defined as that she gave in the first census in which she and her husband were identified. The linkage showed how often discrepancies in age reporting occurred, although the linkage procedure itself meant that links were unlikely to be made if the second reported age were wildly different from that first reported. The majority of discrepancies were the order of a year or two but in some cases were sufficient to place the couples in a different "age of wife" category. It was therefore assumed that women reported their correct ages when in their youth and that it was only as they grew older that they took to misreporting how old they were. Unfortunately, the opportunity was missed to note the ages of all the husbands who were identified for linkage - only for those for whom links were subsequently made was this information gathered. As far as the linked couples are representative of their peers, it is likely that the ages of the linked men are representative of the identified populations as a whole.

Thirdly, in some of the tables which follow, although couples first identified in the 1881 census cannot be linked to the succeeding census, they have been included to augment our information about change over the study period.

Finally, while for the fertility analysis reported in Chapter 5, couples where the wife was aged less than 20 were excluded here they are included in order to give a more complete picture of "young marriage".

To begin the linkage exercise all those couples eligible for inclusion were identified in each set of census records. As this was done by eye some eligible couples were, inevitably, accidentally overlooked. Comparison with the numbers used in the fertility calculations (Chapter 5) indicates the extent of this problem (see Table 6.1). In 1851, 9 (i.e. 3.3%) of the couples where the wife was under 25 years old (25 year olds) were missed while 3 (1.3%) such couples were missed in 1861 and 6 (1.8%) in 1871. 9 couples (2.4%) were omitted when the exercise was repeated for the 1881 census. For the 25-29 year old couples the fertility measures figure included those with children age 5 and over, thus the exact number of eligible couples missed is not known, although it is doubtful if the percentages would greatly exceed those lost amongst their younger neighbours. Table 6.1 does indicate, however, that between 33 and 39 per cent of couples with the wife aged 25-29 had children aged over 5 with them on census night.[10]

Table 6.2A and 6.2B indicate the occupational distribution of the husbands in the two groups identified for linkage in each set of census returns. When the figures for the three main occupational groups (Higher Status and Lower Status Textile Workers being combined) are

Table 6.1 Linkage exercises on couples where the wife was aged <30 and the husband was present on census night. The number and percentage of couples included when [A] the wife was aged <25 and [B] when the wife was aged 25-30, Keighley 1851-1881

	A			B		
Date	1. Number of couples included in fertility analysis.[1]	2. Number of couples identified for linkage.	3. % of couples in 1 included in 2.	4. Number of couples included in fertility analysis.	5. Number of couples identified for linkage.	6. % of couples in 4 included in 5.
1851	277	268	96.7	361	224	62.0
1861	225	222	98.7	402	258	64.2
1871	329	323	98.2	580	385	66.4
1881	462	451	97.6	742	456	61.4

Source: Census Enumerators' books, Keighley 1851-1881.

Notes. 1. In the fertility analysis the small number of couples where the wife was aged < 20 were excluded. In the linkage exercise they were included. There were 24 such couples in 1851, 15 in 1861, 27 in 1871 and 29 in 1881.

2. Couples where the wife was aged 25-29 were excluded from the exercise if any of their own children were aged 5 or over. A small proportion will have been excluded through human error (as in group A) rather than because they fulfil the exclusion criteria, however.

Table 6.2 The proportion of the couples who were identified for linkage who were in various husband's occupational groups when [A] the wife was aged < 25 and [B] when the wife was aged 25-29, Keighley 1851-1881.

A. Wife aged <25

Date	Husband's occupation												
	Prof.		LMC		TETMM		M-M		HST		LST		Total
	N	%	N	%	N	%	N	%	N	%	N	%	N
1851	1	0.4	13	4.8	82	30.5	47	17.5	40	14.9	85	31.7	268
1861	2	0.9	10	4.5	74	33.3	73	32.9	32	14.4	31	14.0	222
1871	1	0.3	26	8.0	100	30.9	154	47.7	28	8.7	14	4.3	323
1881	5	1.1	46	10.2	175	38.8	160	35.5	43	9.5	22	4.9	451

B. Wife aged 25-29, no children aged 5 or over

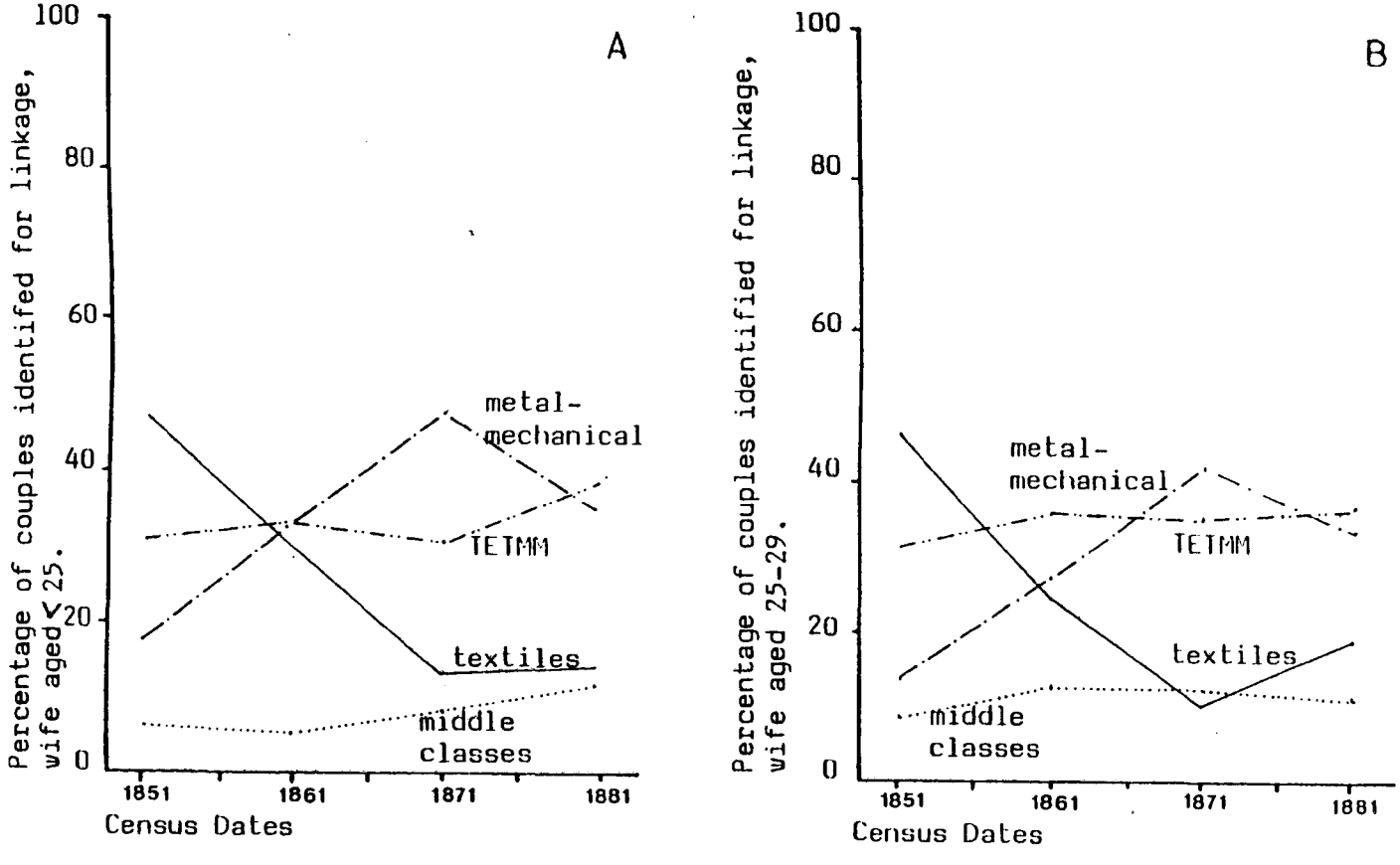
Date	Husband's occupation												
	Prof.		LMC		TETMM		M-M		HST		LST		Total
	N	%	N	%	N	%	N	%	N	%	N	%	N
1851	1	0.4	19	8.5	71	31.7	30	13.4	37	16.5	66	29.5	224
1861	7	2.7	25	9.7	93	36.0	69	26.7	24	9.3	40	15.5	258
1871	5	1.3	40	10.9	138	35.8	160	41.5	31	8.0	11	2.8	385
1881	6	1.3	45	10.1	165	36.2	155	34.0	60	13.2	25	5.5	456

Source: Census enumerators' books, Keighley 1851-1881.

Notes: Prof. = Professional-Managerial
LMC = Lower Middle Class
TETMM = Trades other than textiles or metal-mechanical work
M-M = Metal-mechanical work
HST = Higher status textile workers
LST = Lower status textile workers

graphed (Figure 6.3) they can be compared with Figure 3.11A. Thus we can see that men with wives aged less than 30 were experiencing similar changes in occupational structure to those of men married to women in the 20-49 year age group. The slopes of the graphs in Figure 6.3 are rather steeper; the growth in metal-mechanical work and the decline of textiles being more rapid than amongst the men depicted in Figure 3.11A. Metal-mechanical work became the main employer of men with young wives earlier than it did of married men as a whole. In contrast to Figure 3.11A, where 1871-1881 showed a small rise in the percentage of the men employed in metal-mechanical work, both graphs in Figure 6.3 show quite marked declines. In Figure 6.3A this decline was in favour of the TETMM group while amongst the husbands of the older women in Figure 6.3B it was to those in textile work who saw the proportionate rise in numbers. These figures and graphs support comments made in earlier chapters concerning the influx of younger married men into textile jobs 1871-1881 and the substitution of higher status textile jobs for lower status ones. The middle classes (Professionals and Lower Middle Classes combine) show a proportional increase amongst the husbands of women aged less than 25, 1861-1881, while for the husbands of wives in the slightly older group the proportion in this class remains relatively constant. An increased demand for clerks appears to be primarily responsible for the increase in number of middle class husbands in Figure 6.3A. Men in this occupation tend to be younger, moving up their chosen career path with age, and therefore many of them have young wives. Unless they inherit their shops, shopkeepers tend to be rather older, requiring some capital and experience before they can set up their own enterprises;

Figure 6.3 The proportion of couples identified for linkage in certain of the husband's occupational categories when (A) the wife was aged less than 25 and (B) when the wife was aged 25-29: Keighley 1851-1881.



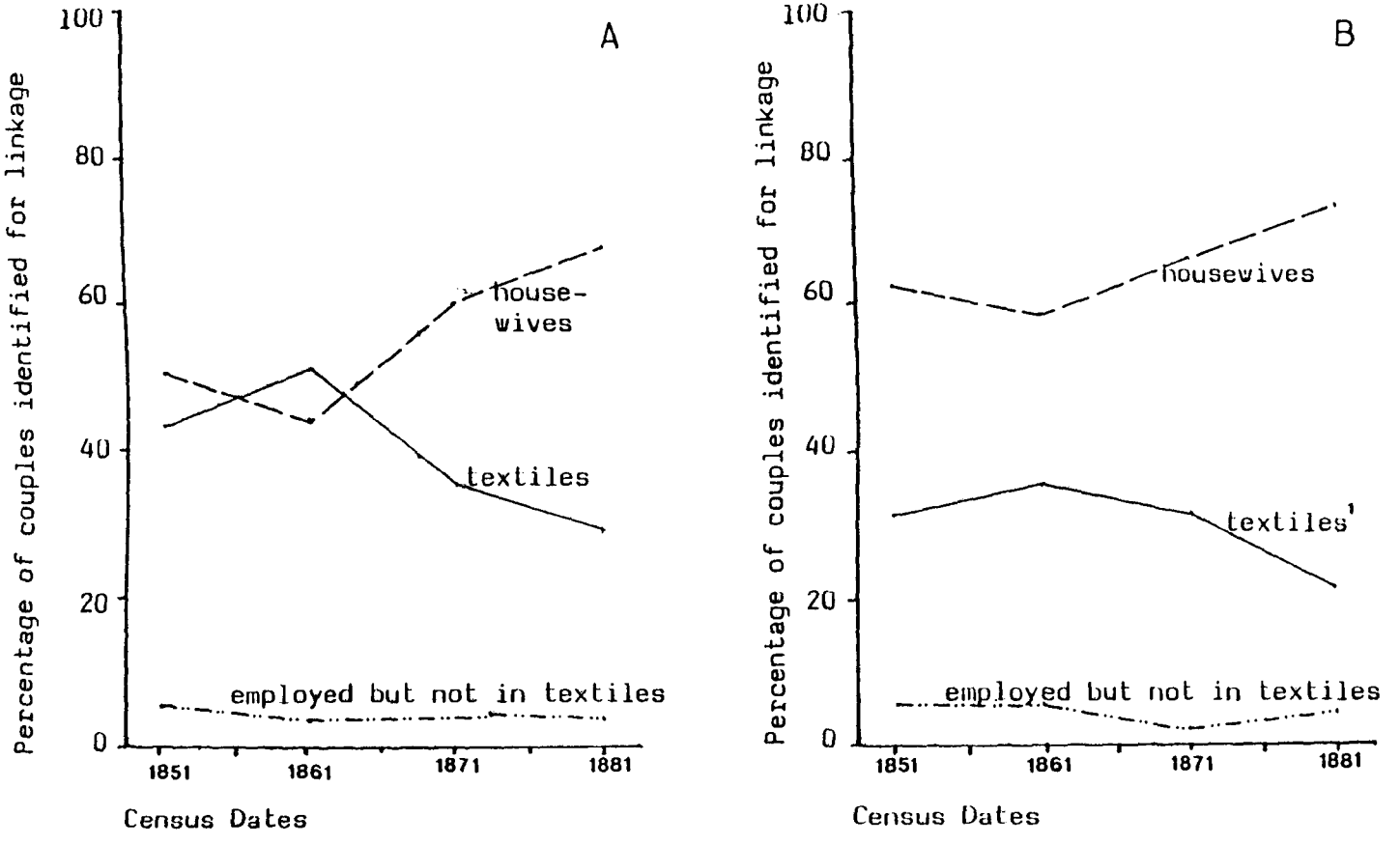
Source: Census enumerators' books.

Figure 6.3B. The growth of TETMM, 1871-1881, amongst the younger husbands cannot be attributed to any one industry, but simply to an increase in the number of trades being plied in the town.

Figures 6.4A & B graph the proportions of the two groups of wives identified for linking who were working in textiles, were working elsewhere or who were housewives. These graphs can be compared with that of Figure 3.11B. While the general shape of all three graphs is similar, increasing numbers working in textiles 1851-1861 followed by the totally opposite trend 1861-1881 as the numbers of housewives soars, the different, relative levels of the three graphs is striking. In the two young age groups proportionally more wives worked, indeed, in 1861 more wives aged less than 25 worked than stayed at home. However, in the ensuing twenty years these women were to leave the mills for the home more rapidly than their slightly older sisters, although they, too, were following the same general trend. With the caveat beneath Figure 6.4B in mind, the impression is that the younger a wife was the more likely she was to be working in textiles.

If we now divide each of the husbands occupational groups from Table 6.2 into three sub-groups defined by the occupation of the wife (Tables 6.3A & B) it can be seen that, as expected from previous discussions in Chapter 3, the wives of men in different occupational groups have varying propensities to work. Figure 6.5A & B highlight these differences, although it should be noted, the absolute numbers are in some cases very small. In the under 25 year group, Figure 6.5A, the TETMM workers (A) are unusual in that the proportion of their wives who are textile workers is much lower than the proportion who are housewives. In the 25-29 year group the low status textile workers (D) who are remarkable for the high proportion of their wives who are

Figure 6.4 The proportion of couples identified for linkage in certain of the wife's occupational categories when (A) the wife was aged less than 25 and (B) when the wife was aged 25-29: Keighley 1851-1881.



Source: Census enumerators' books.

Note 1. As women with children over the age of 5 are not included in these graphs, Graph B probably overestimates the proportion of all 25-29 year old wives who were working.

Table 6.3.A The occupational characteristics of couples identified for linkage when the wife was aged < 25, Keighley 1851-1881.

Husband's Occ.		Prof.			LMC			TETMM			M-M			HST			LST			All
Wife's Occ.		T	H	O	T	H	O	T	H	O	T	H	O	T	H	O	T	H	O	
	N		1		1	11	1	29	47	6	18	26	3	16	23	1	54	28	3	268
1851	%1		0.4		0.4	4.1	0.4	10.8	17.5	2.2	6.7	9.7	1.1	6.0	8.6	0.4	20.1	10.4	1.1	
	%2							35.4	57.3	7.3	38.3	55.3	6.4	40.0	57.5	2.5	63.5	32.9	3.5	
	N		2		2	7	1	27	42	5	37	35	1	23	8	1	26	5		222
1861	%1		0.9		0.9	3.1	0.4	12.2	18.9	2.2	16.7	15.8	0.4	10.4	3.6	0.4	11.7	2.2		
	%2							36.5	56.7	6.7	50.7	47.9	1.4	71.9	25.0	3.1	83.9	16.1		
	N		1		1	20	5	25	69	6	64	85	5	16	12		8	6		323
1871	%1		0.3		0.3	6.2	1.5	7.7	21.4	1.8	19.8	26.3	1.5	4.9	3.7		2.5	1.8		
	%2							25.0	69.0	6.0	41.5	55.2	3.2	57.1	42.9		57.1	42.9		
	N		5		3	41	2	44	123	8	58	99	3	15	27	1	12	9	1	451
1881	%1		1.1		0.7	9.1	0.4	9.7	27.3	1.8	12.9	21.9	0.6	3.3	6.0	0.2	2.7	2.0	0.2	
	%2							25.1	70.2	4.6	36.2	61.9	1.9	34.9	62.8	2.3	54.4	40.9	4.5	

Source: Census enumerators' books, Keighley 1851-1881.

Notes: For full rendering of husaband's occupational groups see Table 6.2

T = Wife a textile worker
H = Wife a housewife
O = Wife employed but not in textiles

%1 - The percentage of the total number of couples identified for linkage (see column headed "All")

%2 - The percentage of all the couples in the husband's occupational group identified for linkage which are in given the wife's occupational group.

Table 6.3.B The occupational characteristics of couples identified for linkage when the wife was aged 25-29, Keighley 1851-1881.

Husband's Occ.		Prof.			LMC			TETMM			M-M			HST			LST			All
Wife's Occ.		T	H	O	T	H	O	T	H	O	T	H	O	T	H	O	T	H	O	
	N		1			18	1	19	46	6	5	24	1	10	24	3	36	28	2	224
1851	%1		0.4			8.0	0.4	8.5	20.5	2.7	2.2	10.7	0.4	4.5	10.7	1.3	16.1	12.0	0.9	
	%2					94.7	5.3	26.8	64.8	8.4	16.7	80.0	3.3	27.0	64.9	8.1	42.3	32.9	2.3	
	N		7			21	4	38	47	8	19	47	3	10	14		24	16		258
1861	%1		2.7			8.1	1.5	14.7	18.2	3.1	7.4	18.2	1.2	3.9	5.4		9.3	6.2		
	%2					84.0	16.0	40.9	50.5	8.6	27.5	68.1	4.3	41.7	58.3		60.0	40.0		
	N		5		3	35	2	40	95	3	59	97	4	14	17		5	6		385
1871	%1		1.3		0.8	9.1	0.5	10.4	24.7	0.8	15.3	25.2	1.0	3.6	4.4		1.2	1.5		
	%2				7.5	87.5	5.0	29.0	68.8	2.2	36.9	60.6	2.5	45.2	54.8		45.4	54.5		
	N		6		2	39	4	39	117	9	36	115	4	14	43	3	9	14	2	456
1881	%1		1.3		0.4	8.5	0.9	8.5	25.6	2.0	7.9	25.2	0.9	3.1	9.4	0.6	2.0	3.1	0.4	
	%2				4.4	86.7	8.9	23.6	70.9	5.4	23.2	74.2	2.6	23.3	71.7	5.0	36.0	56.0	8.0	

Source: Census enumerators' books, Keighley 1851-1881.

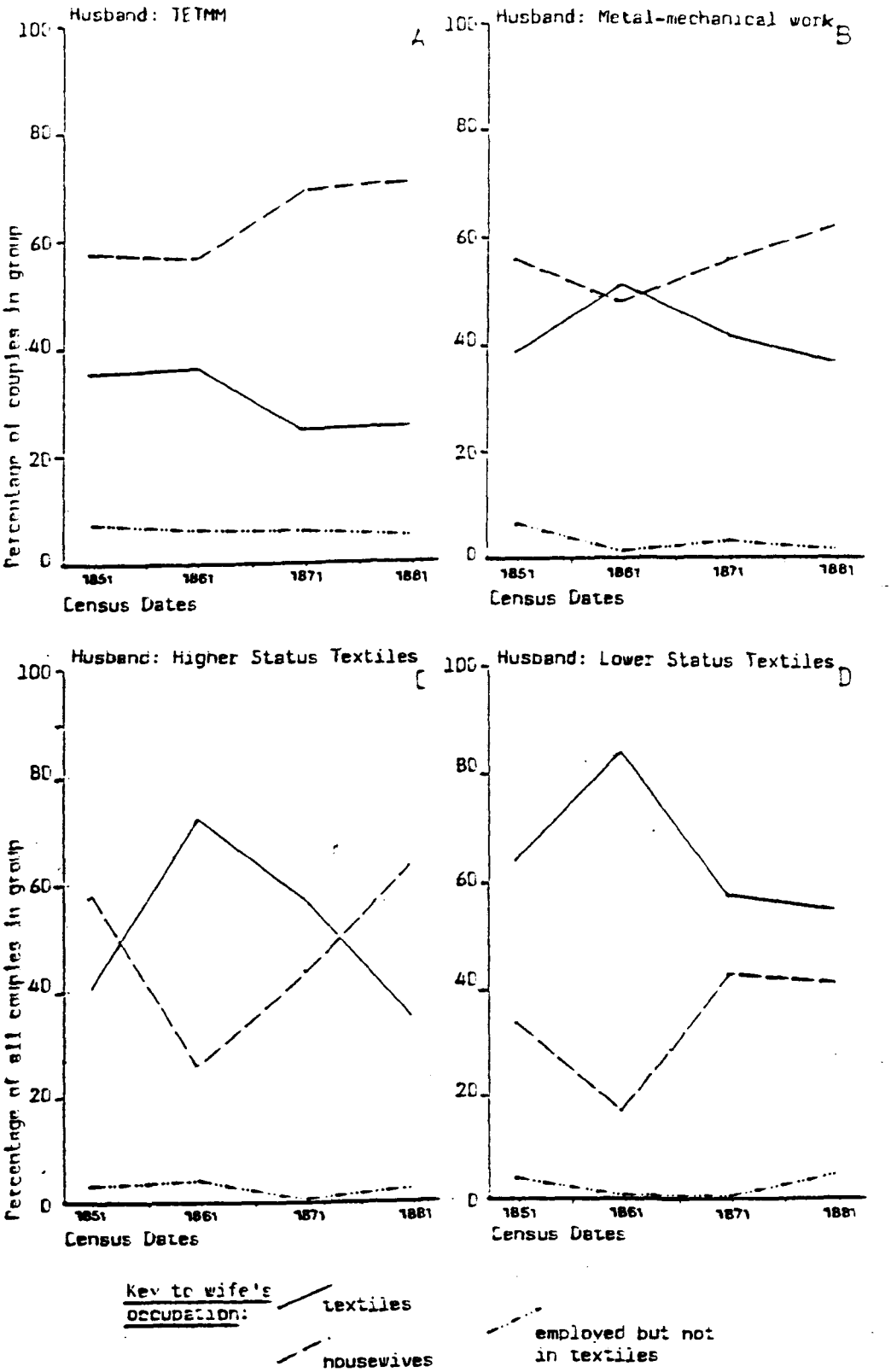
Notes: For full rendering of husaband's occupational groups see Table 6.2

T = Wife a textile worker
H = Wife a housewife
O = Wife employed but not in textiles

%1 - The percentage of the total number of couples identified for linkage (see column headed "All")

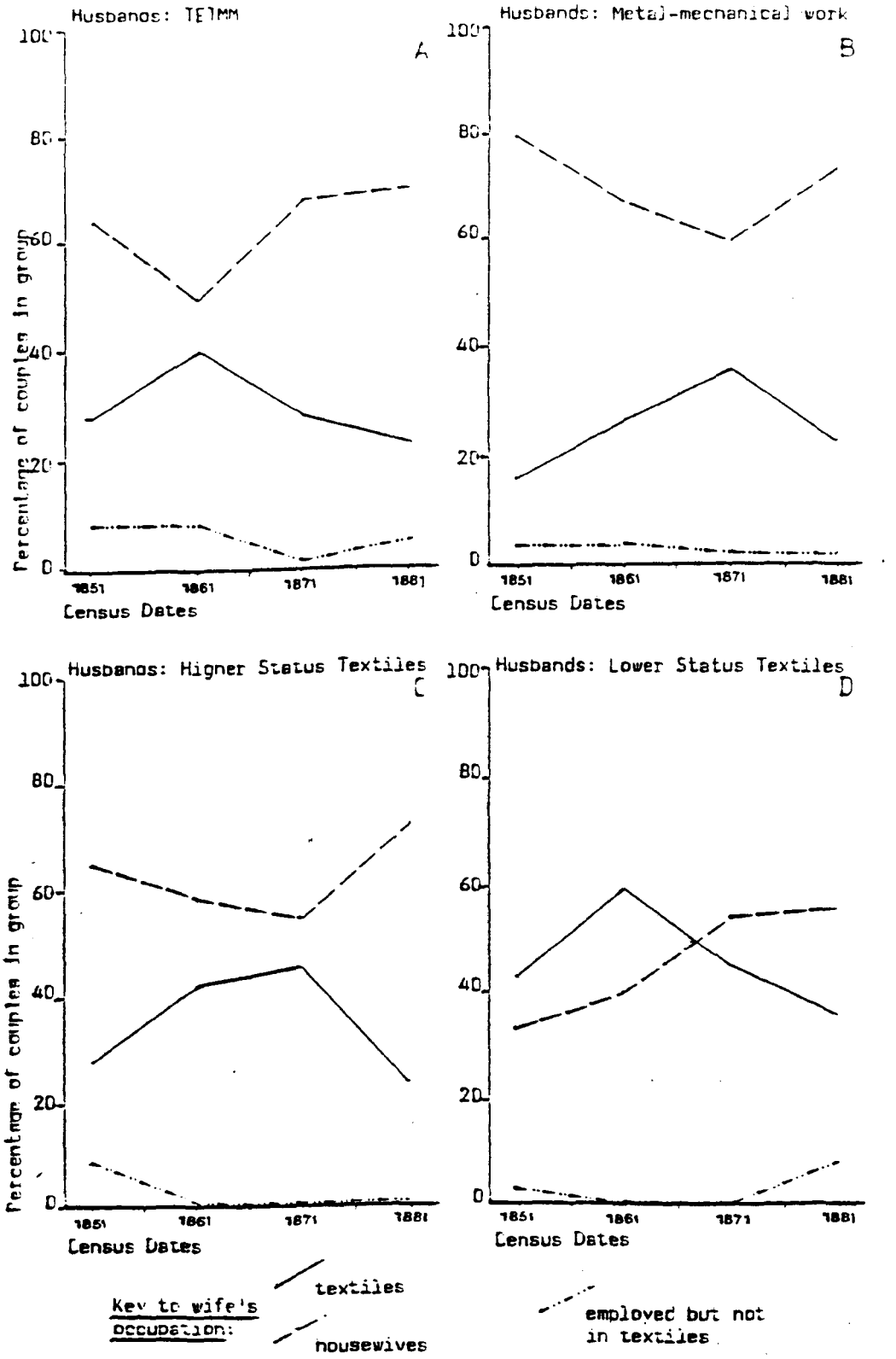
%2 - The percentage of all the couples in the husband's occupational group identified for linkage which are in given the wife's occupational group.

Figure 6.5.A The proportion of wives in three occupational groups, by husband's occupational group where the wife was aged less than 25 on census night; Keighley 1851-1881.



Source: Census enumerators' books.

Figure 6.5.B The proportion of wives in three occupational groups, by husband's occupational group where the wife was aged 25-29 and there were no children aged 5 or over on census night;Keighley 1851-1881.



Source: Census enumerators' books.

not at home. Interestingly, while 1861 was the peak census year for the wives of all male occupational groups in the <25 year group to be working in textiles, amongst the metal-mechanical workers and higher status textile workers of the older group the peak year was 1871. The reasons for this would bear further investigation. Young couples were, therefore, likely to be undergoing very different experiences in the early years of their marriage; the husband's occupation being closely linked to his wife's employment history. From the graphs in Figure 6.5 it would appear that the wives of textile workers were more subject to dramatic changes in their labour force participation than the wives of men in other occupations; but this may simply be an artefact of the small numbers involved after 1861.

While the couples were being identified as eligible for linking the opportunity was taken to learn more about their "living arrangements", i.e. their position within the household in which they were living. The main categories found were (1) those living as heads of their own household, (2) those living with the husband's parents, (3) those living with the wife's parents, (4) those lodging, and (5) those with alternative arrangements. Tables 6.4A & B show the proportions in the five categories for the two age groups. Unfortunately, it was not noted how many couples heading their own households had lodgers or older relatives staying with them, thus the proportion of "complex" households[11] will have been considerably underestimated. Nevertheless, from Tables 6.4A & B it can be seen that an increasing proportion of under 25 year couples were heading households over the study period. The proportion of "heads of household" in the older age group remained rather more constant, at a higher level. The high proportion of couples in this age group who headed their own household may indicate

Table 6.4.A The living arrangements on census night of couples identified for linkage, where the wife was aged < 25, Keighley 1851-1881.

Date	Living arrangements										Total
	Living in own household		Living with husband's parents		Living with wife's parents		Living as lodgers		Other living arrange-ments		
	N	%	N	%	N	%	N	%	N	%	N
1851	184	68.6	29	10.8	33	12.3	16	6.0	6	2.2	268
1861	170	76.6	19	8.5	20	9.0	9	4.0	4	1.8	222
1871	230	71.2	18	5.6	23	7.1	46	14.2	6	1.8	323
1881	374	82.9	26	5.8	21	4.6	25	5.5	5	1.1	451

Table 6.4.B The living arrangements on census night of couples identified for linkage, where the wife was aged 25-29, Keighley 1851-1881.

Date	Living arrangements										Total
	Living in own household		Living with husband's parents		Living with wife's parents		Living as lodgers		Other living arrange-ments		
	N	%	N	%	N	%	N	%	N	%	N
1851	193	86.2	13	5.8	16	7.1	1	0.4	1	0.4	224
1861	218	84.5	10	3.9	14	5.4	11	4.3	5	1.9	258
1871	330	85.7	7	1.8	17	4.4	30	7.8	1	0.3	385
1881	396	86.8	10	2.2	23	5.0	24	5.3	3	0.6	456

Source: Census enumerators' books, Keighley 1851-1881.

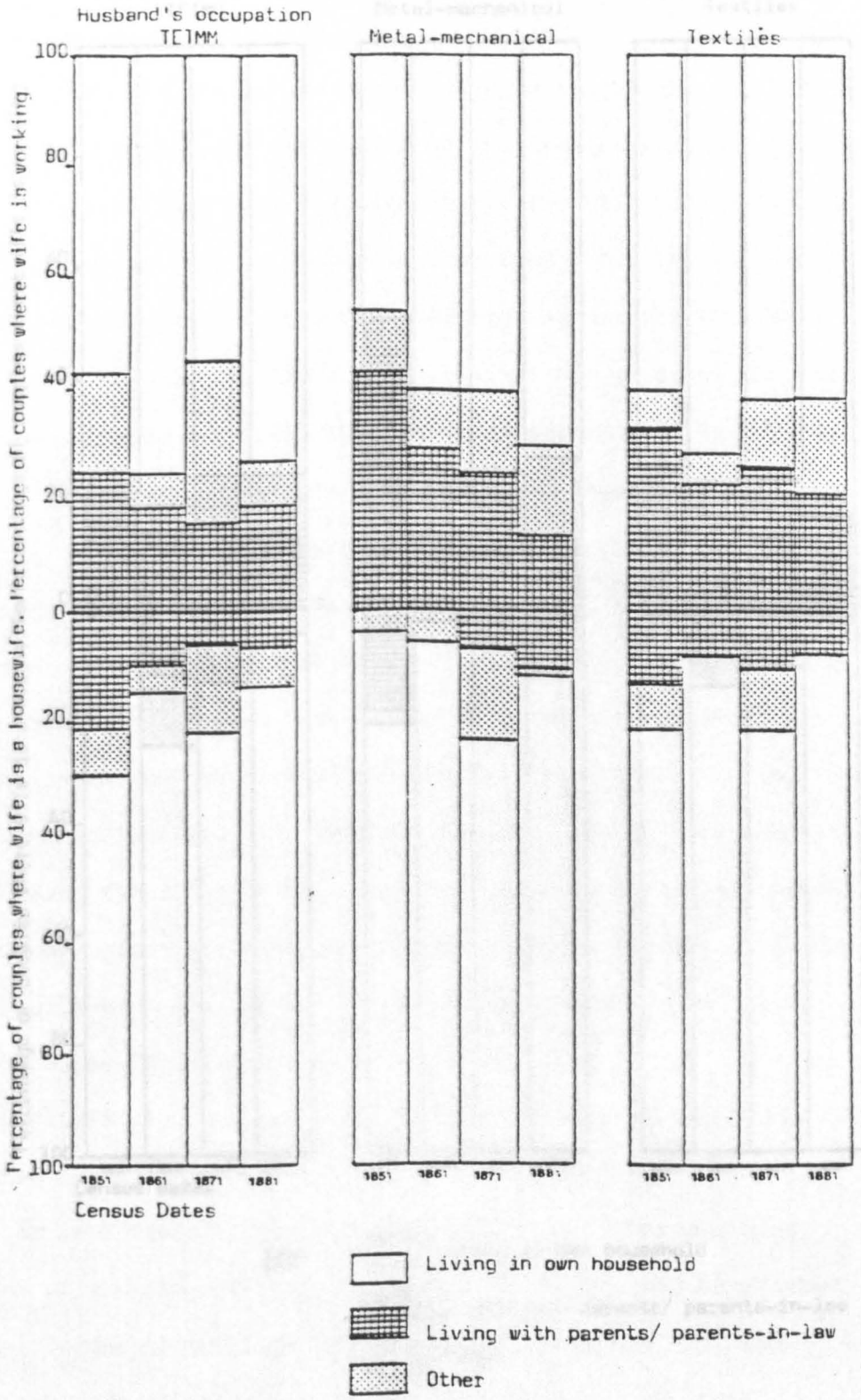
that those marrying later had delayed marriage until they could find, or afford, a house of their own. Alternatively, or perhaps in addition, as sharing accommodation would appear to have been a short lived stage of early marriage in Keighley, and as those in the older age groups would have had a slightly longer average length of marriage, they may well have passed beyond that stage. The steadily decreasing gap between the proportion of household heads in each of the two age groups could point to decreasing pay differentials between the two groups with new industries and work practices increasing the earning power of younger men, thus enabling them to set up their own homes at an earlier stage. This is a tentative suggestion only, no substantial data being available. It has already been postulated that as Keighley grew fewer couples would have ready access to grandparents. The figures given here add weight to this argument as both tables show a steady decline in the proportion of couples staying with parents or parents-in-law. However, we treat these figures cautiously. It may be that what we are seeing is a transition from "authority by age" to "authority by earning power". In the early years of the study, the head of the household might be Mary, Tom Smith's widowed mother, she being the oldest member of the household whereas in 1881 Tom Smith would be the head of the household, as he was the main breadwinner, while his mother is simply another household member. Further work is needed to clarify this issue.

The proportion of young couples in lodgings appears to vary erratically. This may be due to variations in the way enumerators recorded lodgers, although a problem sometimes referred to (see Hinde, 1985a) that of differentiating between "boarders" and lodgers was not encountered in Keighley; the word "boarder" did not appear once in

the four sets of census records.

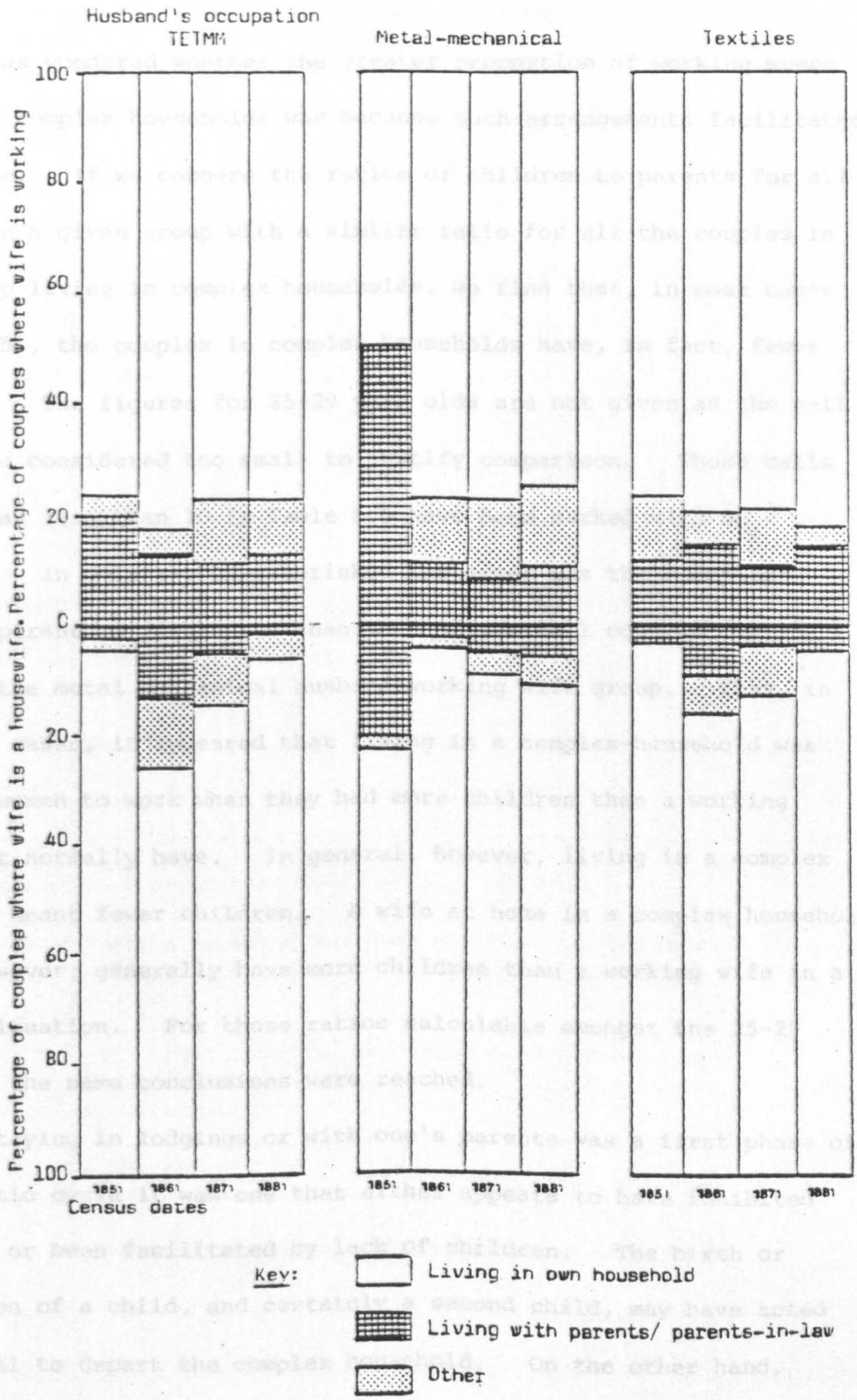
In order to see whether different occupational categories had different household arrangements, Figures 6.6A & B were drawn up. The higher and lower status textile workers have been amalgamated and "living arrangements" have been contracted into (1) heading own household, (2) living with parents or parents-in-law and (3) other living arrangements (which mainly comprises those lodging). Wives have been split into those working and those who are housewives. From the charts it is obvious that those couples where the wife is working were more likely to be living as members of complex households (even given the caveats above). It is also clear that couples in the younger age group are more likely to be living with one or other set of parents than those where the wife was aged 25-29.(metal-mechanical workers, 1851, being discounted because N is very small). The large increase in the proportion living in complex households 1861-1871 which was brought out in Table 6.4A can be seen to spread right across the male occupations but to have particularly affected those couples where the wife was a housewife and the working wives of TETMM workers. No one male occupational group seems to have had consistently higher proportions of couples in complex households,[12] although textile workers had slightly the highest average proportion over the 30 year period. Interestingly, while the proportion of the under 25 year old group living in complex households shrank substantially 1851-1861, that in the 25-29 year old group grew (metal-mechanical group 1851 again excepted). This might indicate that marriages were being delayed, only those couples who could afford to set up their own household getting married when the wife was aged less than 25, while more of the 25-29 year olds were going through the early-marriage

Figure 6.6.A The living arrangements of couples where the wife was aged less than 25, where the wives were working and where they were housewives, by husband's occupation: Keighley 1851-1881.



Source: Census enumerators' books.

Figure 6.6.B The living arrangements of couples where the wife was aged 25-29 and no children aged 5 or over were present, where the wives were working and where they were housewives, by the husband's occupation; Keighley 1851-1881.



Source: Census enumerators' books.

stage of living in a shared house, or were unable to break out of that stage due to the strains on the labour market telling on their finances.

It was wondered whether the greater proportion of working women living in complex households was because such arrangements facilitated child-care. If we compare the ratios of children to parents for all couples in a given group with a similar ratio for all the couples in that group living in complex households, we find that, in most cases (Table 6.5), the couples in complex households have, in fact, fewer children. The figures for 25-29 year olds are not given as the cell sizes were considered too small to justify comparison. Those cells where N was less than 10 in Table 6.5 have been marked with an asterisk. In only two un-asterisked instances was the "complex" child to parent ratio greater than that of the "all couples" ratio, both for the metal mechanical husband/working wife group. Thus, in these two cases, it appeared that living in a complex-household was allowing women to work when they had more children than a working wife might normally have. In general, however, living in a complex household meant fewer children. A wife at home in a complex household would, however, generally have more children than a working wife in a similar situation. For those ratios calculable amongst the 25-29 year olds the same conclusions were reached.

If staying in lodgings or with one's parents was a first phase of the domestic cycle it was one that either appears to have inhibited children, or been facilitated by lack of children. The birth or expectation of a child, and certainly a second child, may have acted as a signal to depart the complex household. On the other hand, sharing sleeping facilities with other family members may have

Table 6.5 The ratio of children to couples where the wife is aged < 25 by husband's occupational group and wife's occupational status, comparing those in a given group living in "complex" households with all couples in that group, Keighley 1851-1881.

Date		Husband's occupation					
		TETMM		M-M		Text.	
	Wife's Occ.	W	H	W	H	W	H
1851	All households	0.48	0.94	0.33	0.81	0.73	1.02
	Complex households	0.13	0.57	0.54	1.00*	0.48	0.36
1861	All households	0.87	0.90	0.63	0.97	0.58	1.61
	Complex households	0.62*	0.67*	0.40	0.00*	0.36	0.00*
1871	All households	0.58	0.97	0.43	1.12	0.58	0.83
	Complex households	0.43	0.73	0.33	1.00	0.30*	1.00*
1881	All households	0.54	1.02	0.59	1.08	0.52	1.00
	Complex house holds	0.50	0.07	0.72	0.67	0.45	0.67*

Source: Census enumerators' books, Keighley 1851-1881.

Notes: A "complex" household here means one which comprises more individuals than make up the nuclear family central to that household.

TETMM = Trades other than textiles or metal-mechanical work
M-M = Metal-mechanical work
Text. = textiles

W = Wife working
H = Wife a housewife

* The number of couples in this group is very small; < 10

restricted the frequency of intercourse, thus delaying pregnancy and thence departure.

While the young wives of textile working men do not appear to have been substantially more likely to live in complex households than the wives of other workers, those of them who were doing so seem to have been more likely to be living in households headed by their own or, less often, by their husband's parents. Several reasons can be put forward for this. Textiles in the area was traditionally a family, cottage based craft, each member making a contribution to the finished product, therefore traditionally a young couple could find accommodation and employment in the parental home. More prosaically financial constraints on both generations may have encouraged the arrangement. Finally, it may simply have been that those couples in textiles were less likely to be "incomers" and therefore more likely to have parents in the area with whom they could stay.

Having identified those couples who fitted the criteria for linkage at each census, the linkage procedure was carried out as described above (Chapter 6, Sections 2 & 3). A successful link was considered to have been made only if one or other of the original couple was identified. Thus a wife who had been widowed and had remarried constituted a link, whereas a couple's three children found without their parents did not. A couple identified in one census were traced to the following census and, if found, sought in any succeeding census.

Table 6.6 A & B details the success rate of the linkage exercises. It became obvious that the social upheavals accompanying the technological redundancy of the hand woolcombers were expressed in a great deal of mobility. Of the 268 couples where the wife was aged less

Table 6.6 Linkage exercises: success rate of linking.

A. For couples where the wife was aged < 25

Date	Number of couples identified for linking	Couples who could not be linked		Couples linked to 1861 census		Couples linked to 1871 census		Couples linked to 1881 census	
	N	N	%	N	%	N	%	N	%
1851	268	161	60.1	107	39.9	70	26.1	53	19.8
1861	222	90	40.5			132	59.4	109	49.1
1871	323	166	51.3					157	48.6
1881	453	*	**						

B. For couples where the wife was aged 25-29, and there were no children aged 5 or over

Date	Number of couples identified for linkage	Couples who could not be linked		Couples linked to 1861 census		Couples linked to 1871 census		Couples linked to 1881 census	
	N	N	%	N	%	N	%	N	%
1851	224	119	53.1	105	46.9	77	34.4	52	23.2
1861	258	103	39.9			155	60.1	122	47.3
1871	385	185	48.1					200	51.9
1881	458	*	**						

Source: Nominal record linkage of census enumerators' books

Notes: * ** As 1881 was the last available census couples identified in it could not be traced

than 25 identified as eligible for linking in 1851, only 107 or 39.9 per cent were linked to the 1861 census. By 1871 only 26.1 per cent of the original 268 were left, and by 1881 this had fallen to 19.8 per cent. Being found in one census, however, increased a couple's chance of being found in the next census, 65.4 per cent of those found in 1861 were in 1871 and 75.8 per cent of those were found in 1881.

In contrast the success rate amongst the younger cohort[13] in the 1861 Census was considerably higher, indicating a rather more sedentary population. A far greater proportion remained two decades after this census than had done so two decades after the previous one.

Links from the 1871 Census could only be followed over one decade, but mobility must have been on the increase again, as success rates of linkage dropped.

The 25-29 year old group, in general, displayed slightly higher rates of linkage success and therefore lower levels of mobility than the younger cohort, although the overall "push" and "pull" factors appear to have been at work. While 73.3 per cent of those in the older group in 1851 found in 1861 survived to be linked to 1871, only 67.4 per cent survived to 1881, in contrast to the increasing proportion in the younger cohort as, by this stage, many of the wives in the older group would have been approaching their sixtieth birthdays and therefore mortality may have been playing an increasing role in reducing the number of links.

Mobility, therefore, does appear to diminish with age, although this pattern can be distorted by economic or social conditions affecting different cohorts to varying degrees. (The 1851 cohorts were more mobile than the 1861 ones, 1861-1871 and 1871-1881, despite the differences in age and allowing for some loss in the earlier

cohorts due to death). As an estimate of how the success rate of the linkage exercise had been affected by choosing to link only wives under the age of 30 an extra linkage exercise was carried out. All couples where both spouses were present and the wife was aged less than 50 on census night, who had a surname initial lying between A and F inclusive in the 1851 census were traced to the 1861 census. The results are tabulated in Table 6.7. As the wife's age increased so the success rate of the linkage rose. There was a considerable jump in success rate between the 25-29 year age group and those in the 30-34 year age group; being over 30 in the original census substantially increased an individual's chances of still being in the area a decade later.

On the other hand, comparison of Tables 6.6 and 6.7 reveal that the success rate of the linking was significantly higher amongst the under 30 year olds in the A-F set than it had been for those included in Tables 6.6A & B. Amongst the 25-29 year olds this might be expected as the A-F sample included those couples in this age group who had children aged 5 or over. Such families may well have had several other small children acting as a hindrance to migration. This reasoning cannot be applied to those couples in the under 25 years old category. When the less than 20 and 20-24 year age groups from Table 6.7 are combined a linkage success rate of 49.3 per cent is achieved; 10 per cent higher than that amongst the population in Table 6.6.A. Admittedly, the A-F linkage was carried out after the other census linkage exercises and therefore the searcher was more confident about making links which had previously been considered dubious; this was especially the case where only one partner had survived the intercensal period. In the A-F sample 6 such cases occurred, they had not been counted in the main 1851 linkage but were

Table 6.7 The outcome of tracing all couples in Keighley, where both spouses were present on census night and the wife was aged 15-49, who had a surname initial lying between A and F inclusive from the 1851 census to the 1861 census.

Wife's age group	1. Number of couples surname A-F in 1851 census	2. Number of couples surname A-Z in 1851 census	Col.1. as a percentage of Col.2.	% in A - F sample traced
15-19	7	24	29.2	42.8[1]
20-24	70	255	27.4	50.0
25-29	109	361	30.2	56.0
30-34	90	324	27.8	65.6
35-39	76	307	24.7	67.1
40-44	63	261	24.1	69.8
45-49	58	246	23.6	70.7

Source: Nominal record linkage of census enumerators' books.

Notes: 1. N is very small

considered to be true links in the sample exercise. If this figure is extrapolated across the whole of the 1851 under 25 years population then some 24 cases could be added to the 107 linked 1851 to 1861. This gives a linkage success rate of about 48.9 per cent. The benefit of repeated searches is thus underlined, although some doubts remain as to their cost effectiveness. We may postulate that a fraction of the discrepancy between the success rates of linkage amongst 25-29 year olds in Tables 6.6B and 6.7 can also be attributed to a "missed links" factor.

By choosing the under 30s as the population for linkage, the fertile population least likely to be traced had been brought under scrutiny. A very high proportion of the original population would turn out to be "goers" rather than "stayers" and comparison of the two groups was necessary in order to assess whether these two groups were radically different from each other in other ways which might have affected their fertility behaviour.

Section 6.5: "Movers" and "Stayers": the Differences

The overall levels of success of the linkage exercise mask the fact that some occupational groups proved more elusive than others. Tables 6.8A & B indicate the proportion of couples from each husband/wife occupation combination category from Tables 6.3A & B who were linked from census to succeeding census. The exercise is rather hampered by the small number of couples in some cells, therefore the proportions traced by husband's occupation only are given in Table 6.9 A & B for easier comparison.

The higher mobility of the middle classes is reflected by their generally low linkage success rates. While some of the mobility may

Table 6.8.A The number and percentage of couples in each husband/wife occupational category combination where the wife was aged < 25, linked from census to succeeding census, Keighley 1851-1871.

Husband's Occ.		Prof.			LMC			TETMM			M-M			HST			LST			All
Wife's Occ.		T	H	O	T	H	O	T	H	O	T	H	O	T	H	O	T	H	O	
1851	N61					4		5	17	2	9	11	1	4	13		27	13	1	107
	%1					36.4		17.2	36.2	33.3	50.0	42.3	33.3	25.0	56.5		50.0	46.4	33.3	39.9
1861	N71		1		1	2		16	25	3	24	25		15	2	1	15	2		132
	%1		50.0		50.0	28.6		59.2	59.5	60.0	64.9	71.4		65.2	25.0	*	57.7	40.0		59.4
1871	N81					9	1	14	32	3	30	45	2	8	6		2	5		157
	%1					45.0	20.0	56.0	46.4	50.0	46.9	52.9	40.0	50.0	50.0		25.0	83.3		48.6

Source: Nominal record linkage of census enumerators' books

Notes: For full rendering of husaband's occupational groups see Table 6.2

T = Wife a textile worker
H = Wife a housewife
O = Wife employed but not in textiles

N61 - the number linked to the 1861 census
N71 - the number linked to the 1871 census
N81 - the number linked to the 1881 census

%1 - The percentage of the total number of couples identified for linkage (see Table 6.3.A) who were linked to the succeeding census

* There was only one couple in this group to be linked therefore the success rate was 100%!

Table 6.8.B The number and percentage of couples in each husband/wife occupational category combination where, the wife was aged 25-29 and there were no children aged 5 or over in the first census, linked from census to succeeding census, Keighley 1851-1871.

Husband's Occ.		Prof.			LMC			TETMM			M-M			HST			LST			All
Wife's Occ.		T	H	O	T	H	O	T	H	O	T	H	O	T	H	O	T	H	O	
1851	N61					7	1	7	22	3	4	12		8	10	1	15	14	1	105
	%1					38.9	*	36.8	47.8	50.0	80.0	50.0		80.0	41.7	33.3	41.7	50.0	50.0	46.9
1861	N71		3			9	2	22	31	7	11	30	2	7	7		14	10		155
	%1		42.8			42.8	50.0	57.9	65.9	87.5	57.9	63.8	66.7	70.0	50.0		58.2	62.5		60.1
1871	N81		3		1	18	1	17	43	1	32	57	3	8	10		1	5		200
	%1		60.0		33.3	51.4	50.0	42.5	45.3	33.3	54.2	58.8	75.0	57.1	58.8		20.0	83.3		51.9

Source: Nominal record linkage of census enumerators' books

Notes: For full rendering of husaband's occupational groups see Table 6.2

T = Wife a textile worker
H = Wife a housewife
O = Wife employed but not in textiles

N61 - the number linked to the 1861 census
N71 - the number linked to the 1871 census
N81 - the number linked to the 1881 census

%1 - The percentage of the total number of couples identified for linkage (see Table 6.3.B) who were linked to the succeeding census

* - there was only one couple in this group to be linked. As it was traced this gave a 100% success rate.

Table 6.9 The numbers and percentages of couples in each husband's occupational category linked from census to succeeding census where [A] the wife was aged < 25 and [B] where the wife was aged 25-29 and there were no children aged 5 or over present in the first census, Keighley 1851-1871.

A. Wife aged <25

Date	Husband's occupation												
	Prof.		LMC		TETMM		M-M		HST		LST		Total
	N	%	N	%	N	%	N	%	N	%	N	%	N
1851	0		4	30.8	24	29.3	21	44.7	17	42.5	41	48.2	107
1861	1	50.0	3	30.0	44	59.4	49	67.1	18	56.2	17	54.8	132
1871	0		10	38.5	49	49.0	77	50.0	14	50.0	7	50.0	157

B. Wife aged 25-29, no children aged 5 or over

Date	Husband's occupation												
	Prof.		LMC		TETMM		M-M		HST		LST		Total
	N	%	N	%	N	%	N	%	N	%	N	%	N
1851	0		8	42.1	32	45.0	16	53.3	19	51.3	30	45.4	105
1861	3	42.8	11	44.0	60	64.5	43	62.3	14	58.3	24	60.0	155
1871	3	60.0	20	50.0	61	44.2	92	57.5	18	58.0	6	54.5	200

Source: Nominal record linkage of census enumerators' books

Notes: Prof. = Professional-Managerial
LMC = Lower Middle Class
TETMM = Trades other than textiles or metal-mechanical work
M-M = Metal-mechanical work
HST = Higher status textile workers
LST = Lower status textile workers

be connected to "career" moves it sometimes simply indicates a desire, and an ability, to live "out of town". If far enough removed into Keighley's rural environs, a couple would disappear from the study area although the husband may well work, or have business interests in the town.

The different divisions of the working class experienced various changes in circumstance over time and these are indicated by fluctuating levels of success in the linkage. Surprisingly, despite the crisis in the combing industry, the greatest success rate amongst under 25 year olds, 1851-1861, was that of the lower status textile workers. Perhaps these men were young enough so that some of them could move to another occupation in the town rather than move away. Certainly their colleagues in the 25-29 year age group were proportionately more difficult to find, indicating perhaps that they were more likely to move; age and experience counting for little in the face of massive redundancies. The hardest working class group to find 1851-1861, however, especially in the younger age group, were the TETMM workers. Why this should be so is not entirely clear, although a decline in the local stone quarrying industry and the fact that the migratory Irish would be concentrated in TETMM group may be relevant. The generally good labour market opportunities in the town, 1861-1871, were obviously keeping people there, whatever their occupations, although textile workers in both age groups were now more mobile than either those in TETMM or metal-mechanical work. Over the decade 1871-1881 workers in the blue collar sectors had an almost exactly equal chance of being traced or not traced if they belonged to the under 25 age group. Amongst the 25-29 age group, however, TETMM workers were once again more elusive than their peers and, again,

the reasons for this are unclear.

Returning briefly to Tables 6.8A & B, it would appear that, broadly speaking, couples where the wife was working are less likely to be traced than those where she is a housewife. There are, however, several exceptions to this. Possibly, as women who are working at a given point in time usually have fewer children than those who are housewives at the same time period, they are more mobile or, because they have fewer children to act as a tracing criterion, they are less easily traced. Tables 6.10A & B certainly suggest that more couples with no children in the first census go untraced in the second than do those with one or two children. (The numbers with 3 or 4 children are much smaller and therefore not strictly comparable.) It might be thought that one child would be less of a hindrance to migration than two and therefore proportionately more two-child families would be traced. However, this only happened to a significant degree amongst the older age group in 1861 and 1871. Indeed, amongst the under 25 year olds in 1871, substantially more one-child families were traced than two-child ones. The more significant division, therefore, is whether or not a couple have children, not how many children they have.

Finally, if we consider the chances of tracing people who have different types of "living arrangement" in the first census, we discover that those lodging were, in general, less likely to be traced than those heading their own household or living with their parents or parents-in-law. Indeed, the most successful tracing was amongst those living with the parental generation at first census (Tables 6.11 A & B). The strong family ties and connections which such an arrangement suggests may well have kept the couples involved in the town. Amongst those heading their own households there was probably a

Table 6.10 The success of linkage to succeeding census by the number of own children aged < 5 in the first census when [A] the wife was aged < 25 and [B] when the wife was aged 25-29 and the couple had no children aged 5 or over with them in the first census, Keighley 1851-1881.

A.		1851			1861			1871		
No. of children at census		Total no. of couples to be linked	Couples traced to 1861 census	Couples un-traced	Total no. of couples to be linked	Couples traced to 1871 census	Couples un-traced	Total no.of couples to be linked	Couples traced to 1881 census	Couples un-traced
0	N	120	36	84	88	45	43	129	51	78
	%		30.0	70.0		51.1	48.9		39.5	60.5
1	N	104	50	54	87	58	29	146	81	65
	%		48.1	51.9		66.7	33.3		55.5	44.5
2	N	28	14	14	38	25	13	40	19	21
	%		50.0	50.0		65.8	34.2		47.5	52.5
3	N	16	7	9	8	4	4	7	5	2
	%		43.7	56.3		50.0	50.0		71.4	28.6
4[1]	N	0	0	0	1	0	1	1	1	0
	%									

B.		1851			1861			1871		
Number of children at census		Total no. of couples to be linked	Couples traced to 1861 census	Couples un-traced	Total no.of couples to be linked	Couples traced to 1871 census	Couples un-traced	Total no. of couples to be linked	Couples traced to 1881 census	Couples un-traced
0	N	81	37	44	79	40	39	127	51	76
	%		45.7	54.3		50.6	49.4		40.2	59.8
1	N	83	40	43	102	62	40	136	73	63
	%		48.2	51.8		58.8	39.2		53.7	46.3
2	N	55	26	29	63	42	21	106	68	38
	%		47.3	52.7		66.7	33.3		64.1	35.8
3	N	5	2	3	11	8	3	14	6	8
	%		40.0	60.0		72.8	27.3		42.9	57.1
4[1]	N	0	0	0	3	3	0	2	2	0
	%									

Source: Nominal record linkage of census enumerators' books

Notes: % = percentage of couples identified in first census for linkage

1. Where all the couples in a group were traced or where they all remained untraced no percentages have been entered.

Table 6.11 The success of linkage to succeeding census by living arrangements in the first census when [A] the wife was aged < 25 and [B] when the wife was aged 25-29 and the couple had no children aged 5 or over with them in the first census, Keighley 1851-1871.

A.		1851			1861			1871		
Living arrangements at census		Total no. of couples to be linked	Couples traced to 1861 census	Couples un-traced	Total no. of couples to be linked	Couples traced to 1871 census	Couples un-traced	Total no.of couples to be linked	Couples traced to 1881 census	Couples un-traced
Own h'hd	N	183	115	68	170	100	70	230	120	110
	%		62.8	37.2		58.8	41.2		52.2	47.8
P/P-in-L	N	63	32	31	39	28	11	41	23	18
	%		50.8	49.2		71.8	28.2		56.1	43.9
Lodging	N	16	10	6	8	3	5	46	12	34
	%		62.5	37.5		37.5	62.5		26.1	73.9
Other	N	6	4	2	5	1	4	6	2	4
	%		66.7	33.3		20.0	80.0		33.3	66.7

B.		1851			1861			1871		
Living arrangements at census		Total no. of couples to be linked	Couples traced to 1861 census	Couples un-traced	Total no.of couples to be linked	Couples traced to 1871 census	Couples un-traced	Total no. of couples to be linked	Couples traced to 1881 census	Couples un-traced
Own h'hd	N	193	89	104	218	133	85	340	185	155
	%		46.1	53.9		61.0	39.0		54.4	45.6
P/P-in-L	N	29	16	13	24	16	8	24	13	11
	%		55.2	44.8		66.7	33.3		54.4	45.6
Lodging	N	1	0	1	11	6	5	30	12	18
	%					54.5	45.5		40.0	60.0
Other	N	1	0	1	5	0	5	1	0	1
	%									

Source: Nominal record linkage of census enumerators' books

Notes: Own h'hd = living in own household
P/P-in-L = living with parents or parents-in-law.

% = percentage of couples identified in first census for linkage

See Table 6.10 for a note on blank percentage rows.

greater proportion with no strong attachments to Keighley who might move on if the need to do so arose. An exception to this general state of affairs is found in 1851 amongst the younger age group where a considerably higher proportion of lodgers remains than do those living with their parents or parents-in-law. Admittedly, the number lodging is very few but it may be that in 1851 many of the husbands living as part of a two-generation household were, in fact, working with their father or father-in-law in a "combing shop". As mass redundancies forced the "handing in" of many combs[14] and the shops broke up many of the younger men may have moved out of the parental home and thence out of the district in search of work, although as has already been seen, young, low status textile workers were overall more likely to stay in the town than were their peers in other occupations.

All the couples discussed below remained in the Keighley area for at least a decade, and any of a myriad of reasons or circumstances kept them there. As "stayers" rather than "goers" they are by no means a random nor a representative sample of the populations originally identified for linkage.

Compared with the rest of the cohort which they purport to represent the "stayers" will have wives of a slightly higher average age and who are rather less likely to be working in the first census than the wives of the cohort as a whole. The remaining couples are also more likely to have had a child by the first census and to be living with the parents of one of the couple or to be heading their own household when identified for linking.

Anderson has written that:

"If a significant section of the population

> moves out of the community under study and cannot be traced, then any analysis derived only from the data of those who remain, however technically sophisticated it may be, is worthless."
>
> (Anderson, 1979; quoted in Willigan & Lynch, 1982)[26]

This is a harsh judgement. Even a partial understanding of the processes enacting within and around a population can illuminate interpretation of point-in-time figures. The observations which follow may not tell the whole story but they do indicate to some degree the social, economic and environmental constraints under which a considerable proportion of Keighley's young people married, began and reared their families over the third quarter of the nineteenth century.

Section 6.6: The Fate of the "Stayers"

The static images of Keighley society presented by the four censuses used in the study suggested that a great deal of change was occurring, but gave little impression of how these changes were affecting individuals within the town. We knew that wives working in textiles had fewer children than their sisters who were housewives, but could not tell if, when they stopped being textile workers, the size of their families then increased. Nor could we be sure whether those listed as "housewife" had stopped work on marriage or whether they too had kept on in the mills for a time. Were textile working wives "odd" or had they just been "caught" by the census at a different stage in the marriage cycle?

The lines joining the "dots" in the change-over-time graphs gave the impression of great changes in the occupational chances of both men and women over the study period but little indication of how these

affected individuals. What did combers do when they found themselves out of a job in the 1850s? Who filled the jobs in the growing number of metal works? How did a husband's change of occupation affect his wife's work history? And how did all these factors intertwine to affect a couple's fertility? These were just some of the questions to be asked of the longitudinal data gathered by linking couples from census to census.

First of all let us look at occupational mobility. We cannot, of course, make any judgements as to whether those young couples who left Keighley were bent on finding a specific type of employment rather than just employment *per se*, or whether their motives were completely divorced from the job market. For those who opted to stay, or did not consider moving, occupational mobility can be monitored by crosstabulating occupation at first census by occupation in the following census. In Figure 6.7 this has been done for the husbands in all the "stayer" couples at each census where the wife was aged less than 30 (this term, here and hereafter, excludes those couples where the wife was aged 25-29 and the couple had a child aged 5 or over alive when the first census in which the couple was identified was taken). The figures have been presented as percentages. Six occupational categories have been used and on the vertical axes the possibilities that a man's whereabouts or occupation were uncertain in the succeeding census or that he may have died during the intercensal period are included. These figures in bold type indicate the percentage of men in an occupational category who were still in that occupational category a decade later; their job within the category may have changed (e.g. a clerk may have become a shopkeeper, or a comber a weaver), but the category itself had not.

Figure 6.7 Changes in husband's occupational sector from the first census in which they were identified to the succeeding census (wives aged less than 30 and none over the age of 25 having children aged 5 or over at census).

Husband's occupation in the first census

Husband's occupation in the second census.

	1851 Prof.	LMC	TETMM	M-M	HST	LST
Professional			2·6			
Lower Middle Class		**54·5**	7·3	2·6	11·8	6·8
TETMM		9·1	**74·5**	5·1	5·9	27·4
Metal -mechanical			7·3	**82·0**	2·9	12·3
High Status Textiles				2·6	**67·6**	8·2
Low Status Textiles		9·1		2·6	5·9	**35·6**
Unsure		9·1	10·9	2·6		5·5
Dead	1861	9·1			5·9	4·1
N	0	11	55	39	34	73

	1861 Prof.	LMC	TETMM	M-M	HST	LST
Professional	**75·0**	6·2	3·1	3·1		2·4
Lower Middle Class		**93·8**	2·0	3·1	10·3	
TETMM			**71·4**	8·2	3·4	19·0
Metal -mechanical			10·2	**80·6**		33·3
High Status Textiles			2·0		**72·4**	26·2
Low Status Textiles			2·0			**11·9**
Unsure			4·1	3·1	10·3	2·4
Dead	1871 25·0		5·1	2·0	3·4	4·8
N	4	16	98	98	29	42

	1871 Prof.	LMC	TETMM	M-M	HST	LST
Professional	**50·0**	6·9		0·6	3·3	
Lower Middle Class		**82·7**	8·3	2·3		
TETMM		6·9	**74·1**	5·2	6·7	
Metal -mechanical			10·2	**83·9**	3·3	
High Status Textiles			0·9		**70·0**	8·3
Low Status Textiles	25·0	3·4	0·9	0·6	3·3	**75·0**
Unsure	25·0		1·8	2·3		8·3
Dead	1881		3·7	5·2	13·3	8·3
N	4	29	108	174	30	12

Note: Figures in bold type show groups where the husband remained in the same occupational category from one census to the next.

Source: Nominal record linkage of census enumerators' books.

Over the decade 1851-1861 in all but the lower status textile group (LST) the majority of the men remained within their occupational sector of origin. Of the 1851 lower status textile group just over one third were still in that group a decade later. A surprisingly small proportion had moved into higher status textile (HST) occupations. Possibly the combers and weavers were adverse to taking higher status factory jobs[15] such as overseeing or wool sorting or it may have been that lack of skill or training for the higher status jobs forced them to seek employment elsewhere. Unexpectedly, even as late as 1871, some young men were returning themselves as power loom weavers, a job which had been thought to be exclusively female. It was, however, definitely a young man's occupation; the job which could be a lifetime's occupation for a woman was only a step on the occupational ladder for a man.

More than a quarter of the LST workers in 1851 had moved into the TETMM category by 1861. Of the 20 couples where the husband made this move, fifteen were traced to the 1871 census and 12 of them were found in the 1881 census. From Table 6.12A it would appear that the majority of men remained in their new occupations for at least a decade; they did not, for instance, use these occupations as a stop gap before becoming involved in the flourishing metal-mechanical sector. Nine of the 15 from the 1851 census were in unskilled labouring jobs in 1861, indicating that they did indeed lack experience or training.

Men working in LST in 1851 who were still in that category in 1861 were also most likely to be in that category in 1871. However, of those who had definitely moved (5 out of 17) the majority (4) had gone into metal-mechanical work rather than TETMM. Fewer of this

Table 6.12.A Occupational histories, 1851-1881, of those husbands who moved from lower status textile jobs to TETMM work in 1861, and where the couple was traceable in the 1871 census.

1851	1861	1871	1881
Comber	Joiner	Joiner	-------
Comber	Labourer	Labourer	-------
Comber	Labourer	Pinder[1]	-------
Comber	Agric. labourer	(deceased)	(deceased)
Comber	Warehouseman[2]	Timekeeper	Curator
Comber	Paper tube maker	Paper tube maker	(deceased)
Comber	Agric. labourer	Yarn grosser	Coachman
Comber	Farmer	Farmer	Coal dealer
Comber	Agric. labourer	Nursery labourer	(deceased)
Comber	Cart driver	Carter	Waggoner
Power loom weaver	Wood turner	Wood turner	Wood turner
Comber	Agric. labourer	Grocer	(deceased)
Comber	Labourer	Iron works lab.	Labourer
Comber	Labourer	Smith's striker	Iron works lab.
Comber	Gas works lab.	Foreman gas wrks.	Gas maker

Table 6.12.B Occupational histories, 1851-1881, of the husbands who remained in lower status textile jobs 1851-1861, and where the couple was traceable in the 1871 census.

1851	1861	1871	1881
Comber	Comber	Sorter	-----
Twister	Twister	Loomer	-----
Comber	Comber	Comber	-----
Comber	Comber	?	-----
Comber	Comber	Weaver	-----
Comber	Weaver	Labourer	-----
Comber	Comber	Mech	-----
Power loom weaver	Power loom weaver	(deceased)	-----
Comber	Comber	Iron works lab.	Wool washer
Comber	Comber	Wool washer	Pea boiler
Comber	Wool washer	Iron works lab.	Mechanic's lab.
Comber	Weaver	Weaver	Weaver
Comber	Weaver	Textile lab.	Laborer
Comber	Textile worker	Machine wrks.lab.	Wool washer
Power loom weaver	Weaver	Weaver	Coal dealer
Comber	Comber	Gardener	Iron foundry lab.
Power loom weaver	Textile worker	Yarn grosser	Yarn grosser

Source: Nominal record linkage of census enumerators' books

Notes: 1. A "pinder" rounded up, penned and looked after animals, especially stray ones.
2. This man probably remained working in textiles, however the title of his job does not specify in which industry he worked, therefore he was placed in the TETMM category.

For explanation of abbreviations see Table 6.13

group were to be found in 1881 than in the group which had switched from LST to TETMM 1851-1861, but of those found more than half had switched occupations 1871-1881; indeed, two men who had gone to work in the metal-mechanical sector had returned to LST work.

The exodus from LST jobs was even more marked amongst the under 30 year olds traced from 1861-1871. Over this decade, however, the favourite destination was metal-mechanical work (Table 6.13). HST jobs were also a considerably more popular choice than a decade previously. Again, when those from the 1861 Census, who were traced to 1871 Census, were then traced to the 1881 Census, most husbands tended to stay in their new choice of occupational sector for at least a further decade. It appears, therefore, to have been easier to obtain a job in metal-mechanical work 1861-1871 than it was 1851-1861. Of the 9 LST workers shown in Table 6.13 as going into metal-mechanical work by 1871, 7 went in as labourers. As speculated previously, the growing industry was probably attracting an increasing proportion of unskilled and semi-skilled labour, than creating new opportunities for those initiated to the art of smithying.

The few husbands in the under 30 group who were working in LST jobs in 1871 seemed less disposed to leave than their predecessors. New job titles were entering this sector; "finisher", "sizer", and "twister"[16] replacing weaver and comber.

In comparison to the large percentage moves in the LST columns, other movements on the matrices in Figure 6.7 are relatively minor. High status textile jobs seem to have been the best springboard from which blue collar workers could move to the white collar sector, most becoming grocers or drapers. The former term may, in fact, have been

Table 6.13. Occupational histories, 1851-1881, of husbands who moved out of lower status textile work between 1861 and 1871.

Moved to metal-mechanical work

1861	1871	1881
Comber	Machine labourer	Iron labourer
Weaver	Iron planer	Machine planer
Comber	Moulders lab.	Foundry labourer
Weaver	Foundry labourer	Engine firer
Machine comber	Machine shop labourer	(deceased)
Comber	Iron works labourer	Pea hawker
Comber	Iron works labourer	Comber
Weaver	Iron works labourer	Foundry labourer
Comber	Engine tenter[1]	Engine tenter

Moved to higher status textile jobs

1861	1871	1881
Weaver	Overlooker	?
Weaver	Warpdresser	Warpdresser
Twister	Warpdresser	Warpdresser
Weaver	Warper	Design reader[3]
Textle worker	Overlooker	Warehouseman
Weaver	Beamer[2]	Warpdresser
Weaver	Overlooker	?

Moved to TETMM work

1861	1871	1881
Comber	Labourer	Joiner
Comber	Lamplighter	Comber
Comber	Tripe dresser	(deceased)
Weaver	Bread baker	Bread baker
Weaver	Agric. labourer	(deceased)

Source: Nominal record linkage of census enumerators' books

Notes: 1. This man probably remained working in textiles, however the title of his job does not specify in which industry he worked, therefore he was placed in the TETMM category.
2. A beamer may be considered as equivalent to a warpdresser.
3. This term was taken to mean a textile design reader.

----- indicates that the family could not be traced

? indicates that the wife was found but that the whereabouts of the husband were not clear

(deceased) indicates that the wife was found in the census, returned as a widow.

Agric.= agricultural lab.= labourer wrks = works

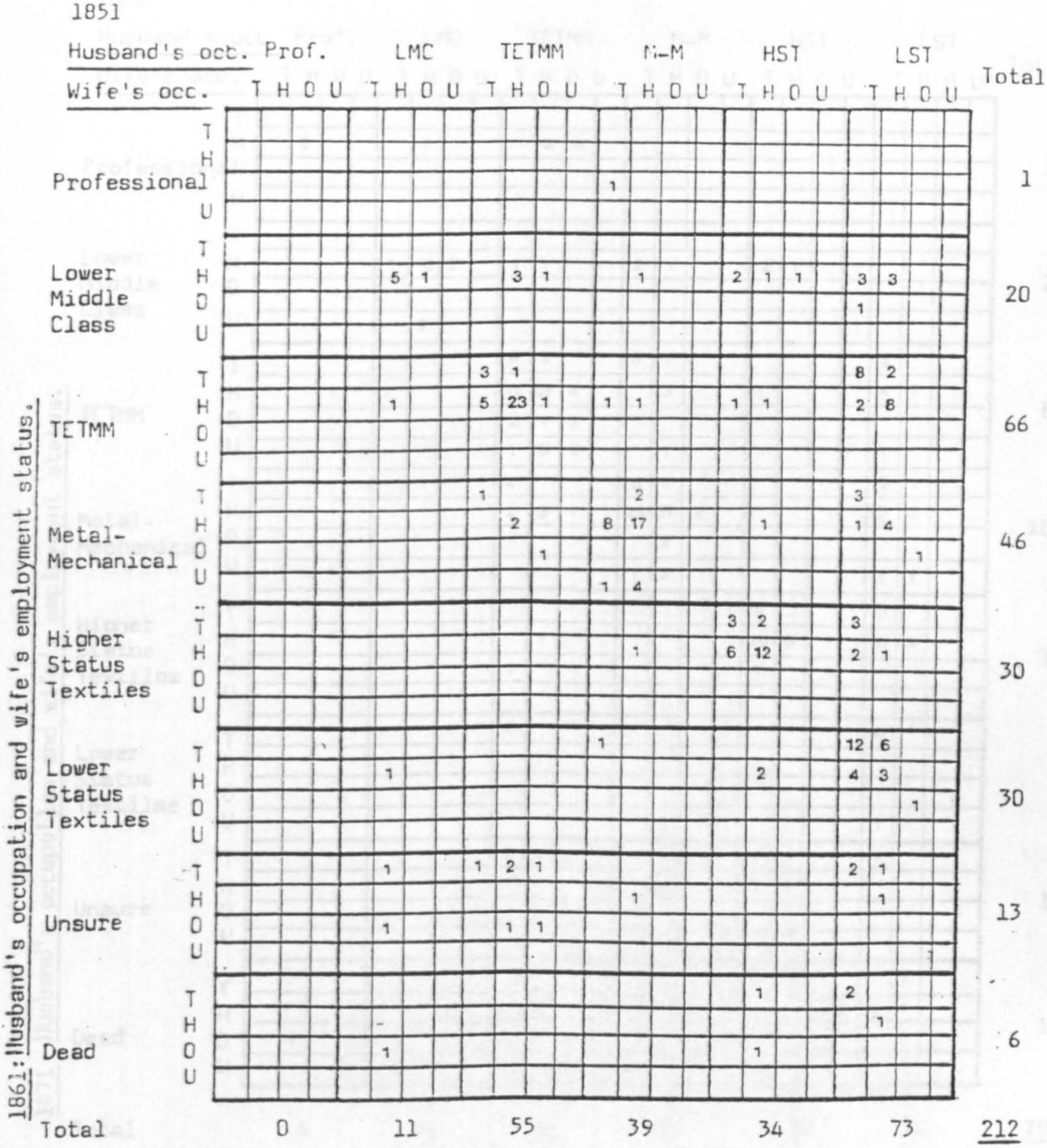
rather misleading as the textile occupation of "yarn grosser" sometimes appears to have been written "yarn grocer". The term "grosser" on its own was distinguishable as a textile occupation but, were it to appear as "grocer", the individual involved would be assigned to the lower middle classes (See Coding Appendix B). Very few HST workers moved into the metal-mechanical sector and once a young man was in the latter line of work he very seldom left it.

The impression left by the matrices in Figure 6.7, therefore, is that young men's choice of jobs swing away from the LST sector after 1851 towards metal-mechanical work and to a lesser extent to TETMM jobs. Those who chose textiles as an occupation, however, found themselves having to find alternative employment. At the beginning of the study period this tended to be TETMM work, later metal-mechanical work was the preferred choice. By the final decade of the study period the situation in the textile industry seems to have stabilised with a less numerous but more steadily employed workforce. There are indications too that with age men tended to change occupations, presumably to less strenuous activities: gardening and hawking peas being two examples from Tables 6.12 and 6.13.

Rather than moves across occupational sectors the wives in the traced populations were most likely to experience moves into and out of the labour market. Figures 6.8A, B & C attempt to convey these moves in combination with those of their husbands. As many of the cells are very small absolute numbers rather than percentages have been shown.

The majority of women in the 1851-1861 matrix were housewives in 1851 and by 1861 an even greater proportion were thus categorised. Where husbands' occupations remained the same 1851 to 1861, we can see

Figure 6.8.A Changes in couple's occupation combinations where the wives were aged less than 30 in 1851 and the couples could be traced to 1861; Keighley.



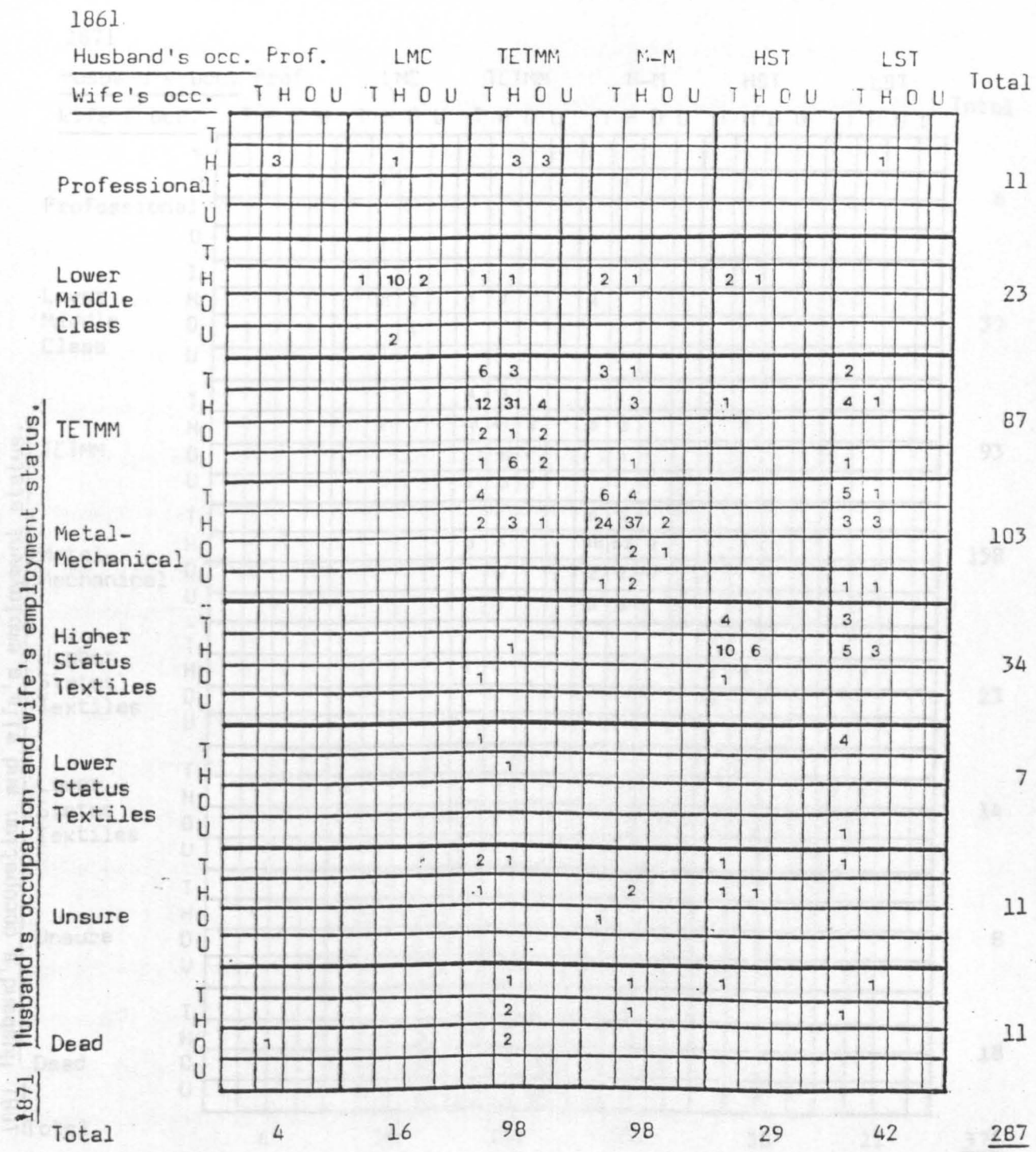
Key to wife's occupation:

T - works in textiles
H - housewife
O - employed but not in textiles
U - unsure or dead.

Note: The 'U' columns are never used as both partners had to be present on census night to make them eligible for linkage. The 'U' rows include both those cases where the wife's whereabouts were unsure or where she had died.

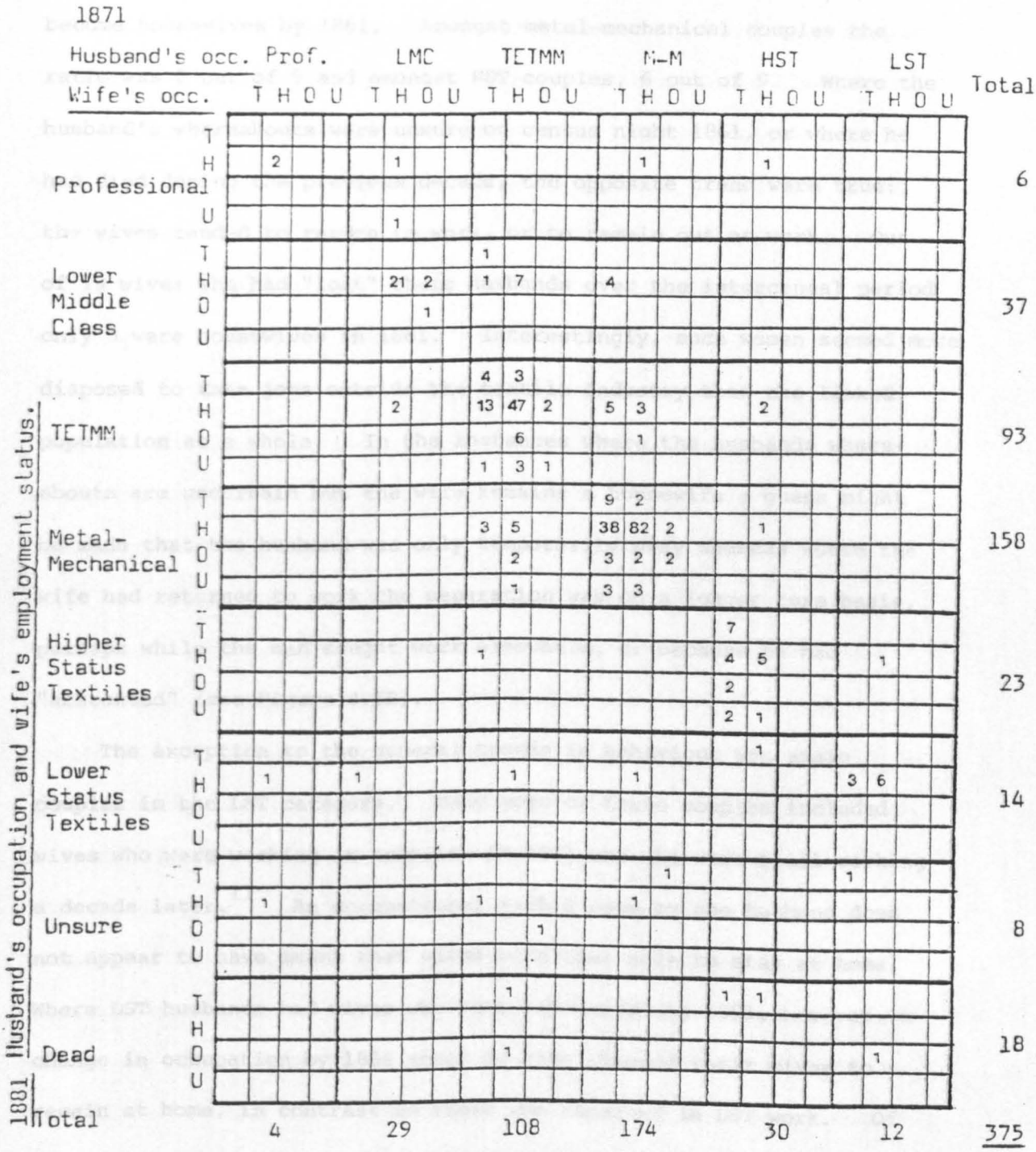
Source: Nominal record linkage of Census enumerators' books

Figure 6.8.B Changes incouples' occupation combinations where the wives were aged less than 30 in 1861 and the couples could be traced to 1871, Keighley.



For Key, Notes and Source see Figure 6.8.A

Figure 6.8.C Changes in couples' occupation combinations where the wives were aged less than 30 in 1871 and the couples could be traced to 1881, Keighley.



For Key, Notes and Source see Figure 6.8.A

that out of 8 TETMM couples (as defined by the husband's occupation) where the wife was working in textiles in 1851, 5 of these wives had become housewives by 1861. Amongst metal-mechanical couples the ratio was 8 out of 9 and amongst HST couples, 6 out of 9. Where the husband's whereabouts were unsure on census night 1861, or where he had died during the previous decade, the opposite trend were true: the wives tended to return to work, or to remain out at work. Out of 19 wives who had "lost" their husbands over the intercensal period only 3 were housewives in 1861. Interestingly, such women seemed more disposed to take jobs outside the textile industry than the linked population as a whole. In the instances where the husbands whereabouts are uncertain but the wife remains a housewife a guess might be made that the husband was only temporarily away whereas where the wife had returned to work the separation was on a longer term basis, perhaps while the man sought work elsewhere, or because he had "absconded" (see Figure 4.5B).

The exception to the general trends in behaviour was again couples in the LST category. Many more of these couples included wives who were working in textiles in 1851 and who were still working a decade later.[17] An occupational sector move by the husband does not appear to have meant that wives were then able to stay at home. Where LST husbands had wives who were housewives in 1851, however, a change in occupation by 1861 seems to have allowed their wives to remain at home, in contrast to those who remained in LST work. Of the nine LST/housewife couples where the husband did not move sector, six wives were observed to have gone into the mills by 1861[18], a ratio unequalled by any other group.

Married women's labour force participation had, therefore, a major

role in tiding families over periods of crisis whether in the male labour market or in the domestic situation.

The matrix in Figure 6.8B indicates that the LST workers in the 1861 cohort of under 30 years old couples (as defined by the wife's age) were less likely than their predecessors to send their wives back to the mills once they had become housewives. Both the TETMM and metal-mechanical working groups from the 1861 cohort had higher proportions of working wives than did their colleagues in the 1851 cohort but the difference in the proportions was much more pronounced amongst textile workers, especially those in HST work. The smaller leap in proportion of wives of LST workers working is at least partly attributable to the fact that it was already high amongst the 1851 cohort. Over the decade which followed the 1861 Census, however, a great many wives gave up work to become full-time housewives, an indication, perhaps, that their husbands' employment situation was less fraught. Amongst LST couples, however, a move of occupational sector for the husband was still required before a wife was likely to give up work; if a man stayed in LST his wife stayed in the mill too.

The third matrix, observing the under 30 years cohort from the 1871 Census over the following decade, shows that the move by young wives away from the mill and into the home after a few years of marriage was growing stronger than ever. Only the HST workers had a relatively high proportion of their wives remaining in textile work in 1881. It might be rather cynically suggested that, since 1881 lay in a period of low textile employment for women, HST workers were best placed to help their wives find work.

From the above matrices, therefore, it would appear that young married men working in textiles, were more likely to have textile

working wives than other occupational groups. Their wives were also likely to remain in the mills longer than other wives. We have also seen that in 1861 a peak in married women's employment occurred, which is reflected in the matrices for both the 1851 and 1861 cohorts. The question now was whether the various occupational histories could be related to different childbearing patterns displayed by the couples involved, a question which is further explored in the next section.

Section 6.7: Women's Work and the Building of Families

The diagrams in Figures 6.9 to 6.11 are graphic representations of individual couple's childbearing patterns over the period of the first intercensal decade across which they were traced. The lines represent the length of time each couple was "in view". This is taken as being from the year of birth of the eldest child to the day on which the second census was taken. Not knowing the exact date of birth of each child meant that accurate years of birth could not be computed. Each child's age was simply subtracted from the date of the census in which it was found; thus a two year old in the 1851 census was given the birth date 1849. This is, of course, somewhat misleading. Census day each decade, 1851-1881, fell either late in March or early in April. Thus a child who was returned as not yet having reached its first birthday could have been born either in the preceding 3 months of the census year or in the last 8 or 9 months of the previous year. Thus the year "1849" in fact refers to the period from the beginning of April 1848 to the end of March 1849 (approximately). Some children's dates of birth were discovered from the Keighley and Ingrow Parish Registers (see Section 6.8, below). A small selection of these have been compared with the years of birth assigned to each

Figure 6.9 Childbearing patterns: for couples where (A) the husband was a textile worker in 1851 & 1861, (B) where he was a textile worker in 1861 & 1871, and (C) where he was a textile worker in 1871 & 1881.(Wives were all aged under 30 in the first census in which the couple were identified), by wife's occupational history.

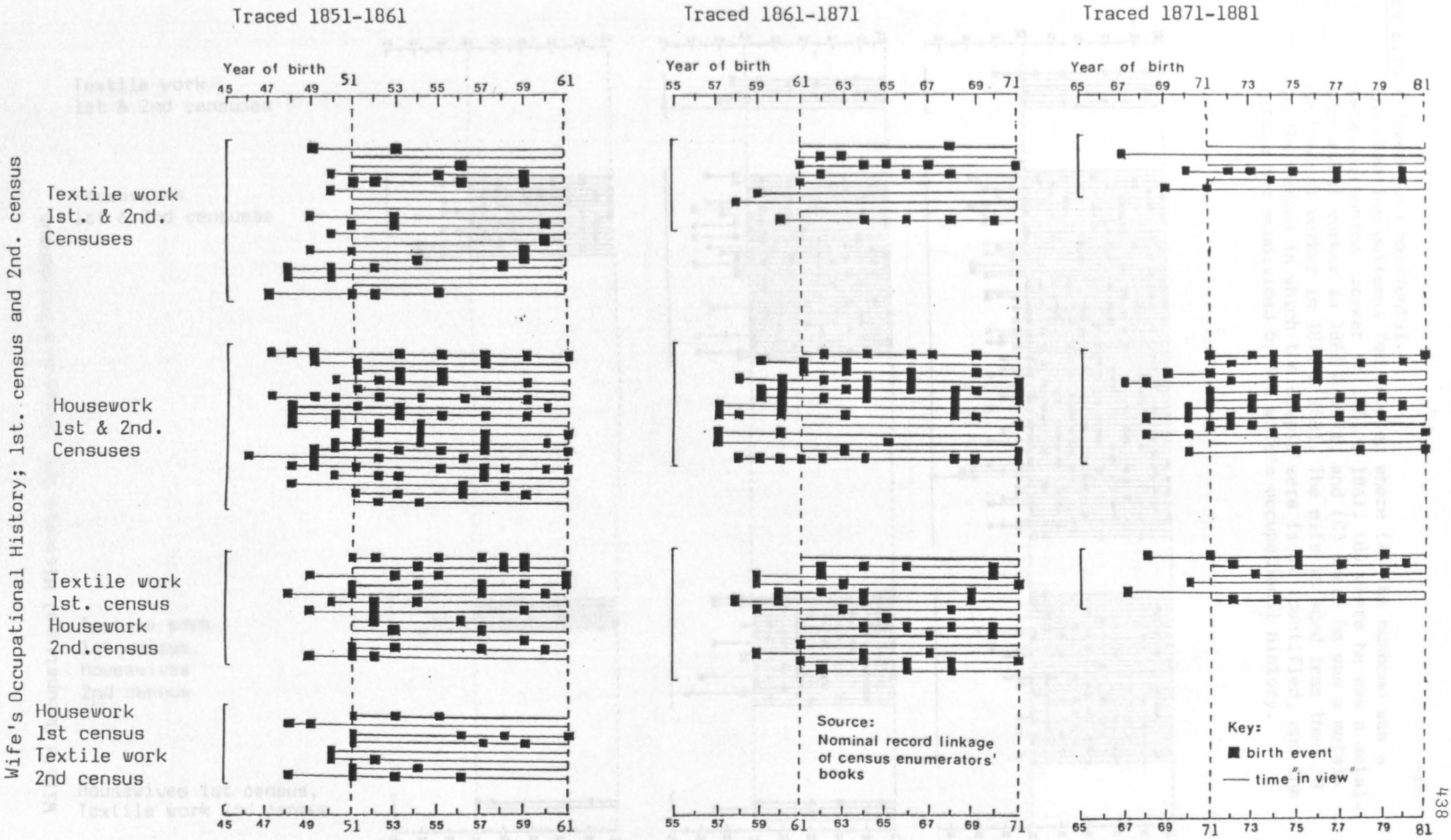
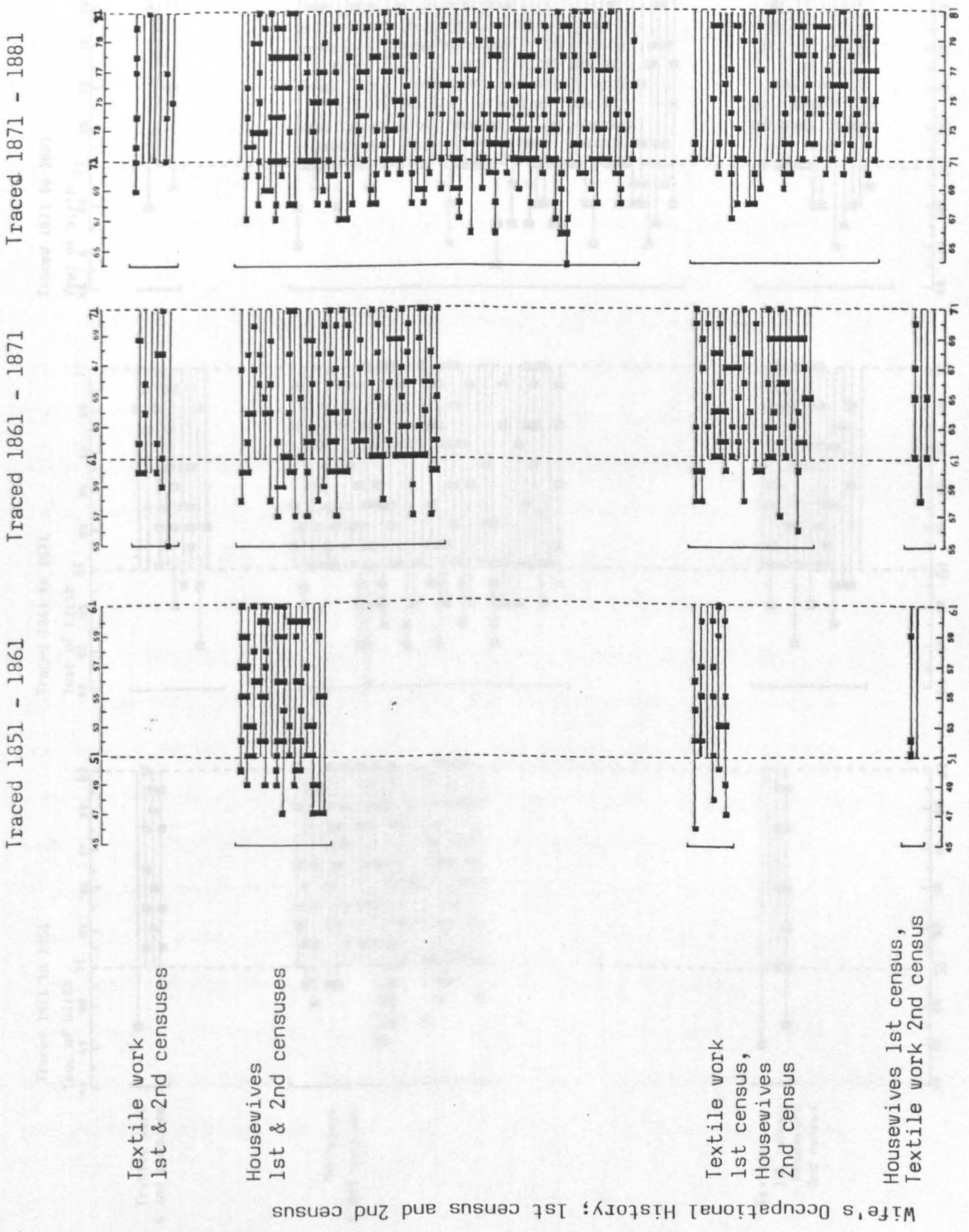


Figure 6.10 (Please turn horizontal.)
Childbearing patterns for couples where (A) the husband was a metal-mechanical worker in 1851 & 1861, (B) where he was a metal-mechanical worker in 1861 & 1871, and (C) where he was a metal-mechanical worker in 1871 & 1881. The wife is aged less than 30 in the census in which the couple were first identified, and the groups are subdivided by the wife's occupational history.



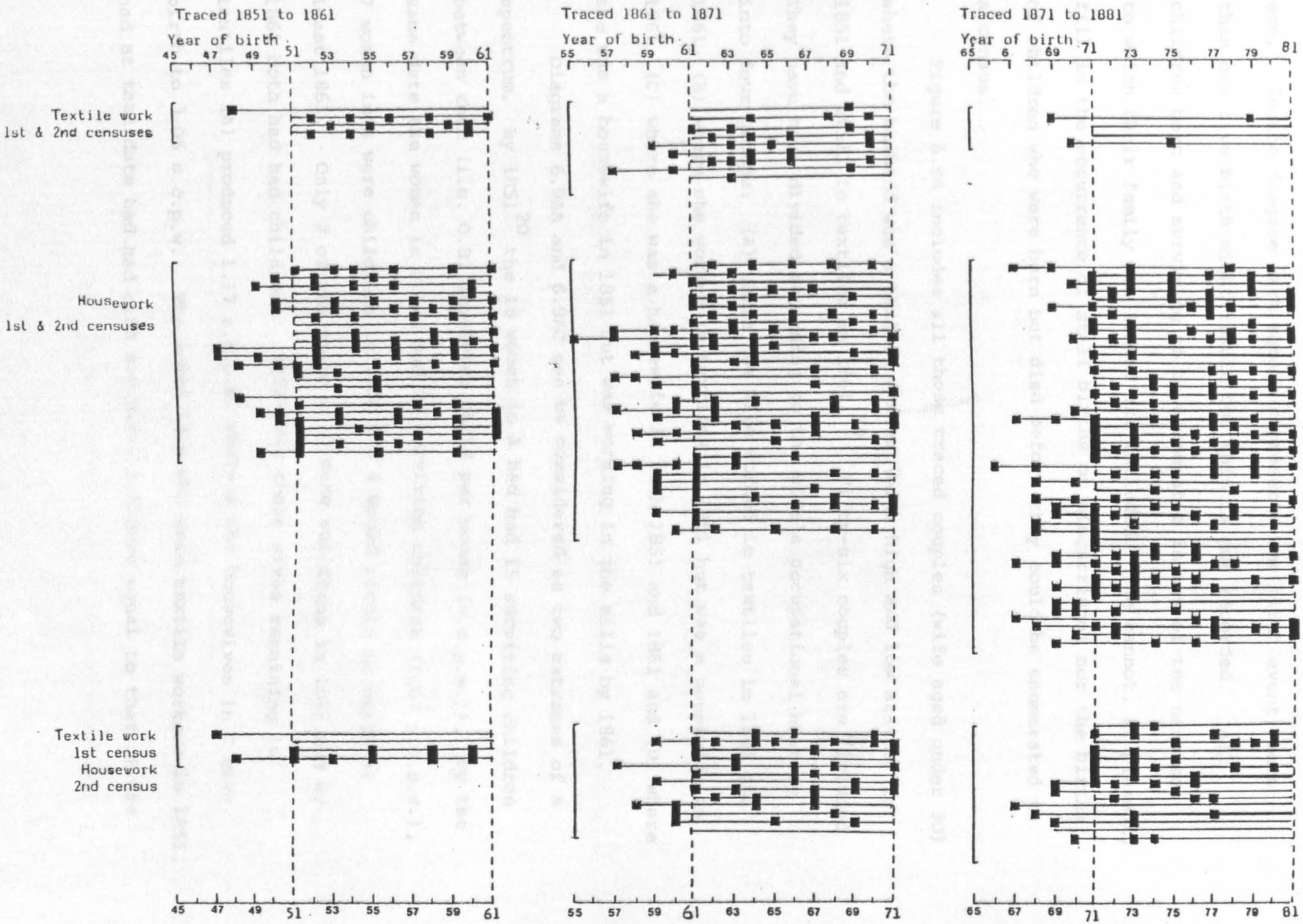


Figure 6.11

Child bearing patterns: for couples where (A) the husband was in TETMM work in 1851 & 1861, (B) where he was in TETMM work 1861 & 1871, and (C) where he was in TETMM work 1871 & 1881, by wife's occupational history.(Wives all aged less than 30 in the first census in which the couple were identified.

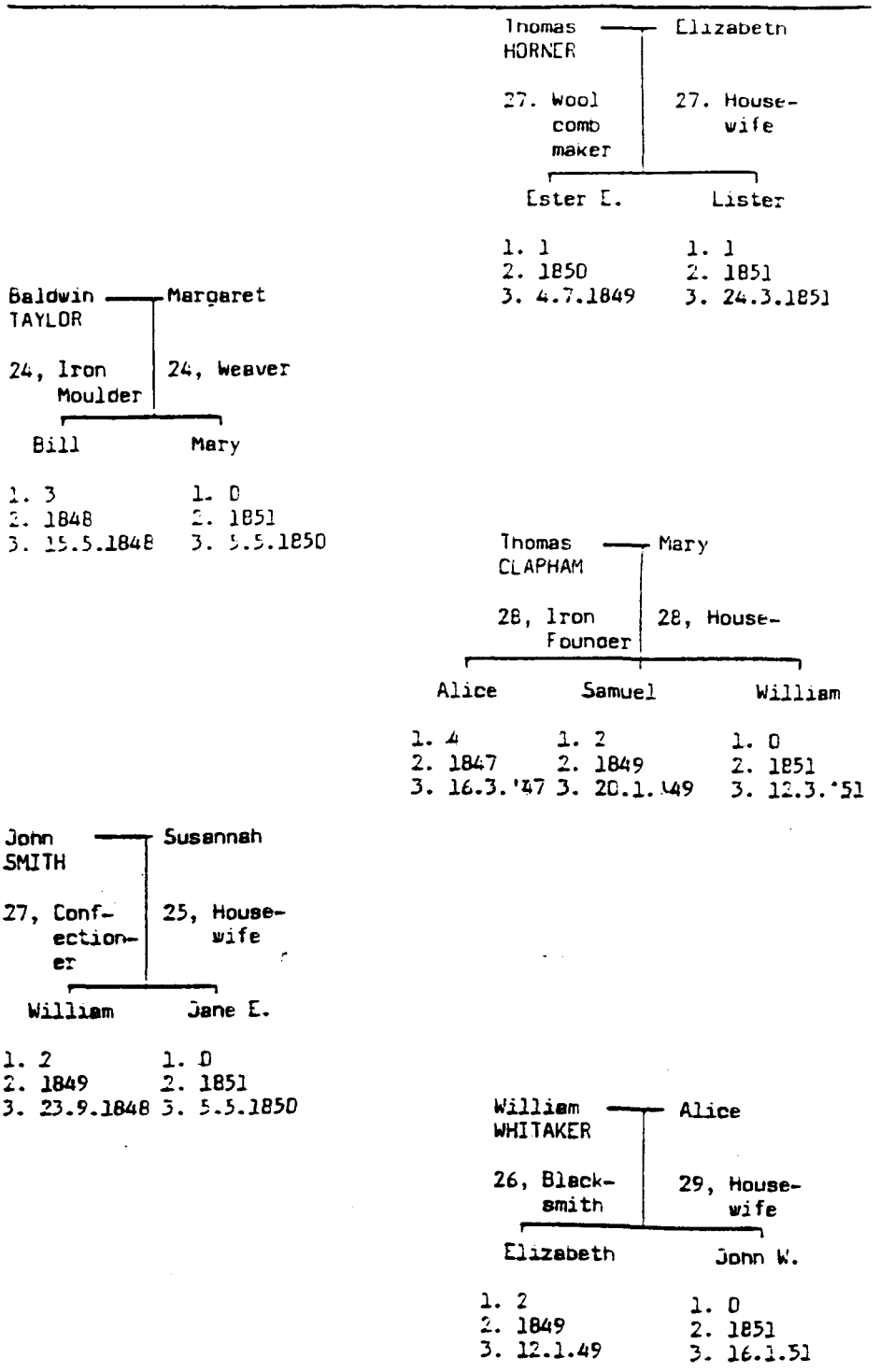
Key and source: as Figure 6.9

child from their age at census to demonstrate the above remarks. (Figure 6.12). The year marked in the diagram is, therefore, the latest year in which a child can have been born, given its reported age. In the diagram each square represents one birth event; more than one live birth might result but this is not recorded. All children born and surviving to be enumerated in any of the censuses to which their family was linked are included. We cannot, at present, fill in the occurrence of still births or miscarriages nor the births of children who were born but died before they could be enumerated in a census.

Figure 6.9A includes all those traced couples (wife aged under 30) where the husband was a textile worker (both high and low status) in 1851 and still in textiles in 1861.[19] Fifty-six couples are included They have been divided according to the wife's occupational history into four groups: (A) where the wife worked in textiles in 1851 and 1861, (B) where she worked in textiles in 1851 but was a housewife in 1861, (C) where she was a housewife in both 1851 and 1861 and (D) where she was a housewife in 1851 but was working in the mills by 1861.

Diagrams 6.9AA and 6.9AC can be considered as two extremes of a spectrum. By 1851[20] the 18 women in A had had 15 surviving children between them (i.e. 0.83 surviving child per woman (s.c.p.w.)). By the same date the women in C had had 30 surviving children (1.67 s.c.p.w.), 7 women in A were childless in 1851 and 4 would remain so until at least 1861. Only 2 of the women in C were childless in 1851 and by 1861 both had had children. 1852-1861 those wives remaining in textiles (A) produced 1.17 s.c.p.w. whereas the housewives in C gave birth to 3.05 s.c.p.w. The women in B who were textile workers in 1851, had at that date had had o.83 s.c.p.w., a figure equal to that of the

Figure 6.12 The birth-years of children calculated from the ages returned in the 1851 census compared with their actual birth dates given in the Keighley Parish Registers.



Sources: Census enumerators' books

St. Andrew's and St. John's Parish Registers.

women in A. 1852-1861, however, the women in B produced 2.5 s.c.p.w; a figure more closely approaching that of the housewives in group C, and they, themselves, had now become housewives. The women in group D were rather different. They had had 1.25 s.c.p.w. by 1851 but 1852-1861 they had had only 1.37 s.c.p.w. Only two of these women had had children within the 2 years before the 1861 Census and both of these women had 10 year old children, quite old enough by 19th century standards to help look after a baby sibling. Because we do not know how long these women had been working in the textile factories before the 1861 Census was taken we cannot, unfortunately, tell whether their return to work had followed rapidly on the birth of their youngest child, which might imply that they had ceased bearing children in order to work, or whether there had been a hiatus between birth and work, suggesting perhaps that when a financial squeeze had hit these couples, the woman, finding herself with no infants to care for, had considered herself, or been considered, able to work. An alternative interpretation of the first scenario might be that circumstances had forced the woman out to work and the physical consequences prevented her from having any more children. Due to the lack of data, however, these can only remain speculations.

Despite the diminishing number of textile workers who remained textile workers, Figures 6.9B and C paint similar pictures. It very much depended at which point in the family building cycle the census "captured" a couple whether the wife would be returned as a "housewife" or a "textile worker". Couples who had not yet started a family or had only one child (or two well spaced children) were more likely to include a working wife. Over the intercensal period those wives remaining in textiles were those who achieved smaller families.

From the appearance of, say, Figure 6.9A this was done by spacing children far more widely apart than in families where the wife was a housewife. From the same figure it was calculated that where more than one surviving child was born to a couple (11 out of 18 instances in A, 11 out of 12 in B and 18 out of 18 in C) the average spacing between successive children was 3.5 years, 2.8 years and 2.5 years respectively. Thus "housewives" (C) were taking about 21 months to fall "successfully" pregnant (i.e. to conceive a child which would be born and survive until enumerated in a census) whereas textile workers were taking approximately 33 months.

Was this spacing deliberate or not? We cannot tell. Certainly such gaps allow one young child to be reared to near self-sufficiency before another is born. Two closely spaced children would be more demanding on their mother than a single child and therefore widely spaced children might have been a desirable family plan amongst couples with a working wife. There are also a few instances of a more "modern-look family"; two closely spaced children shortly after marriage followed by a long period of infertility. Perhaps these do indicate parity specific birth control being practised, those cases where the barren period is terminated by another birth being indicative of "slips" in the method used.

The present generation's pre-occupation with contraception must not blind us to the possibility that textile working women were more susceptible than most to miscarriages, still births or infant mortality. Work outside the home may have acted in some way to reduce wives' exposure to intercourse, or to reduce their chances of conception. Any of these factors could have created the longer than average spaces between the children found amongst textile working wives, no matter

what their husband's occupation or the census in which they were first identified.

It must not be forgotten either that many couples are naturally infertile, many more subfecund. In 1948 Whelpton & Kiser calculated that in a population where neither contraception nor voluntary abortion was practised, about 10 per cent of married couples would be unable to conceive or have a pregnancy come successfully to term. (Whelpton & Kiser, 1948). Of the remaining 90 per cent, 10 per cent would be capable of having only one child, and ten per cent of the remainder would only be able to have one more child, and so on. Only 64.6 per cent of all couples would be able to have a successful fourth pregnancy. Trussell & Wilson (1985) display a table which indicates the proportion of women with no live birth at specified durations of marriage by age at marriage. Their data is taken from the parish registers of 16 English parishes and encompasses marriage cohorts from 1550 to 1869. The figures tabulated suggest that after 10 years of marriage, 6 per cent of women married between the ages 20-24 will have no live birth. For women aged 25-29 at marriage, the figure is closer to 10 per cent. Those married when aged less than 20 will, by Trussell & Wilson's reckoning, be less likely to conceive a successful pregnancy than their sisters, married aged 20-24. After 10 years of marriage 8.3 per cent of the younger brides will remain childless. (Trussell & Wilson, 1985). From the linkage exercise we can, of course, only identify couples who have been married at least ten years. We might, therefore, expect the incidence of childlessness to be somewhat less than that predicted as some women may still successfully conceive after 10 barren years of marriage. John Lister, tin manufacturer, and his wife Mary, who was a dressmaker, for example, were

identified aged 24 and 23 respectively, in the 1851 Census and traced through to the 1881 census. Their only child surviving to be enumerated was John, who was not born until 1864. (He went on to be one of Keighley's few "students" in 1881). Because we can only "see" those births where the children have survived to a succeeding census rather than all live births which might be recorded in the parish registers, the incidence of apparently childless marriages might be rather higher than that predicted by Trussell & Wilson. By removing those couples aged 25-29 from the sample who had children over the age of 4, the proportion of "childless" couples would be raised even further, although the greater mobility related to their childless state may have made them less likely to appear in the traced sample.

If we consider those young couples traced 1851-1861, those traced 1861-1871 and those traced 1871-1881 where both husband and wife are present together on both census nights and calculate the percentage of couples who have no surviving children in the second census, we find that in 1861 this is 8.7 per cent, in 1871 8.4 per cent and in 1881 9.8 percent. These figures are close enough to those of Trussell & Wilson and Whelpton & Kiser to suggest that natural levels of childlessness, brought on by sterility or subfecundity are being observed.

Table 6.14 lists the number of couples in the linked samples where the husband was in the same occupational sector in the first two consecutive censuses. It then gives the number and percentage of each group who had no surviving children at the second census. Small numbers can give rather distorted figures but, broadly speaking, the values are within range of predicted values of natural childlessness. The main point of the table, however, is to illustrate that of those childless couples many more than expected were to be found

Table 6.14. The proportion of couples who were childless after at least 10 years of marriage where the husbands were in the same occupation in the first two successive censuses and where the mother remained in textiles over the same period, Keighley 1851-1881.

Husband's Occ.	Censuses		N	Those childless		Number with mother in textiles at census 1 & census 2.	Number of mothers in textiles at censuses 1 & 2 who are childless
	1st.	2nd.		N	%		
Textiles	1851	1861	56	4	7.1	18	4
Textiles	1861	1871	37	3	8.1	10	2
Textiles	1871	1881	24	3	12.5	6	2
Metal-mech	1851	1861	23	3	13.0	0	0
Metal-mech	1861	1871	64	2	3.1	6	1
Metal-mech	1871	1881	111	9	8.1	7	3
TETMM	1851	1861	32	2	6.2	3	0
TETMM	1861	1871	56	2	3.6	9	0
TETMM	1871	1881	66	4	6.1	4	2

Source: Nominal record linkage of census enumerators books

Notes: N = The number of couples in each of the husband's cross-censal occupation categories

Metal-mech = Metal-mechanical work
TETMM = Trades other than textiles or metal-mechanical work

amongst those where the mother was a textile worker in both censuses. Were we to repeat this exercise for those couples who can only have one child, we would probably find the same phenomenon, as single-child families do seem to have been more common amongst textile workers than amongst the sample populations as a whole.

Lack of children, therefore, would seem to enable women to remain out at work, but it does not appear to be a condition deliberately sought; the proportions suggesting that a natural regime of childlessness was in operation.

Section 6.8: Individual Fertility Histories

The lack of dates of marriage and exact dates of birth in the census data has already been lamented. The diagrams in Section 6.5 suggested that "housewives" were so categorised because they had been married longer before the census and therefore had had time to build up a family and leave the mill. However, if those in the textile workers category were experiencing longer than average delays between marriage and first birth, they could have been married equally as long as the "housewives". In order to investigate this point further, it was decided to attempt to match couples in the census with entries in the Keighley registers of vital events.

Ideally, the couples already linked intercensally would have been sought in the marriage registers and their offspring hunted in the registers of baptisms. However, as discussed in Chapter 4, Section 3, the high proportion of non-conformists and the lack of records from their chapels, made such an exercise virtually impossible. The most desirable procedure had, therefore, to be turned on its head; marriages and births being linked to couples in the census rather than vice versa

thus giving a new population of sample couples.

The marriage register of St. Andrews, Church of England, Parish Church, Keighley which covers the period immediately prior to the 1851 census runs from September 27th 1847 to February 27th 1852, covering 500 marriage ceremonies. By census night, 1851, 390 of these marriages had taken place. The equivalent register for St. John's Parish Church, Ingrow-cum-Hainworth holds only 29 marriages from the first entry in April 1845 to census night 1851. Although at this period the couple's ages were seldom recorded in full in the register, the combination of the couple's forenames with the groom's surname and occupation (that of the bride not being given until later registers) was sufficient to identify couples in the census. The address at marriage sometimes acted as confirmation of a link.[21] Of the 419 marriages 196, or 46.8 per cent could be linked to couples in the 1851 census. However, it was noted earlier (Chapter 3 and Appendix C) that there was a tendency for brides to move to join their husbands upon marriage, rather than vice versa. Of those 105 couples where the groom's address lay outside the study area, none could be found in the following census. Of the remaining 314 couples the 196 traced represented 62.4 per cent.

In order to have some representatives of Keighley's non-Church of England population included in the linkage data, the Registrar's indexes of Registry Office weddings (i.e. all weddings not taking place under the auspices of the Church of England) were used. These indexes contain only the names of individuals being married and the number of the page on which their certificate of marriage appears in the actual Register. If these listings are fed into a computer and then sorted by page number, two brides and two matching grooms are identified.

The BCALS can be used to search for each groom's name in combination of one or other of the brides. Cross checking ensures that two men are not linked to the one wife. The weddings listed in these indexes occurred all over Keighley Registration District (R.D.). As the study area covered approximately only one third of the R.D.'s population, we might therefore expect a proportionately smaller rate of linkage success. However, of the 134 marriages in the Registrar's Index covering August 1848 to the end of March 1851, 56 couples or 41.8 per cent, were traced in the 1851 Census. Possibly the growing town had a younger population than the R.D. as a whole, leading to a greater proportion of marriages than expected taking place there, alternatively there is also the possibility that with the larger population there was greater scope for wrong links to be made between index and census, especially when so many couples went unseen. Also with the Registrar's Indexes the only dates known were the months at the start and the end of the period covered by the register. As a ready reckoner as to which year a marriage took place, the marriages were assumed to be evenly spread from the middle of the first month covered to the middle of the last. Seasonal fluctuations probably did occur, however, public holidays being favourite wedding days[22] and thus those marriages taking place in the middle of a year can be dated more accurately than those occurring at either end of a year. Knowing a woman's age at census and her year of marriage we can work out her approximate age at marriage. Having, at least, an approximation of the month of a woman's wedding but no indication of her date of birth crude measures had to be applied. Thus a woman returning herself as 24 in the 1851 census was assumed to have had her 24th birthday on January 1st, 1851. Thus, if married in 1849, she

was deemed to have been married aged 22. This method was slightly different from that used in calculating the year of birth of children in the census because, in the latter operation, the actual event was not defined. In a very few cases, however, this may result in a child appearing to be born before its mother married when this in fact was not the case. This would be particularly the case if a baby was conceived pre-nuptially. Which leads on to tracing records of births to couples in the census.

Registers of births are held by the Registrar but they are virtually useless for the proposed linkage as no other means of identification are provided. This left the parish registers, unfortunately meaning that only the children of parents who were members of the Church of England could be traced. These primarily serve as a record of of baptisms conducted in the church and, therefore, they do not always include date of birth (see Chapter 4). After the 1830s the majority of entries in the Keighley registers do contain this piece of information, however, as well as the names of the parents, an address and often the father's occupation thus making identification within the census more certain. Only the entries for which the date of birth was given were listed, but as it became obvious from the discrepancies between birth and baptism dates that children could be quite old before they were baptised, the search for pre-1851 census births was carried on until the end of the records for 1853. No doubt, even then, some births were missed. Thus a list of 149 births from St. John's register and some 796 from that of St. Andrews was compiled. Eventually it is hoped to trace as many of these births as possible to the 1851 Census, however for the moment the list was sorted alphabetically by surname to allow those marriages where an exact date of marriage

was known to be matched with any births resulting from that marriage taking place before the 1851 census. This, of course, resulted in a very special population, being both married and having children baptised in the Anglican Church in a relatively short few years, although not all were located in the 1851 Census.

Of the 64 couples where a marriage-first birth link could be made three wives appeared to bear children before their marriage, a further 29 women (i.e. 45.3 per cent) were pregnant when they got married. Indeed, Martha Aked married Anthony Brotherick or Broderick, a comber, on the 11th of November 1850 and was delivered of a daughter, Sarah, just nineteen days later on November 30th. Cutting it even more finely was Margaret Gregson, who married a joiner, Aaron Driver, on the 15th of May 1848. Two days later a son, George, was born.

The average interval between marriage and first birth amongst the couples was 9.36 months with only 8 taking longer than 9 months to conceive after marriage. Within a year of marriage 67.6 per cent of the wives had given birth. These statements must be treated with care, however. Linking marriages and births from time periods with the same end points will tend to favour links being made amongst those couples with short marriage-to-first birth intervals. Nonetheless we can see that pre-nuptial pregnancy was not at all uncommon. As such pregnancy could mean expulsion from the mills, the girls involved would have had little choice but to become housewives on marriage. A girl who had proved herself fertile was therefore unlikely to be a textile worker; those who may have been having the same sexual experiences but were proving less easy to impregnate were more likely to remain at work. We know little of pre-marital sexual behaviour amongst textile workers, except for comments passed during

the 1830s' enquiry conducted by the Sadler Committee (P.P. 450, 519, Vol. XXl, 1833) which, although denouncing the textile population as promiscuous, were uncertain as to the reasons behind the lack of illegitimate births in the textile areas. The following statements were given by medical witnesses before Sadler's Committee of Enquiry on the 1st of August 1838:

Witness B.C. Brodie:

> Q... do you conceive that labour, interfering with the health of females, diminishes the power of fecundity?
>
> A... I should suppose that females under these circumstances would be less likely to bear children than females under other circumstances.

Witness C.A. Key:

> Q... Is very early and promiscuous intercourse between the sexes ordinarily attended, as far as the female is concerned, with prolificness?
>
> A... I should be inclined to think to the contrary.

Witness Samuel Smith:

> A... promiscuous intercourse has a direct tendency to produce sterility; therefore I would say that in the agricultural districts, the circumstance of intercourse not being followed by conception was the exception; but in the manufacturing districts, where intercourse was followed by conception, I would say that was the exception.

(Wing, 1967)

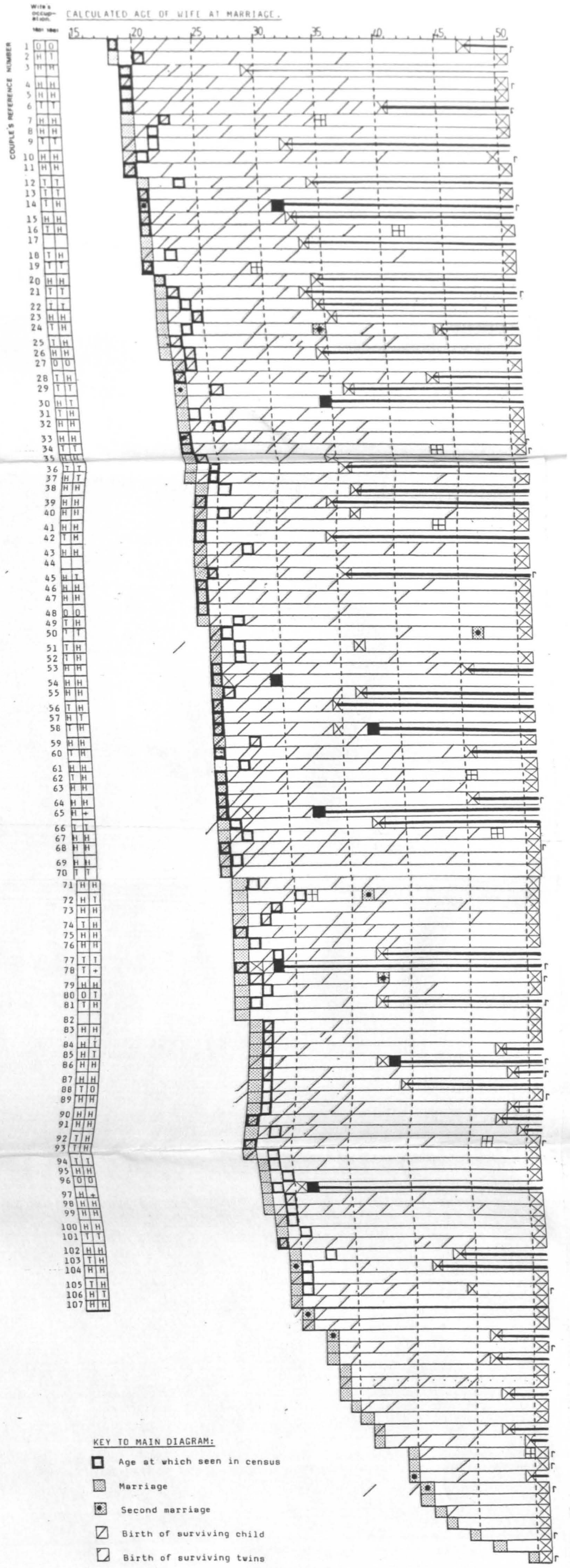
Elsewhere the distribution of birth control pamphlets by Carlile and Place (Hewitt, 1955) in the textile districts was held responsible for low illegitimacy rates. From the small amount of Keighley data given above, it might be construed that illegitimacy rates were low because, for the most part, marriage followed on the heels of impregnation, although it is worth noting that the first witness above

attributed low fecundity to women's work rather than promiscuity.

For many of the Church of England marriages, and all of those conducted under the auspices of the Registrar, however, births and marriages would not be linked; and accurate measures of marriage-first birth and birth-birth spacing could not be made. By linking pre-April 1851 marriages to the 1851 Census returns and thence to subsequent censuses, however, an impression of marriage and child-bearing patterns can be gleaned.

Figure 6.13 groups the couples so traced by estimated age at marriage. The preference for marriage between the ages of 22 and 26 is easily discernable, there being a rapid tail off in the number of marriages as the bride's age at marriage increased. Some of the marriages will be second ones, especially amongst the older age groups but any children born to previous marriages have been excluded from the diagram as rigorously as possible. Although, in the diagram, marriages of women aged 30 or over have been included, the following discussion will concentrate on those married under the age of 30. Having used only registers dating from 1845, few couples were likely to have children aged 5 or over by the 1851 census so most would be included in the intercensally linked sample 1851-1861, although a few of the women married in their late 20s would have been aged 30 or over in the 1851 Census and therefore would not have been included. Each wife has a "marriage" event marked in the diagram as well as a "disappears from view" event; the latter being her 50th year or non-appearance in a succeeding census, depending which occurred first. Where a wife had died by the following census but had borne children in the intercensal period, her "disappearance from view" event has been placed immediately after the last birth. All births resulting

Figure 6.13 Birth spacing, by mother's age at marriage, couples married pre-1851, traced from Keighley Parish Registers and Registrar's Indexes of Marriage to the 1851 census and beyond.



KEY TO MAIN DIAGRAM:

- Age at which seen in census
- Marriage
- Second marriage
- Birth of surviving child
- Birth of surviving twins
- Death of husband
- Death of wife
- Age of wife when couple last in view
- r The marriage of the couple was found in the Registrar's Indexes of Marriages

KEY TO WIFE'S OCCUPATION 1851 & 1861:

- H Housewife
- T Working in textiles
- O Employed but not in textiles
- \+ Dead

in a child which survived to be enumerated are shown by a diagonal line. The outlined boxes indicate the age at which the wife was identified in the 1851 Census. It can be seen that only a short time has elapsed between marriage and census in most cases as might be expected given the dates of the registers used. With increasing age of the wife, we are probably, therefore, seeing an increasingly biased sample as only the more newly married couples have been selected. Further symbols indicate where a husband died and where a remarriage took place. Although such events in themselves are interesting, little can be made of them here as the nature of the tracing exercise will create an unrepresentative sample of couples disrupted by death.

Such a diagram is not easy to interpret. Only by dissecting it and investigating individuals within the make up do possible patterns become discernable. The majority of couples appear to have begun their families within the first two years of married life, many indeed within a year; little evidence of birth control there. Those who prove the exception to this general rule, therefore, deserve closer attention. By linkage and then back-checking with the original census entries we can learn more about those couples' living arrangements and conditions (see Appendix E).

(Couple No. 12, Fig. 6.13)

> James and Alice Edmondson married in June 1847, when Alice was 20. Their first surviving child was not born until Alice was 26. In 1851 James was working as a comber and Alice as a weaver. They had as a lodger 17 year old Sarah Smith, who worked as a drawer. They shared a house with a widowed agricultural labourer (aged 56) and his three sons. Ten years later Alice was still working as a weaver, although James had been promoted to the position of overlooker. In the interim they had had three children, (at least), evenly spaced three years apart.

(Couple No. 20, Fig. 6.13)

William and Mary Harrison also took six years to start a family. Married in February 1850, Mary was returned as a housewife just over a year later. Her husband was a comber then but by 1861 he had become a smith's labourer and with three under 5s to cope with Mary remained at home, which the couple shared with John and Elizabeth Riley, a pipe maker and his wife and their 9 year old daughter.

(Couple No. 22, Fig. 6.13)

Henry and Martha Merrall had an eight year gap between their marriage in 1848 and their first surviving child. Henry was a stone delver and Martha a weaver. In 1851 they were living with Henry's parents; John (51) a navvy and Barbery (57). Ten years later the couple had a house to themselves and their 4 year old daughter Ellen Ann. Martha was still out at work but when Ellen Ann was not at school her grandparents, living just down the street, were probably looking after her.

(Couple No. 24, Fig. 6.13)

The Tillotsons, Samuel and Sarahann were married in 1848, when the bride was 21. In 1851 both were returned as powerloom weavers. They were living with Sarahann's parents, Joseph and Margaret Speak. Ten years later they had moved to Turkey Street where Samuel now kept a beerhouse. They had a four year old daughter, Martha, and were well enough off to keep two servants. By the following census Sarahann had been widowed and remarried. Her new husband was a labourer. As the exact date of the marriage is not known we cannot tell whether 5 year old Mary Mitchell is Sarahann's daughter by Abraham or whether she is her step-daughter.

Couple No. 36, Fig. 6.13)

Joseph and Martha Smith married in 1848. Both were powerloom weavers in the 1851 census and were living with Martha's unmarried brother and sister, Richard and Sarah Widdop, also powerloom weavers. A decade later, the Smiths still had no children and both were still out at work as weavers. Richard and Sarah had been replaced by 15 year old Amos Smith, a lodger and possible relation working as a machine maker.

Couple No. 42, Fig. 6.13)

William and Olive Clayton also remained "childless"

(Couple No. 42, Fig. 6.13) Cont'd.

from their marriage in 1850 until the 1861 Census. In 1851 William was working as a mechanic and Olive as a weaver and they lived on their own. A decade later William had moved to iron turning and Olive had given up work. They still lived alone.

(Couple No. 76, Fig. 6.13)

William and Ann Feather had six barren years after their marriage in 1849. William was a weaver in 1851 while Ann remained at home. They lived next door to another Feather family, headed by Thomas (26), an overlooker, and his wife Ellen. They had two young children and Thomas's brother James, a woolcomber, was also living with them. A decade later William and Ann had moved and William had turned to joinery. They now had a 5 year old and a 3 year old and Ann remained at home. On census night Ann's unmarried sister, June Spencer, was visiting.

(Couple No. 80, Fig. 6.13)

Anthony and Harriet Kelley or Kelly married in 1848 when Harriet was 25. Anthony was a mason's labourer and Harriet a hawker. They lived in 1851 in Carrodus Square with Harriet's parents, Anthony and Bridget Dunn, who kept a lodging house. On census night as well as Anthony and Harriet, Harriet's sister Sarah, a factory worker, and her husband Michael Walsh, who was also a mason's labourer; another married sister (a factory worker) and her son aged 5; two unmarried sisters and one unmarried brother, all factory hands; plus six other lodgers (four of them Walshes) were living with the Dunns. Anthony was not present in the 1861 Census but would return by 1871. Harriet was still living with her parents and now had two children (the eldest born some 5 years after her marriage and the other under a year old, but she was still out at work , now in a factory. Harriet's father had in fact given up the lodging house (he was returned as an "agricultural labourer") although this was not obvious as on census night two of Harriet's brothers had returned to live with their parents, one bringing a son with him; a sister was there too, plus a granddaughter surname of Walsh as well as three "visitors", two of them a Dunn girl and her illegitimate daughter. Quite a houseful. Such complex households were not atypical amongst Keighley's immigrant Irish.

(Couple No. 81, Fig. 6.13)

Fred and Elizabeth Sharp were married in 1849 when the latter was 25. He was a wool sorter and she a weaver and they were living on their own in 1851. A decade later Elizabeth had left work, presumably to care for their only son, Walter, born almost ten years after their marriage.

(Couple No. 88, Fig. 6.13)

Susannah Milner married her husband William in 1850. He was a whitesmith and she a weaver. In 1851 they were living with Susannah's mother, Fanny Astin, a minister's wife. Her husband was not at home on census night but Susannah's sister, a 23 year old weaver, and her brother, a 15 year old smith's apprentice, were. A 4 year old grandson was also staying. By 1861 William had become the manager of an iron works and Susannah had turned to the more "genteel" employment of dressmaking. They had moved to their own home, but remained childless.

(Couple 96, Fig. 6.13)

In 1848 Thomas and Anne Cullingworth were married. In 1851 he was a joiner and she a 29 year old dressmaker. Their marriage was to remain childless but in 1861 their 3 year old niece and 4 year old nephew were staying with them, indicating perhaps that they were not childless by choice.

(Couple No. 101, Fig. 6.13)

Charles and Maria Knowles were also destined to remain childless all their married life. They wed in January 1848 & in 1851 were living by themselves, Charles working as a warpdresser and Maria as a weaver. A decade later, however, they were sharing a house with Thomas Heaton, a 30 year old wool scourer, his widowed mother, Mary, and his niece, 3 year old Sarah Elizabeth Heaton. The marriage register confirms that these are probably Maria's brother, mother and niece as she was the daughter of Jonas Heaton, a wool sorter.

(Couple No. 103, Fig. 6.13)

James and Hannah Baxter, married in 1847, spent at least 15 years childless. In 1851 James was a comber and Hannah a weaver. A decade later he had switched to foundry work and she to housework.

Appendix E.1. lists the household arrangements of all the couples listed in Figure 6.13 where the wife was a textile worker in 1851 and/or 1861. The overwhelming impression is that these couples began married life as part of another household, although there were exceptions; e.g. the Corlasses, the Applebys, the Holmses and the Stowells. When this is compared to a small sample (1 in every 5) of those couples where the wife was a housewife at both censuses (Appendix E.2) the contrast is marked; of the latter couples, very few shared their dwellings. A further point of interest is the fact that the husbands of these housewives include a draper, a corn miller, a cabinet maker with men in his employ, a butcher, a cordwainer, a warp dresser, an overlooker and a railway employee - all more prestigious and better paid jobs than those of the men in combing, weaving and labouring whose wives went out to work. This general impression is also given support by the addresses of the couples, those with textile working wives being more likely to live in the more densely packed, reputedly noisome houses in the town centre.

At an individual level, therefore, the data, albeit somewhat unrepresentative, corroborates the more generalised figures given in Chapter 5. Textile work for married women appears to have been most prevalent amongst the less well off strata of Keighley society, and it appears to have acted as a safety valve in times of economic pressure. Shared accommodation appears to have played a part in the early married lives of such couples. Such arrangements presumably encouraged the young wife to go out to work as in that way she would be benefiting everyone in the household by the extra income she could contribute. Children, however, appear to have been seen as a deterrent to sharing a house, although the age and number of children appear to have come

into the calculations. Possibly, where a mother had to give up work to look after the child, the loss of her income meant that the other members of the shared household were more financially stretched than if she were not there so she and her husband would move out. Ten years on, in 1861, most of the couples were living in their own households. In their turn some had taken in lodgers, possibly as a means of replacing the mother's lost earnings. Most of the lodgers were young people in their late teens or twenties, but in some cases the young couple were now housing other family members. In one case at least, that of the Wilsons (No. 70, Fig. 6.13), this appears to have allowed the wife to continue working while her widowed mother-in-law acted as "housekeeper". It is noticeable, however, that a number of couples remained in close proximity to the parental or kin household of which they had formed a part the previous decade. See for instance the case of the Merralls above and in Appendix E.1.

Those who were better off could afford to move more rapidly into their own accommodation, the wife would have less need to work and therefore more housewives appear to be in non-complex households. Couples with several children are also more likely to have been in their own household, and to have had a non-working wife. Thus time from marriage to census may also affect the living arrangements "captured" by the census "snapshot". Further work linking the registers and the census, would provide a larger population of couples, allowing certain factors to be held constant in order that such cause and effects chains might be studied more closely.

The phenomenon of women returning to work in 1861 after being housewives in 1851 has been discussed previously (see above and Chapter 5). In Figure 6.13 there are seven examples of such

behaviour:

(Couple No. 2, Fig. 6.13)

William and Barbara Keighley were married, according to the parish records on 8th October 1848. In the St. Andrew's baptismal records, however, is an entry for the birth of Ann Keighley, born on 1st March 1848, daughter of William Keighley, mechanic of Fleece Street, and his wife Barbara. Anna M. Keighley was also born to William and Barbara on 31st August 1850. It is possible that there are two completely different sets of William and Barbara Keighleys, the former moving away from the area before 1851 because they do not appear in the census returns. Otherwise they are the same couple living together as man and wife and having a child before an official marriage ceremony took place. In Figure 6.10 it has been assumed that the couple in the census did not have the earlier baby, although by coincidence their first child was returned as Ann in 1851. By 1861, when she was ten years old she was referred to as Hannah Maria and she now had a nine year old sister Selina. There was then a gap of seven years before their brother John arrived. The two girls were returned as scholars but either would have been considered old enough to take charge of the infant while their mother worked. As well as Barbara's return to work the fact that the Keighleys moved from Brunswick Street, itself in a poor area, to "Brickhouses" considered to be the lowest of the low areas (Dewhirst, 1974), indicates probable financial pressure on this family over the decade.

(Couple No. 37, Fig. 13)

Richard and Dinah Stowell had three children in quick succession after their marriage in 1848. Robert was aged 11 in 1861, Mary 9 and Thomas 7. In 1851 Richard was an innkeeper. He did not re-appear in any subsequent census, however, although Dinah continued to return herself as married. Nevertheless by 1861 Dinah had a one year old son, Charles, who was probably minded by his elder sister while his mother was out working as a reeler. Ten years later Dinah had yet another one year old son, Harry. All her four other children were now out at work, presumably supporting the family while she remained at home. The long gaps in Dinah's fertility, the absence of her husband and the presence of a late teenage daughter at the time of the last birth, when Dinah was 43, all raise questions concerning the latter's "family building" but the Stowell family

(Couple No. 37, Fig. 6.13) Cont'd.

> illustrate how different work and childcare patterns were forged at varying stages in the life cycle and in the face of various situations.

(Couple No. 45, Fig. 6.13)

> James and Jane Shuttleworth had a very young daughter in 1851. James was a "factory worker". By 1861 both he and his wife were weaving and the daughter Maria was 10; old enough to help care for her 4 year old sister and 2 year old brother.

(Couple No. 57, Fig. 6.13)

> James and Elizabeth Hartley had two lodgers in 1851 and Elizabeth was at home looking after their small daughter Martha. Ten years later, however, Elizabeth was out at work, there were no lodgers and Martha was no longer with the family; perhaps she had died. There were, however, an 8 year old daughter and a 6 year old son, both scholars, and old enough, by nineteenth century working class standards to fend for themselves when their mother was out at work.

Two of the families remaining out of the seven (Couples Nos. 72 and 85, Fig. 6.13) repeat this pattern; either the children were old enough to take care of themselves or one child was sufficiently old enough to be left in charge of the younger ones. The inevitable exception is Sharpe and Nancy Buckley who had a new daughter in 1851 but had lost her before 1861, by which time Nancy had gone to work as a weaver, presumably to help out her comber husband. How she coped with her remaining 5 and 3 year old sons cannot be told, although the help of friends, neighbours and relations must never be discounted.

It has been suggested that textile women cut short their family building in order to return to work. On the evidence of these very few cases it would seem that those who returned to work to alleviate financial difficulty, and this does seem to have been the main reason

for going back to the mills, were those who could fit work around their child care commitments rather than vice versa. It was not that children in other families were not looking after their younger siblings but that in such families the greater numbers of the latter would mean that the elder child could not cope on his, or more likely, her own and thus the mother would stay at home unless financially very hard pressed indeed or unless other child care arrangements could be made.

Looking down Figure 6.13, very few mothers who were housewives in both 1851 and 1861 have the sort of family structure described above. Two which do look similar are that of the Spencers (No. 46) and that of the Ratcliffes (No. 64). In the first case the father, James, was an overlooker at both censuses. He was some six years older than his wife, and therefore presumably had had time to work himself into his high status position before marriage, thus putting his family on a securer financial footing. There may have been no need for his wife to consider working; overlookers were relatively well paid (Table 3.3). His eldest daughter was working in the mills as a spinner by the age of 10, however, and both she and her younger sister eventually became weavers. Very few children in Keighley, even those of the more affluent workers, escaped a period of factory work.

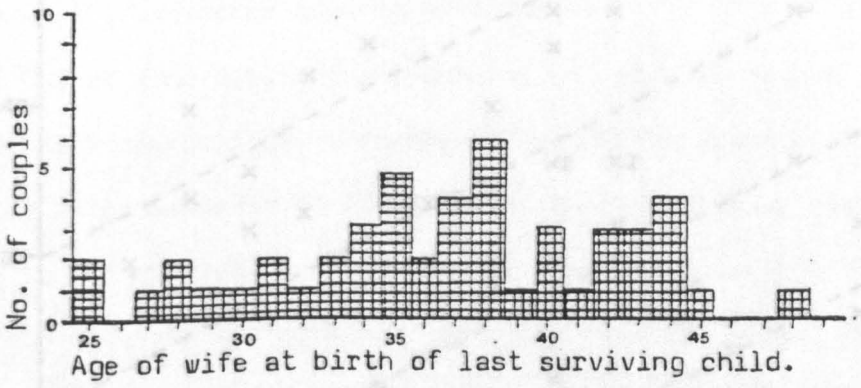
The Ratcliffe (sometimes spelled Radcliffe) family probably saw an upturn in their fortunes 1851-1861 as William, the father, moved from woolcombing to woolsorting. His wife Margaret was delivered of three sons in just over four years of marriage. From the census returns there then appears to be a four year gap before a fourth son was born. Admittedly, there were no girls to "nurse" the youngest child, and all three of the older boys were working as half-timers in

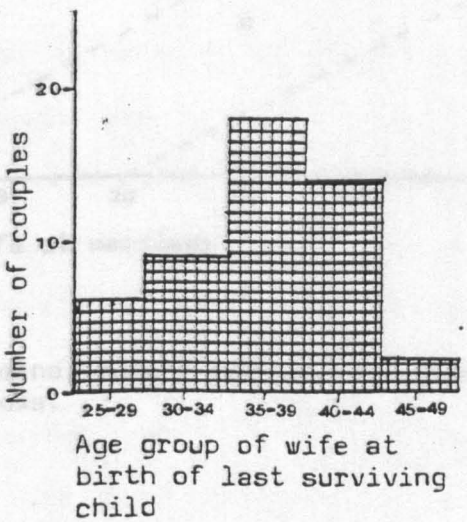
the mill augmenting their family's income so Margaret might have been expected not to be out at work. However, by chance, the births of all four brothers are noted in the St. John's baptismal records and this shows that in fact a son called Charles was born only 27 months after his immediately elder brother. The gap in the census ages may, therefore, be misleading so the pattern of Margaret's childbearing is not really so like those of the mothers who returned to work.[23] This acts as a warning to be considered during interpretation of these figures based on the census returns.

The major part of this discussion has focussed on the beginnings of families child bearing sequence. The fact that a considerable proportion of the under 30 year old couples in Figure 6.13 includes a wife who is observed to reach her 50th birthday allows us to take a short look at the end of the family building process. Figure 6.14A graphs the age of mother at birth of last child. Figure 6.14B compresses the mothers into 5 year age groups, thus showing that the vast majority of women had reached the end of their childbearing span by the age of 44 and that many women concluded their families by the age of 39. The average age of the mother at the birth of the last child amongst those women observed to the end of their reproductive career was 36.7 years, with menopause presumably following a few years afterwards. This average age at last birth of child is considerably younger than the 41-42 calculated by Frisch for mid-nineteenth century England and Wales (Leridon & Menken, 1979).

Figure 6.15 graphs the age of these mothers at marriage by their age at the birth of the last surviving child. Lines indicate 0, 10, 15 and 20 years of marriage. As might be expected an increasing number of the older brides have fertility spans of less than 10 years'

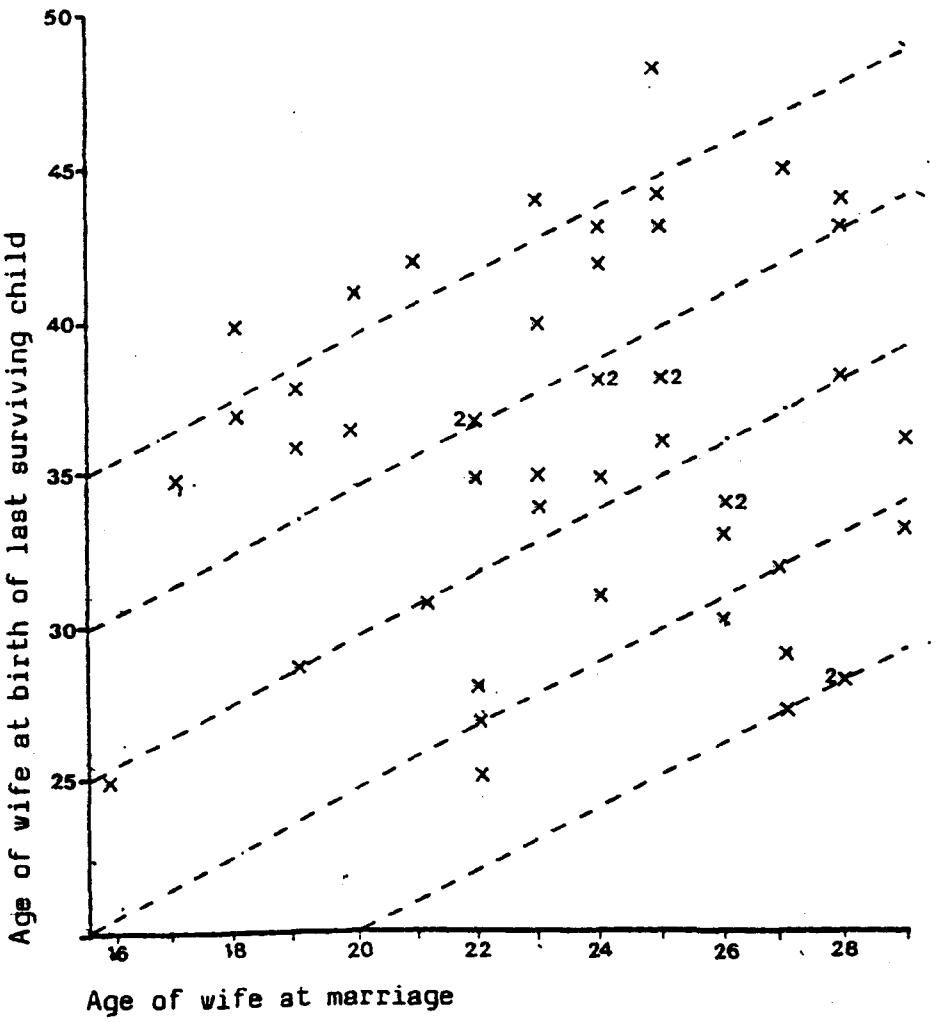
Figure 6.14 Age of wives in view until their 50th birthdays, at the birth of their last surviving child; Keighley 1851, by year of age and by 5 year age group.





Source: Nominal record linkage of census enumerators' books.

Figure 6.15 Age of wife at birth of last surviving child by age of mother at marriage, for mothers traced from 1851 census and in view until their 50th birthday.



Source: Nominal record linkage of census enumerators' books.

duration after marriage. Fertility does drop off with increasing age, and while it must be admitted that some women may have ceased bearing children because of social constraints rather than physical ones, it does appear that the later a woman married the more likely her childbearing period was to be of short duration.

One further linkage exercise was carried out in an attempt to gauge the frequency of long delays between marriage and first birth which might have been obscured by the comparatively short time between the pre-1851 registers and the 1851 Census.

For a period of time during the research, St. Andrews Parish Church records were unavailable, a change of incumbent taking place and the records being transferred from a safe in the vestry of the church itself to the Local History Section of Bradford Central Library, where they are now easily accessible. Had they been available, it would probably have been of greater benefit to try to link 1851-1861 marriages recorded in them to the 1861 Census, given the greater detail such registers contain. However, as they were out of circulation at the relevant point in the research, it was decided to use the Registrar's Marriage Indexes instead.

Four of these were used in all, those running from August 1848-May 1852, May 1852-May 1855, May 1855-December 1857 and December 1857-November 1860. It was decided not to include the following one for November 1860-January 1866 because so small a proportion of the weddings listed would have taken place in the four months or so before the 1861 Census.[24] The same method as outlined above was used for gauging the approximate year of marriage. All the caveats connected to this method plus that of calculating the bride's age at marriage and the date of birth of her children still hold, and therefore Figure

6.16 must therefore be treated as impressionistic only. Further, the possibility of the "wrong" link being made is heightened by the greater geographical area and the greater timespan involved. All these factors may combine to produce those cases where children appear to have been born before marriage. On the other hand, the child may have indeed been born before the marriage, either out of wedlock or, as we cannot identify cases of second marriage from the indexes, if a widower had remarried rapidly after his wife's death in childbirth and the child had been wrongly attributed to his second wife.

Very few of the women are observed to reach their 50th birthdays. Only in those cases where a woman married in her mid-to-late twenties some five or more years before the 1861 census would she be old enough to have reached 50 by 1881. This, unfortunately, makes any observations about average age at birth of last surviving child impossible. However, large numbers of women are again seen to have children very quickly after marriage. No doubt, if the previous observations are correct, many of these were the result of pre-nuptial pregnancy. There are, however, a considerable number of couples who had several years to wait for a surviving child, or remained completely childless.

(Couple No. 1, Fig. 6.16)

> Holmes Rushworth married Martha Hoyle when she was just 17 in about 1852. In 1861, although he is returned as a mason and married, Martha is not living with him, although she would have been aged 25 or thereabouts. Perhaps she had gone home to have, or to show off her new baby because in 1871 the couple had only two children, one 10 years old. The other was aged 2. They therefore had a seven or eight year wait for their first surviving child.

(Couples No. 2 & 3, Fig. 6.16)

> Neither Nicholas and Jane Sharp nor Moses and Hannah Sugden had any surviving children in the 1861 Census, despite having been married in 1855

Couples No. 2 & 3, Fig. 6.16 (Cont'd.)

and 1854 respectively. Both Jane and Hannah were working as power loom weavers in 1861, as was Nicholas. Moses was a mason (25). In 1861 both couples lived by themselves.

(Couple No. 4, Fig. 6.16)

Mary Wild married William Feather in 1859 when she was about 19. The couple remained childless over the next two decades. William worked in the iron industry although in 1871 he was "unemployed". Mary was a weaver in 1861, was at home in 1871 but was back out at work by 1881. Again the couple were living by themselves in each census.

(Couple No. 5, Fig. 6.16)

The Lynches, John and Margaret, were married in 1852 when Margaret was approximately 20. In 1861, when she was returned as being 28, she was at home looking after a 4 year old and a two year old. Some four or five years must have elapsed between marriage and the first surviving child.

(Couple No. 6, Fig. 6.16)

Smith and Jane Milner married in 1857 when Jane was 21 and Smith was reportedly 72! However, a decade later he had reverted to being 36. In 1861 Jane was a housewife but in the succeeding two censuses she was a weaver. Smith worked in the iron industry. The couple had no living children by 1881.

As well as those who took a long time to start a family there were also those who had long gaps between their children, as was mentioned above. Some examples from Figure 6.11 include:

(Couple No. 7, Fig. 6.16)

John and Mary Narey married late in 1860, when Mary was 20 or 21. In 1861 John was a mason's labourer and Mary a weaver. They were lodging with a Gouldin family composed of 2 adult couples and three small children. Two doors away was a household of 9 Nareys! Within a year after the census, John and Mary had a son, James, but it was not until 8 years after that that their second surviving child

(Couple No. 7, Fig. 6.16) Cont'd.

> was born. In 1871 Mary was still out at work and John remained a mason's labourer, but now they were living by themselves. Four years later a third child was born and five years after that a fourth. In 1881 Mary was still out at work and her 11 year old daughter was probably helping to look after the two year old. Another Narey couple were living next door, but both were out working.

(Couple No. 8, Fig. 6.16)

> Thomas Reeday married Sarah Ann Bower in 1851 when she was 21. By 1861 he had become a shoemaker with other men in his employ. The couple had two children in quick succession after marriage but there was then a seven year gap before their third surviving child. A three year gap separated the third and fourth and a six year gap the fourth and fifth children. Sarah Ann was a housewife in both 1861 and 1871.

Such long gaps between children are not at all uncommon in Keighley at this time. Is this deliberate spacing the result of subfecundity or a manifestation of the high infant and child mortality rate? Despite the use of the term "surviving child", remarks have been made above as though no births apart from those in the diagrams took place. If the estimate of infant mortality used in the fertility analyses (see Chapter 5) is even roughly correct then for every four births in Figures 6, 9, 10, 11, 13 and 16 another birth will have occurred but not been observed in the census. As some family patterns allow little space for "extra" children, those families with the widest spacing and the fewest children have probably borne the brunt of infant death, miscarriage and still birth. It is well to remember Rebecca Town and her childless state despite at least fifteen births (see Chapter 4, Section 5).

As well as those with large "breaks" in their childbearing and those who have no children at all there are those who only have one

child very early in marriage and then no subsequent children. Three examples are:

(Couple No. 9, Fig. 6.16)

> Henry and Ann Whitaker, married in 1857. Ann was 26 and a weaver in 1861, Henry a wool sorter and the couple had a three year old son. The couple were sharing their accommodation with another couple, Bracewell and Betty Snowden, who were also weavers. Ten years later there had been no additions to the family and both parents were still out working, while the son, William, was a scholar; a somewhat unusual occupation for a boy of 13 in Keighley. By 1881 William had become an assistant school master while still living at home, and his mother had given up work.

(Couple No. 10, Fig. 6.16)

> Thomas and Jane Wood also only had one surviving son, Richard, born soon after their marriage in 1854. Thomas was an overlooker and his wife was not working at any of the censuses. Richard was a mechanic at 16 and left home some time in the following decade.

(Couple No. 11, Fig. 6.16)

> William and Ellen Midgley married in 1860. In 1861 William, aged 32 was a machine tender and Ellen, aged 24, was a weaver. They were living with William's parents and his sister. Approximately a year later they had a son, James. By 1871 William worked as a carter and Ellen still remained a weaver. By 1881 James was an overlooker. His father was still married but Ellen was not present on census night and the fact that William returned his occupation as "housework" suggests her absence was a long one.

Greer (1985) suggests that this "one-child-early-in-marriage-then-no-further-children" pattern, further examples of which can be found in Figure 6.16 :, is indicative of the practice of coitus interruptus before and after marriage amongst peasant communities. Could couples also have been practising this "technique" in Keighley? Did Henry and Ann Whitaker plan to have only one child in order that he might receive a

better education and move up in the world? Or was he able to do so because his parents, involuntarily, had only him and, therefore, could channel more resources and energy into his schooling? Certainly his mother's remaining at work in order to let him remain at school suggests a parental desire to see their child succeed. Whether this desire sprang up before or after his birth is impossible to tell.

Diagram 6.16, like its predecessor, is hardly quantifiable, especially as so many of the women it depicts are not observed to complete their fertile span. However, some impressions can be gleaned. It would appear that women marrying before the age of 20 do not produce so many surviving children in the first decade of marriage as those marrying aged 20-24. There are longer waits for, and gaps between, children, suggestive of lower reproductive efficiency or higher infant mortality. If anything, those marrying aged 20-22 seem more prolific than those marrying aged 23 or 24 whose childbearing patterns once again become more attenuated. To delay a girl's age at marriage beyond age 22 in Keighley, therefore, was to reduce the number of children she was likely to have.

From contemporary observations (see Chapter 2) female textile workers seem to have had later than average ages at menarche, although doubtless the majority of girls probably began their periods before the age of 20. From the small sample depicted in Figures 6.14A & B, and from contemporary accounts, they also appear to have had a somewhat earlier average age at menopause than their peers in non-textile working areas. Frisch has indicated that:

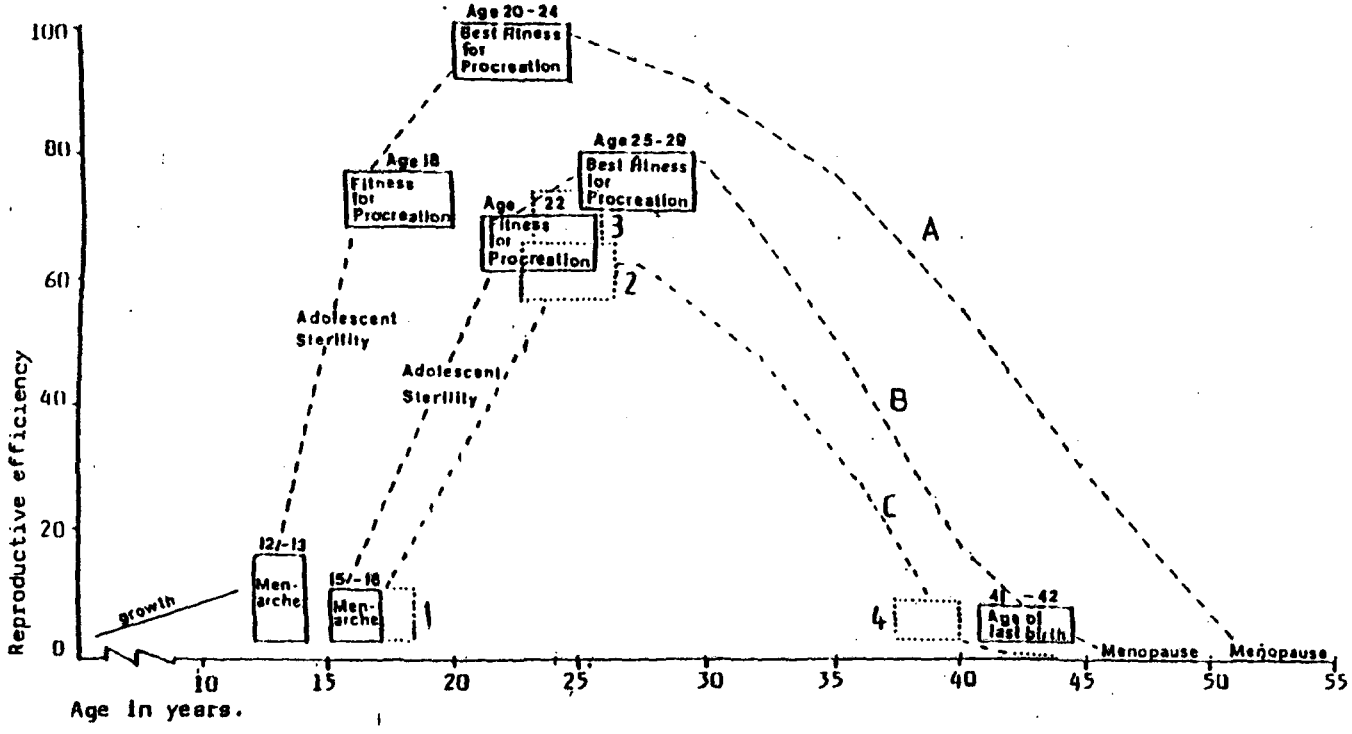
> "...historical data on nutrition, growth, age-specific fertility and the ages of reproductive events show that slow growth to maturity of women and men due to undernutrition, hard work and disease is

> correlated with a reproduction span which is shorter and less efficient than that of a well nourished population.
>
> Sub-maximum rates of growth to maturity in a population or in some classes of a population are subsequently associated with a pattern of late mean age at menarche, early mean age at menopause, longer birth intervals and more relative and absolute sterility".

Frisch's diagram which she used to illustrate this point has been reproduced (Figure 6.17) with an added curve to indicate that, on the basis of the information discussed here, the stresses and strains of factory work coupled with poor nutrition levels for the amount of work done may well have acted on the dimensions of a textile population's reproductive efficiency curve. With an earlier age at menopause, a later age of menarche and a shorter span of nubility, textile workers' fertility could be reduced below the six to eight children which would result from Frisch's 1850-1870 fertility schedule.

Nutrition, however, is not just a question of how much one eats but also the content of what one is eating. We have already seen that textile workers tended to have "jaded palates " and suffered from stomach and bowel disorders. We know that rickets was very common in the textile districts and that false teeth were much sought after. Commentators often remarked on the stunted growth of the "operative class", as well as the prevalence of aenemia amongst them. These observations together point to deficiencies of vitamins and minerals amongst the textile population; deficiencies which could be passed on from generation to generation. Lack of vitamin B produces nervousness and stomach complaints; vitamin A deficiency stunts growth; rickets is the result of vitamin D deficiency; lack

Figure 6.17 The proposed curve of textile workers reproductive efficiency.



Source: based on a diagram from Frisch, R.E. (1979) "Some Further Notes on Population, Food Intake and Natural Fertility" in Leridon, H. and Menken, J. Natural Fertility (Ordina, Liège)

Explanation:

A The female reproductive ability of the " well-nourished, non-contracepting, modern Hutterites, 1930-1950 which can result in 10-12 children.

B The reproductive ability curve postulated by Frisch for England & Scotland, 1850-1870. Such fertility would result in 6-8 children.

C A proposed curve of reproductive ability amongst 19th century textile workers: (1) A later than average age at menarche (2) adolescent sterility lasting well into the twenties reducing reproductive efficiency. (3) Once best fitness for procreation is reached it is of a shorter than average duration, so the curve peaks more sharply than either A or B. (4) The decline towards the zero reproductive efficiency of menopause is more rapid amongst textile workers tired out by work and running a home; few women have children in their 40s.

of calcium causes soft bones and poor dentition, increasing the chance of deformity in the former and caries in the latter; a shortage of iron creates aenemia in adults and increases the chances of infant mortality (Drummond & Wilbraham, 1939/1957; Pearson & Greenwell, 1980).

Admittedly many other sectors of the urban working class population would be short of the minerals and vitamins essential to health and well being; indeed many would have also been receiving greater amounts of harmful substances than their rural counterparts; water contaminated by high amounts of lead from the pipes in which it was carried is just one example of this. However, working women, and especially women working in the factories, had to endure extra physical and mental pressures creating additional stress-related symptoms. Stress can inhibit the uptake and efficient use of vitamins and minerals and therefore reduce the chances of conception, or of carrying a pregnancy successfully to full term.

Pregnant women require to increase their food intake by 300-400 calories per day during gestation to produce a healthy child (Boyce, 1985). Women doing hard physical exercise require an even greater increase. Yet we know that many working class women in the nineteenth century cut back on their often already meagre food intake to save up for their confinement and the baby's needs. Many also went out to work, or remained at work right up until the birth in order to augment their savings (Spring Rice; 1981, reprint). It is unlikely that they were using their extra income to buy the fresh meat, vegetables, fruit and milk which the medical profession recommend for pregnant women. It can be noticed in Table 3.13 that the "articles in general consumption by the working classes" contain none of those items; the largest expense being flour with which to bake

bread. Drummond & Wilbraham (1939/1957) point out that a farinaceous diet in itself can produce vitamin depletion, especially if white, processed flour is used. The diets of wool combers in the early 1850s certainly did not contain large amounts of animal proteins (Table 3.12) and it is likely that the female members of a household were less well fed than the males; some may well have survived on bread and tea as contemporary observers commented. A further result of the dietary deficiency highlighted by Drummond and Wilbraham was the fact that breast-feeding declined; partly because of mothers going out to work but also due to mothers being insufficiently well fed to produce adequate supplies of breast milk (Drummond & Wilbraham, 1939/1957), thus increasing the risk of infant mortality.

The role of stress in this chain of events may well be an important one. We have seen in previous chapters that fertility was low amongst younger wives in Keighley, when large proportions were out at work, but that fertility was relatively higher amongst older women, most of whom had left work. This may indicate that by staying away from the factory and its pressures women were more likely to conceive and bear live, healthier children when their food intake was not being competed for by the demands of work and their reproductive systems.

If this hypothesis is correct then it suggests that the age specific marital fertility schedules postulated by Coale & Trussell (1974, 78) and even Hinde & Woods 1984), who took under-nourishment and illness into consideration, do not go far enough towards allowing for the conditions under which female textile workers existed based as they were on the "well-nourished, non-contracepting, modern Hutterites" (Frisch, 1979) and the nineteenth century population of Britain

(which would include a large rural population with access to fresh, nutritious food), respectively.

It is possible, therefore, that the low level of marital fertility amongst 20-24 year old and 25-29 year old wives in Keighley between 1851 and 1881 was due to causes outwith the direct control of the population.

Section 6.9: Conclusion

The use of nominal-record-linkage to provide longitudinal views of couples' family building patterns has proven very successful in showing how static figures mask great mutability within a population over time.

We have seen that female textile workers' fertility registers as low on the fertility measures because more fertile women are unable to carry on at work and therefore leave to become housewives, and to add their fertility to that of the women already in this category. If women return to the mills after bearing children it would appear that they do so only when the children can look after themselves, or each other. Women remaining in the mills did so because their fertility did not reach a socially set threshold after which they would be expected to stop work. In Keighley this threshold seems to have lain somewhere between 1 and 2 children, although child spacing also appears to have been taken into consideration. This threshold was not rigorously adhered to, however, and women with several children can be observed in the textile workforce. For the most part, these women came from families in the grip of poverty; social stigma appears to have been attached to having a family and a working wife. Those women who never had any children, or only one or two, were not pressurised into leaving the mill and therefore the women in the older textile age groups are more likely to be infertile thus producing ASMFR curves which strongly suggest that textile working women limit their fertility, whilst in fact the women work in textiles because they have no fertility to limit. The evidence of the birth spacing diagrams in Figure 6.9 to 6.11 suggests that male textile workers had a higher proportion of their wives in this category than either of

the other two major occupational sectors, and this consequently reduced their fertility below that of the latter two groups. The reasons behind these facts are difficult to interpret as there is also evidence that the wives of metal-mechanical workers and men working in TETMM left the mills earlier than the wives of textile workers anyway no matter what their fertility levels.

It has also been shown in this chapter how men moved from occupation to occupation both over the life-cycle and through changes in the labour market situation. Again, therefore, the composition of the groups whose fertility was measured in Chapter 5, is seen to alter, which has further ramifications for the interpretation of M and m.

The longitudinal data also uncovered the fact that pre-nuptial pregnancy was fairly frequent within the community, at least in the late 1840s and early 1850s. The low levels of illegitimate fertility in the textile areas so agonised over by the middle class investigators could thus be explained by couples marrying when they found the girl was pregnant. This suggests that couples had already formed strong attachments and planned to marry anyway but were spurred on by the imminent arrival. It would be of great interest to know the length of such relationships and the frequency of intercourse outside of marriage as this would give an indication of how likely girls were to fall pregnant. The dilemma would remain, however, of whether the couples sought pregnancy as a reason for getting married, or staved it off to deliberately delay marriage. Were brides pregnant on their wedding day proving their fertility or their inefficiency as contraceptors?

The large gaps in the child spacing charts of many textile

working wives in Keighley could equally be attributed to "slips" in contraception although without replacing children lost from view through mortality, we cannot be certain whether these women were, as many contemporaries believed, more likely to lose their children in infancy than their non-working sisters and thence to appear less fertile. Certainly to modern eyes the spacing of children seems haphazard and a likely result of a larger family being reduced by mortality or of a reproduction system which produced miscarriages or still births rather than live children. As we have seen, however, well-spaced children would be an advantage to a mother who wished, or had to work, and therefore the child-spacing observed could be the result of design rather than chance.

The small amount of evidence concerning the reproductive systems of women in Keighley does suggest that, on average, they reached maturity later, had a sharper peak of reproductive efficiency and were menopausal earlier than their contemporaries, which would be consistent with the low fertility of women in their early twenties observed amongst the various groups in Keighley over the study period. There are, however, several alternative interpretations of the figures and in the final chapter the observations, measurements and findings of the study will be summarised, and discussed as a whole rather than in discrete sections in order to come to some firmer conclusions as to the exact nature of the fertility behaviour to be found in Keighley 1851-1881.

Notes to Chapter 6

1. The term "reconstitution" is usually applied to work done on registers of birth, marriage and death and the methods used are most notably described in Wrigley (1966). Here "reconstruction" is used to signify a similar but somewhat cruder procedure based on the census enumerators' returns and subject to all the constraints which the use of that source implies.

2. See Laslett (1983) for a list of 30 "select English parishes" for which reconstitution has been undertaken. The most famous of all must surely be that of Colyton in Devon carried out by E.A. Wrigley (see, for example, Wrigley, 1966, 1978).

3. "SOUNDEX is a name compression routine: it is a system whereby a surname is reduced to one letter and three numerals, such as A234 or M152...SOUNDEX, technically the Russell SOUNDEX code, was developed for use with twentieth century material. Ian Winchester made a number of modifications to account for the special character of Irish and Scottish names and for typical confusions in nineteenth century penmanship...(this) version is more powerful for historical research than the original code." (Katz and Tiller, 1972).

4. Minor problems arise when young couples are staying with the groom's parents. As the son (code 03) the groom would be listed first, then any younger brothers, followed by any sisters (04) and then by his wife as the daughter-in-law of the head of household (06). The enumerators' habit of listing children in descending order of age coupled with the sort programmes division of siblings into male and female created lists of sons by descending order of age followed by lists of daughters similarly ordered. In future, for similar studies, it would in fact be advantageous to have siblings ordered by age rather than relationship to household head as it is their order of arrival rather than their "son" or "daughter" status which is of interest and time is lost interdigitating siblings to recreate a complete order by age. Such a sort could easily be achieved by editing all 03 (son) and 04 (daughter) codes to a one number code representing "child".

5. A Direct Access file has all its component entries itemised by the computer enabling it to seek and locate an entry using any of the coded criteria as an identifier with the maximum speed and efficiency.

6. Reducing the size of the DA file noticeably increases the speed at which the computer works on finding a required entry. Other users of the mainframe also do not experience a drastic decline in their computing speed.

7. Because of the sorting of the file, members of a household with different surnames were not listed together, thus the design of the programme echoed and reinforced the focus of the study: the reproductive couple. Alterations to the Computer Assisted Linkage System could identify whole households thus enabling studies of such entities. Discussion on this topic, however, showed that the amount of computer time and file store required prohibited such an exercise on a time sharing computing system such as that run at Sheffield. Where further details of the households in which a couple were living were required, cross-referencing between the hard copies of the unsorted and alphabetically sorted listings was required.

8. If a "married" man were being sought and a "single" man were found, he was not considered as a possible link. Once married an individual could only become "widowed" as the census returns did not record "separated" or divorced. In a very few cases during the linking exercise carried out here unusual names have made it possible to observe couples living apart - although, of course, there could be a multitude of reasons for their not being together on census night. It is possible that when separation had occurred, women were more likely to return themselves as still "married" or even, widowed, because of the status that conferred while men reverted to being "single". The fact that "absconding" husbands (see Figure 4.5B) were chargeable to the parish for the upkeep of their wife and offspring may also have meant that such men were very unlikely to be found in the local area! One example of an apparently separated couple are Moses and Ann Hanson, aged 29 and 27 respectively in 1861, both weavers who were married in 1858. By 1871 Moses had become a mechanic's labourer while Ann was still a weaver but, although still returning herself as married, was lodging elsewhere in the town.

9. See Chapter 4 on the reasons for change of birthplace.

10. The decreasing proportion of couples where the wife is aged 25-29 with children aged 5 or over 1851-1871 shown in Table 6.1 contrasts with the decreasing singulate mean age marriage for the Keighley study area over the same period (Table 3.1). An inverse relationship might have been expected rather than a corresponding one. On the face of it the two tables might be interpreted to indicate women marrying younger but waiting longer to start a family. Whether this is an accurate interpretation remains to be seen. 1881 again stands out as running against the trend of the three previous censuses in both tables.

11. A "complex" household is here taken to mean one that consists of more individuals than comprise the actual nuclear family.

12. The percentages overall of the three male occupational groups TETMM, metal-mechanical work and textiles in the under 25 year age group who were living in complex households in 1851, 1861, 1871 and 1881 were: 35.4, 19, 29, and 17.7%; 22.2, 25.5, 20.2, and 21.2% and 32, 24.2, 31 and 21.6% respectively.

13. "Cohort - A group of individuals who enter on some stage in the Life Cycle simultaneously and are analysed as a unit throughout their life time" (Johnson et al, 1981, p. 44).

14. Combers tended to work in small groups, known as shops, many of which could be situated well out of town (see Map 4.4). The worsted manufacturers gave out work to the shops, supplying them with wool and with their combs. The combers would come to the mill to fetch the wool for combing and would return the completed "tops" and receive more wool and their pay, usually once a fortnight. If they ever wished, or were forced, to leave a manufacturer's employ they would return his combs to him, a gesture known as "handing in your combs". See Notes from J. Room (Figure 3.22).

15. It has been suggested that, with mechanisation and the employer's preference for female or child labour, the men in the cottage industry preferred to send their children and women folk to work while they, themselves, retained an autonomy over their lives by staying at work in their cottages and combing shops. There they were neither at the call of the factory bell nor at the mercy of relentless machines (Hareven, 1981).

16. "Finisher", "Sizer" and "twister". These textile job titles came to prominence 1871-1881, however the numbers involved were relatively small and so they were put in the general textile workers category, 6700 (see Appendix B) which in turn has been consistently classified as a low status textile occupation, encompassing as it does the terms "factory boy" and "mill hand". It is possible that the newer job titles were accompanied by higher status or higher wages than this "catch all" category confers and therefore were seen by men as more attractive long term employment.

17. The term "still working" implies that the women had not stopped working. We have no easy means of monitoring their job histories over the intercensal period so we cannot tell whether they were indeed in continuous employment over the decades or whether they had had one or more periods of work before returning to the mills over the period during which the second census was taken. The term, therefore, indicates women observed to be working in 1861 as well as in 1851.

18. As shown in Chapter 3 the vast majority of Keighley women would have worked in textiles before marriage. For most, if not all, of the women mentioned here their move would have been a return to work rather than a whole new experience. (See also Appendix B concerning the problem of women's misreporting of their occupation).

19. Men also may have changed occupational sectors between censuses (see Note 18) and therefore the term "still" includes those instances where a man has left his first census occupation, gone to another one or more and then returned to the original occupation in time to be observed in the second census as being in the same occupation as he was in the first census.

20. 1851 and the other census years fit awkwardly into the "year of birth" calculations as some children, born in 1851 but after the census was taken, are returned as being 10 years old. In 1851 the census was taken on the night of Sunday 30th March and in 1861 it was taken on the night of Sunday the 7th of April, therefore children born in the week 31st March - 7th April 1851 would be 10 years old in the 1861 census although they did not appear in the 1851 census. Others who were returned in the 1861 census as 10 would be given the year of birth "1851" (1861 - 10) when in fact they were born in the year which should have been designated "1852". Thus, in the diagrams, there is probably some overestimation of children born in 1851, as births from two censuses can be recorded as falling in that year, and a consequent underestimation of birth occurring in 1852.

21. The term "address at marriage" is rather ambiguous as no indication is given as to whether this should be the address of where each individual was living before the ceremony or where they are going to set up home as a married couple, which presumably would have been arranged before the ceremony. If the former, then a surprising (to modern eyes) number of individuals married the boy or girl "next door" or were living with their future spouse before marriage as both bride and groom returned the same general address. The implications of this for a study of fertility behaviour are sufficiently great to warrant further study. Perhaps couples married shortly after a census could be traced in the returns to see what their pre-nuptial living arrangements were.

22. Christmas Day was in fact a favourite day for weddings, presumably because it would be a holiday from work and therefore guests and even bride and groom would not have to hurry back to work, in fear of losing their jobs. (Roberts, 1984; Adams, 1982).

23. An alternative explanation is, of course, that the first Charles died shortly after birth and that the Charles in the census is, in fact, a later baby named after his dead brother, a not uncommon practice in Victorian times.

24. As a fee was charged for consultation of the indexes on the basis of time taken and the whole index would have had to be copied out to ascertain which of the marriages indexed fell November 1860 to April 1861, cost was the main factor in the decision not to use this fifth register.

25. We cannot be certain that no children were born to these two couples. If the children were staying elsewhere on census night we have no means of identifying them as, since their parents do not reappear in the 1871 census, we have no other opportunity to "catch" the children at home.

26. Williqan & Lynch took their quote from:

Anderson, M (1979) "Some problems in the use of census type material for the study of family and kinship systems" pp. 69-80 Sundin in Sundin & Söderlund (eds.) Time, Space and Man: Essays on Microdemography. (Almqvist & Wiksell, Stockholm).

CHAPTER 7.

Before Their Time or Sacrificed to Progress? A Reappraisal and Some Conclusions.

This thesis took as its starting point a graph drawn up from the published results of the 1911 "Fertility Census" (Registrar General, 1923). The graph (Figure 1.2) showed that the occupational Class VI, comprising textile workers, was experiencing rates of marital fertility well below those of all but the highest social class in the middle of the nineteenth century. This was somewhat unexpected for, while the downturn in the overall birth-rate of England and Wales had begun in the late 1870s, it had previously been supposed that the working classes would be affected last. They would have to 'wait' for the downward diffusion of birth control knowledge and increased incentive to act upon it. While agricultural workers and miners lagged behind other class groups, maintaining high fertility levels for longer, the textile workers' fertility levels indicated that either they had greater, or earlier, access to knowledge concerning birth control, or else greater incentive for its use, than their working class peers; or else their fertility was being reduced by some means other than deliberate limitation. It was also possible that some or all of those factors were acting in combination. The 'diffusion' model of the spread of birth control was called into question because textile workers' fertility lay below that of Social Class II; a situation which would not occur, it was thought, if the middle classes were adopting birth control first and then passing it successively down the social order. It was not until

the 1870s, when Social Class II's fertility levels fell below those of the 'textile workers'.

As defined by the Registrar General, any particular couple's class was decided by the husband's occupation only. As such the 'textile workers' class had several unique characteristics. Its members were spatially highly concentrated, congregating mainly in the cotton centres of Lancashire and the woollen and worsted areas of Yorkshire's West Riding. By the mid-nineteenth century, after the advent of widespread mechanisation within the industry, they were a highly urbanised population; their dwellings clustering around the factories in which they worked. Thus, unlike the agricultural workers or the miners, the textile work-force experienced the combination of industrialisation, mechanisation and urbanisation comparatively early. A further feature which differentiated the textile industry was the large proportion of the workforce which was female; women and girls worked alongside men and boys, although actual tasks performed tended to be segregated by sex.

The relationship between the experiences of the textile population as an industrial group, the high number of women working in the textile mills and the low level of fertility displayed by the Registrar General's Class VI was the main focus of this study. Was the textile workers' fertility so low, so early because of deliberate limitation of births, and, if so, what had motivated this behaviour, what form did it take and how had the textile work-force acquired knowledge of the methods they used? If deliberate fertility control was not involved, what influences were at work to reduce the number of births amongst married textile workers?

On the basis of a review of contemporary and retrospective literature a model was drawn up of factors which might have affected the textile population's fertility levels (Figure 2.10). This model

divided into two halves (or pathways), both affected by the large number of women working in the mills, the 'psychological' and 'physiological', respectively. The first path represented the view that the textile population, being in the forefront of the Industrial Revolution, was the first to experience social changes which spawned new attitudes which would, in time, become widespread as "modernisation" gained momentum. Amongst those were new attitudes towards contraception. The alternative path suggested that the changes wrought by the new, industrial urban era were not for the better and, being amongst the first populations to experience such conditions on a large scale, textile workers of both sexes suffered ill health and physical degeneration which left them with lower than average child-bearing potential. In one scenario, championed by Hewitt, Pinchbeck, Collet and others, the textile workers were 'before their time'; the harbingers of change, developing a pattern of behaviour which would become increasingly widespread as the impact of industrialisation spread throughout society. In the other, the textile workers were seen as sacrificial lambs offered at the altar of progress; their bodies stunted, their health broken and their lives reduced to drudgery in order that ever-increasing profits could be made. Engels and Hutchins were amongst the "social commentators" who provided evidence for this argument. These two, very different, views are symbolised by the artists' impressions of life in the textile districts depicted in Figures 2.11 and 2.12. In each case the high number of women, and especially married women, employed in the textile districts was seen as a major contributing factor to the low levels of fertility among textile workers. The Registrar General himself had specifically implicated this feature in his report. The present study sought to

ascertain whether the accusation that it was women's work which reduced fertility amongst the textile class was a valid one and, if so, to discover how the relationship operated.

Two methods of enquiry were employed, both utilised the census enumerators' books for the town of Keighley in the West Riding of Yorkshire covering 1851, 1861, 1871 and 1881. The study was designed to compare and contrast the fertility experiences and family building strategies of a variety of groups and couples from different class and occupational backgrounds within one fairly typical, medium-sized town. Keighley, the third largest worsted centre in the West Riding fitted those requirements and was therefore chosen as the study area.

The first stage of the study involved measuring the marital fertility of groups defined by husband's occupation, wife's occupation, or both partners' occupation combined. This was done by calculating age specific marital fertility rates (ASMFRs) for the groups being studied from child-woman ratios calculated from the census enumerators' books. The observed ASMFRs were then measured against two standard schedules of marital fertility, yielding figures purporting to represent the level of underlying natural fertility within the group (M), the extent to which marital fertility was being controlled in a parity-specific way (m). A further measure calculated the overall fertility which a woman would achieve were she to marry when aged 20 and experience the ASMFRs displayed by the observed populations as she proceeded towards her fiftieth birthday (TMFR).

The two standard fertility schedules were somewhat different in the level and shape of the curves they described. When the ASMFR curves of the Keighley population groups were measured against them the Coale Trussell Standard was shown to be nearer in shape to the Keighley curves

whereas the British Standard schedule lay at a level much more akin to those of the mid-nineteenth century textile community. The British Schedule was therefore considerably more useful for comparative purposes but the Coale-Trussell fertility model usually predicted fertility curves which were a closer fit to the observed ASMFRs in Keighley.

Comparison with either standard schedules suffered, however, because the study population failed to fulfil certain assumptions contained in the models on which the M and m indices were based.

First, the models assumed that there was no dissolution of marriage before the age of 50. In Keighley, the inclusion of women who moved out of non-domestic employment and into the home in groups defined or strongly influenced by women's employment acted to produce an effect very similar to that resulting from widespread marital dissolution.

Second, variations, in the extent of married women's employment, and in the average length of time which a woman would stay at work after marriage, between groups and within groups over time created effects akin to those brought about by swings in nuptiality.

Third, the models assumed that wives in the 20-24 age group would be the most fertile, but a late age of marriage in Keighley meant that it was the 25-29 age group who showed the highest fertility rates, at least in those groups where the wife's occupation was not considered. When the wife's occupation was taken into account it was shown that female non-domestic and domestic employment could be fertility-dependent states and the measures of fertility which were calculated had to be interpreted with this in mind.

Once the effects of all those factors in M and m had been recognised, it could not be expected that all the groups observed

would have fertility rates which fitted well to those predicted by the two models. Thus the mean square error term (reported as MSE x 10^3), the measure of goodness of fit of observed to predicted fertility, could be larger than 0.005 (5 in MSE x 10^3 terms, described as a 'mediocre' fit by Coale and Trussell) and still be acceptable in the Keighley context. An MSE x 10^3 of 50 was taken as the upper limit of acceptability amongst Keighley's population groups. The number of poorer fits, many caused by random processes, was reduced by confining the discussion to those occupation- or class-defined groups which consisted of 100 couples or more.

Each group also had its TMFR calculated. This measure highlighted the problem of lack of mortality data. Differences in rates of child and infant mortality with mother's age would have had the greatest effect on the calculation of M and m: class specific mortality would not, of itself, have changed the shape of the observed ASMFR curves. In the case of TMFR, as class-specific differences in mortality were not known, inter-group comparisons could not strictly be made. Many other features of life in Keighley were also, unheralded, contributing to TMFRs calculated and this increased the difficulties of interpretation. Changing rates of employment, migration, swings in the proportions married and the age of marriage, alterations in the industrial and class make-up of the town and within the town, all affected the final estimate of any one particular TMFR.

Many of the problems and disadvantages of the fertility measures stemmed from the fact that they were derived from static, point-in-time data and yet sought to quantify phenomena within an ever-changing community. The second method used to investigate Keighley's

family formation behaviour took a longitudinal approach; tracing couples and their offspring from census to census and, where possible, from census to the registers of vital events. In this way couples' changing circumstances in regard to occupation, living arrangements and fertility could be monitored.

This exercise too had its problems: high population turnover meant that only a moderate proportion of the population could be observed over time; and the lack of non-conformist records of vital events coupled with the high number of non-conformists in the community limited the populations in some of the linkage exercises even further. The longitudinal data, however, uncovered new facets of life in Keighley and shed further light on several aspects of fertility behaviour. The story of Keighley's fertility behaviour, as observed between 1851 and 1881, is not straightforward, but we can now begin to answer the five questions set out in Chapter 1.

Was low fertility a general phenomenon within Keighley?

We have questioned the validity of the fertility levels reported by the 1911 "Fertility Census", as we have seen that textile employment in middle age did not guarantee that a man had experienced unbroken employment in that sector since his late teens, and if it did this may well have been facilitated by his wife's low fertility. There was therefore the possibility that the low fertility amongst the textile working Class VI shown in Figure 1.2 was an artefact of the methods of calculation. This could not be checked directly as the present data source, census enumerators' books, did not allow comparable calculations to be made.

The measurements of fertility which we could take using the census enumerators' books led us to take the British Standard of

marital fertility as indicative of the level of fertility prevalent in mid-nineteenth century England. This too can be questioned. This standard fertility curve was based on the mean fertility measurements derived from family reconstitution surveys of twelve English villages, and spanning 1650-1799, in combination with the mean fertility figures derived from vital registration data for Scotland in 1855. The final standard was weighted towards the latter set of figures because of its greater reliability (Hinde & Woods, 1984). It is unlikely that the curve produced is wildly inaccurate, it is certainly closer to the nineteenth century experience than that derived by Coale and Trussell, but local variations would be expected to occur and caution should be exercised until further studies allow final conclusions to be drawn concerning the accuracy and applicability of the British Standard in the context of nineteenth-century Britain.

If it is deemed representative of natural average fertility levels in the mid-Victorian period then fertility in Keighley does appear to have been generally low; with couples where the wife was aged less than 30 contributing most to the shortfall of births.

A woman marrying aged 20 and following the British ASMFR curve could expect to have had 7.17 children by her 50th birthday; a similar woman in Keighley could only expect to have 6.5 children. The latter figure assumes, however, that in fact mortality has been accurately estimated. A slight alteration in the distribution of infant mortality by mother's age and the Keighley population would have appeared as fertile as their peers in the country as a whole.

Within the town, however, different fertility patterns were displayed by the various groups; the textile working class, as defined by husband's occupation, stood out as having particularly low fertility.

Was there a difference in fertility between married women working in textiles, married women who were working but not in textiles, and women who were married and stayed at home?

At any one time wives who remained at home were much more fertile than those who were out at work. Those who worked in textiles were a little less fertile than those who were employed elsewhere, but this is not surprising as many of the non-textile jobs were carried on in or around the home thus reducing the problems of children. Women with higher numbers of children could therefore do these jobs whereas the textile working women were more restricted. Over the study period the level of fertility in each of the three women's occupational groups remained remarkably constant suggesting that the number of children which a woman could have and still remain out at work did not alter to any great extent over the 30 year period, 1851-1881. The main effect of women's work on fertility levels appears to have been through the proportions in which they went out to work, at what ages they did so, and how long they remained there. Large numbers of married women going out to work reduced the fertility of wives working in textiles and increased that of housewives, in any particular population group.

Did a woman's occupational history affect her fertility?

This is a very difficult question to answer as the two aspects of a Keighley woman's life, employment and fertility, were very closely connected so that the nature of the relationship is not always clear.

Very few girls in Keighley did not spend some time in their teenage years at work in the town's textile factories, although the point-in-time census data did not allow us to differentiate between those who 'never worked' in textiles, those who had done some work in textiles, and those who had always worked in textiles before marriage. After marriage the question seems equally valid when reversed: did a woman's fertility affect her occupational history? A woman with several children, especially closely spaced children, was far less likely to be out at work than a woman with no children. Pre-nuptial conception, a fairly common occurence in Keighley, would remove women from the workforce relatively promptly after marriage. Keighley's average age at marriage amongst women lay in the later twenties, but the high pre-nuptial conception rate suggests that a large number of the younger age groups were not without sexual experience. Whether factory work facilitated this cannot be told. However, because so many of those pregnancies were followed by marriage rather than an illegitimate birth, it suggests both that the bond between the couples was already strong and that in some ways pregnancy was seen as a signal to marry. Not knowing the extent of premarital sexual intercourse we cannot gauge whether the pre-nuptial pregnancies were the results of 'accidents' in contraception or of a few acts of unprotected intercourse. Pre-nuptial pregnancy acted to increase apparent marital fertility amongst younger women, and to reduce their participation in the work force.

Other couples would require longer after marriage for the wife to conceive and bear a child and such women would very often remain longer in the mills; although amongst some groups, especially the higher status ones, it would appear to have been customary for the wife to leave work

immediately upon marriage. Some couples had long childless periods after marriage, but it remains uncertain whether this delay was due to the failure to conceive, to carry pregnancy to term; to a higher incidence of infant mortality; or whether it was the direct consequence of deliberate attempts to avoid the wife having to leave work.

In the later years of marriage a woman could go out to work if she had not recently had any children or if her children were sufficiently well-spaced for the older ones to look after their younger siblings. Again we cannot tell whether such a family building pattern was deliberate or simply fortuitous. Once out at work, it would seem probable that women in Keighley were not conceiving as often as might otherwise be expected. This suggests that a dual work load led to stress and fatigue, a decrease in libido, less frequent intercourse and fewer pregnancies which stood a reduced chance of coming to term. As many women went out to work when their husbands were receiving reduced wages, or were under- or un-employed or were too ill to work, both partners may have lost interest in sexual matters.

Was there any evidence that the health of textile workers was adversely affecting their reproductive capabilities?

There is no direct evidence that textile workers' health was adversely affecting their reproductive ability or behaviour. There is some circumstantial evidence that the effect of urban conditions, poor nutrition and disease, which Hinde & Woods believed to be reducing the fertility of nineteenth-century populations in England and Wales, were compounded by the nature of women's work in the textile districts. There is literary evidence for high incidence of menstrual problems, problems associated with nutritional deprivation certainly in terms of

the quality of food value, and problems in childbirth; all of which points to reproductive systems working below par. That those problems were not confined to the textile workforce is certain, but with the concentration of working married women in the textile districts the effects may well be magnified, especially if the women left out at work are those with no children. It has been suggested that such effects of textile work were seen at their strongest amongst younger married women. It might initially take them longer to conceive and complete a successful pregnancy; but once they achieved this they would leave the mills and with the release of stress and the reduced work load they would find conception easier and would be more likely to achieve further live births.

Were there differences between different groups of textile workers and if so what factors appear to have been involved? Were these factors observable amongst the rest of the town's population?

The difference in fertility observed in Keighley were many. They are discussed at length in Chapter 5. In essence, it would appear that male textile workers as a whole had lower observed marital fertility rates than the rest of the population because of the proportion of their wives who went out to work in the mills, and because of the great upheavals taking place in the worsted industry during the 1840s and 1850s. Within the textile industry, the higher status workers appear to have undergone reductions in fertility at an earlier date and faster rate than lower status workers. This was connected with the changing status structure of the textile industry, but must be attributed chiefly to the fact that higher status couples . . began to limit their fertility in the later years of the wives' childbearing span. Lower status workers followed suit, but not until the fertility

of their younger wives began to rise thus reducing what would otherwise have been a large drop in fertility. Other occupational and class groups showed changes in M and m indicative of a move towards greater family limitation between 1871 and 1881 but none were as marked as those amongst the textile workers. Even by 1881 the town's population as a whole had not reached levels of m sufficiently high to signify that the majority of couples were limiting their fertility in a parity-specific way. Amongst the textile workers m was well above even the 0.3 limit imposed by Hinde & Woods: if young textile wives were not having many children older wives were successfully stopping themselves from having any more.

It is possible, therefore, to provide some form of answer to each of the five questions posed at the beginning of the study. In so doing we have also raised even more questions and highlighted areas that require further investigation. The most prominent of the latter is a need for a greater knowledge of the incidence and distribution of infant mortality within Keighley during the study period. An attempt had been made to take it into account but this has been shown to be inadequate. Unless an acceptable model of infant death rates by maternal age is constructed to be included in marital fertility models, and a greater insight into class-specific infant death rates is achieved, then the lack of early accessible local data on mortality is going to continue to plague investigators of fertility in towns where the census remains the most practical data source.

The uses of nominal record linkage have been demonstrated here as a very limited section of the population. Further work would benefit greatly if the process could be applied to all members of the community, especially those in their later years of childbearing, since in this way

a greater range of cohorts could be followed and a more detailed knowledge gained of the changes taking place before the start of the study period. In a few years time the 1891 census will become available. It would be of great interest to add figures derived from that set of enumerators' books and to trace our Keighley families across a further decade. More extensive use of Keighley's available vital registers would also further enhance and build upon the work reported here.

Finally, this study has lacked the benefit conveyed by comparative data. To repeat the investigations carried out in Keighley in another textile town would provide a testing ground for some of the ideas presented in this study. The validity of comparisons would not always be easy to assess because new, locally derived dimensions would create further twists in the already complex tale. Such comparative work is essential, however, if our understanding of the Fertility Transition is to advance.

Given the work reported here, what can be pieced together about the low fertility of textile workers in Keighley between 1851 and 1881?

Going back to the early years of the nineteenth century, the textile industry was burgeoning; factories were being built to spin cotton and worsted yarn. The latter, however, relied on the hand wool combers for their supply of wool and on the hand loom weavers to work up the spun yarn. Thus the factories were "manned" by women and children while the men still worked at home in small semi-rural and rural villages. Fertility, by all accounts was high. However, as the textile industry expanded it became more and more urbanised. As people moved into the textile centres so once sufficient amenities became stretched and began to decline in standard. Clean water became

scarce, waste disposal problems increased, air pollution thickened and over-crowding became fiercer. The population began to suffer from the effects of several generations of factory work and their worsening living conditions. The Sadler report of the 1830s spoke of a great deal of deformity in the textile districts; in the 1840s the Keighley Union Surgeon was warning of the danger of high rates of prolapse of the uterus, abortion and premature labour brought on by women's work in the factories.

In the 1840s power looms began to force hand loom weavers out of business. The new technology increased the demand for wool so many of the weavers turned to combing rather than to power loom weaving which was fast established as a predominately female occupation. A decade later combing too was overtaken by technology and many men were thrown out of work, or could only make the most meagre living at their trade.

In 1851 the latter crisis had not yet taken full hold; many textile workers were marrying relatively early with quite a considerable proportion of their wives being under 25 years of age. The majority took wives when they were aged between 25 and 30. Higher status work was mainly the province of younger men who did not object so strongly to factory work while the older men, preferring their more independent ways, were found in the much larger lower status sector, outside the factories. There was no indication that the older couples were limiting their fertility in a parity specific way, but amongst the younger couples in both sectors fertility levels were low, but especially so amongst the lower status workers, who married rather later. Large numbers of the young wives were working in the textile industry, and this served to reduce the overall fertility levels as the textile working wives did

have much lower fertility. Those women were either losing more babies than their housewife sisters or they were refraining from having children for some considerable time after marriage. We know that lower status workers' wages were considerably lower than those of higher status workers so the fact that a greater number of their wives went out to work is not surprising. But if deliberate fertility limitation in the form of delaying conception and child spacing were allowing them to remain out at work longer than their 'higher status' sisters, this would mean that motivation not to limit fertility could be as high as that to limit: a strange concept so early in the nineteenth century. Through the nominal record linkage exercises we have shown that frequently the early months of marriage in Keighley meant sharing accommodation with one or other set of in-laws. This acted, no doubt, as another way of saving money and helping out the family, especially when the son or son-in-law could be incorporated into the father's combing shop. It may well also have acted as a restraint on intercourse and thus delayed pregnancy. Very often the birth of a child gave the young couple the impetus to set up their own home. Higher status workers, being better paid, may well have been able to afford housing earlier in their marriage and thus, several barriers to childbearing were removed. Higher status textile workers' wives certainly appear to have fallen pregnant more quickly (or more successfully) in the 1850s. The question of possibly greater stillbirth, miscarriage or infant death amongst the lower status workers raises the question, again unfortunately unanswerable, of whether women who had suffered such a trauma would treat it as an unremarkable occurrence and return immediately to work? This would certainly be the implication of the high number of young wives out at work, unless

fertility were low for other reasons.

During the late 1850s the crisis amongst the lower status textile community deepened. Fewer young men went into this sector of the industry and those who did so married later. However, other sectors of the textile industry were enjoying better fortunes and this combination sent many women out to work, many of them having had a spell away from the mills but deciding to return. Those who had the least child care worries were the most likely to return. Thus we mainly find women who had not had any children in the recent past and women who had older children capable of looking after younger siblings out at work, although in some cases a friend or relative might act as childminder to allow a mother out to work. Even amongst the higher status group young wives were staying out at work longer after marriage, they were also marrying later. With the glut of men looking for textile jobs this group may have been experiencing the worries of reduced wages or a less stable job market. Prices of goods were also high at this time, so wages would not have gone so far.

It is difficult to decipher whether young wives' fertility in both groups actually rose 1851-1861 or whether this was a function of some women staying out at work even after passing the 'normal' threshold fertility level. Because of this, however, the impression is given that both high and low status textile workers had an increasing number of wives in the older age groups who were attempting to reduce their fertility. With the stress and strain of extra work amongst the women and the threat of redundancy or reduced wages, couples may have not been trying very hard to limit their fertility but were nevertheless quite successful in doing so.

The 1860s was the hey-day of the worsted industry; it was also

the decade in which the majority of the male textile workforce fell first into the high status sector. The proportion of wives out at work in both status groups dropped but in terms of fertility behaviour the two groups diverged.

It seemed that the fertility limitation observed amongst high status textile workers in 1861 had been deliberate for it continued in 1871. The younger wives were becoming increasingly fertile as the average age at marriage dropped again and, as times were good wives had less need to go out to work, even though weavers' wages at that point were high. Older women were, on the other hand, definitely showing signs of parity specific reductions in births.

Amongst the lower status workers, however, it is difficult to tell whether the lower fertility in 1861 had been deliberate because by 1871 the older wives were once again showing few signs of fertility limitation and the fertility of younger wives had dropped again. This may well be connected with the fact that very few young men were entering this branch of the industry, preferring alternative employment; the population was aging rapidly. We have seen in Chapter 6 that if a wife went out to work then a comber, or weaver, had less need to move into alternative employment. Thus the low fertility amongst the younger couples may have been an attempt to avert a change of employment, as the infertility of their wives was allowing the young men to remain in textile jobs until they could work their way into higher status positions.

Was the fertility pattern among lower status textile workers in 1861 brought about by deliberate changes in behaviour which, when the need for reduced fertility receded were abandoned? Or was it brought about by changing circumstances, which in turn changed again, forming

a new pattern? It is hard to believe that the dire straits the lower status group found itself in during the previous decades would not have emphasised the advantages of fewer children, and yet the lessons of how this could be brought about were soon forgotten. Thus the second option, that of changing circumstances from census to census, would appear to make more sense.

By the mid-1870s the whole textile industry was in the throes of a deep depression. This time, it would seem, the female operatives were under the greatest pressure as power loom weaving went into decline in Keighley, and wages dropped. The women responded by withdrawing their labour into the home. Metal-mechanical workers too suffered the experience of a depression as the demand for their worsted machinery dropped, and their fertility fell for the first time. The reduction in the number of lower status textile workers' wives who were out at work coupled with an influx of young men into this branch of the industry led to a decrease in the age at marriage which led in turn, it would seem, to a rise in fertility amongst the youngest age group. Amongst the wives aged 35 or over, there was a most successful move to limit the number of their children expanding any further. Some of the 40-49 year olds in 1881 would have been aged 20-29 in 1861. Were they putting into practice what they had learnt when wanting to delay childbirth in order to stay out at work or were the processes which had first affected higher status workers now beginning to affect them and they had, very successfully, followed their lead in fertility control? A third possibility is that if women in 1861 had indeed had a few more children in their 20s than their peers in 1851 or 1871 then they felt a greater need for family limitation by the 1880s.

The higher status workers in 1881 were showing fertility patterns which suggested that by then birth control was part of their lives, as young couples as well as older ones, housewives and working wives were all displaying fertility curves suggesting birth spacing in the early years of married life followed by attempts to curtail family size in the later years.

Attempts to limit marital fertility may have been increasing, and increasing in their success, amongst Keighley's population during the 1870s, but the textile workers had already mastered the concept, and its execution by 1881.

The value of married women's labour, indeed women's labour in general, to the textile industry and to the households within a textile town has been very evident throughout this study. It is doubtful that it would have gone unnoticed by contemporary textile workers and the rest of their communities. Even families whose menfolk worked in other industries would, in Keighley, have some female relative at work in the mills. The double burden of childbearing and factory work would not have gone unappreciated. It is likely therefore that attitudes to women and their work, and the attitudes of women, changed more rapidly in the textile districts than elsewhere. Other changes in belief and behaviour are equally likely as urbanisation and industrialisation created 'modern' modes of thought amongst those workers in the vanguard of progress. Loss of fatalism and the growth of the ideal of 'self-betterment' were encouraged by the way of life in the nonconformist strongholds of the textile districts. It is very probable that the 'psychological' pathway of the model in Figure 2.10 was in operation amongst the textile population. The evidence we have gathered concerning the poor physical condition of

many of the textile workers and the recurring problem of infant and child mortality makes it seem unlikely, however, that the 'physiological' pathway was not also playing its part, although perhaps a declining part, in influencing the overall patterns of textile fertility to an extent greater than has been previously realised. One factor, the fertility levels amongst Keighley's Irish community (see Appendix C), argues both for and against this. Their fertility in the 25-29, 30-34 and 35-39 age groups in Figure C2. are very high compared with those of the textile population. If the Irish were so very poor, and very unhealthy how were they able to produce such high numbers of children when the Keighley mothers of the same age could not? This suggested that the depressed fertility of the under 35 year olds in Keighley resulted from practices which reduced the number of successful pregnancies. There is also the possibility, however, that, deprived as they were, the Irish had 'newly' arrived from a rural environment and had not long been subjected to the rigours of urban living and factory life which had told on the physique and the constitution of early nineteenth century textile workers and had been passed on to their children and their grandchildren.

If the textile community was restricting the number of its children its methods of doing so will probably never be known with confidence. In the early years of the study period abstinence undoubtedly played a part. It is unlikely in the financial climate of the 1840s and 1850s that expensive contraceptive devices were being used.

Malthus assumed that passion between the sexes remained constant but in times of stress or fatigue libido can falter and reproductive capabilities diminish. Abstinence may not have been

the trial of self-control it is often pictured to be, when both partners were coming home after a minimum twelve hour day with perhaps only six hours sleep until the next shift began. The problem may have been one of conceiving rather than of contracepting. The textile workers may have been more successful at limiting their fertility because their fertility was more easy to limit.

Abortion would certainly have been an option, but it seems unlikely that a woman would choose to suffer repeated abortions, with all the consequences this would have for her health, if her intention was to remain at work as long as possible.

By the 1870s when fertility was being much reduced by older textile couples it is likely that some birth control appliances were in use. Many would have been available, the actual method chosen being dictated by personal preference or circumstance. Gossip, information and advice must have spread quickly 'horizontally' through such a community.

There is no doubt from the figures presented here that textile workers in Keighley were limiting their fertility in a parity specific way well in advance of their working class peers. Be it the result of changes in their environment, of the struggles within their industry or of new attitudes engendered by special circumstances of the era in which they found themselves, they were well before their time. The low overall fertility rates within this one textile town, especially amongst the younger workers, do prompt the belief that sacrifices were being made by the work people to keep the textile machines clacking and whirring and to keep the wheels of progress turning.

The work reported here has several implications for the understanding and future study of the "Fertility Transition".

In Chapter I we stated that we were seeking to understand "the mechanisms which precipitated whole populations into a new era of small families, with all the attendant sociological and psychological changes which that entailed". Reduced marital fertility was, we now realise, as much a product of the sociological and psychological changes brought by the new methods and practices of production following in the wake of the "Industrial Revolution", as it was their predecessor.

The term "revolution" conveys the impression of a sudden, quick-acting and widespread event. The major processes involved in the Industrial Revolution were, however, relatively slow, although those caught up in them no doubt found their lives altered rapidly and dramatically in many ways. Such changes did not affect all members of society equally, nor simultaneously, and reaction to them could not be expected to be instantaneous, evenly distributed nor exactly the same in every community.

The textile workers of Britain were certainly amongst the first to experience the full impact of industrialisation; there was little previous experience of the conditions with which they had to contend, conditions which we now take for granted and seldom question. Take 'time' for instance. Today we live by the clock, working a "nine-to-five" day, everyone wearing a watch. We find it difficult to imagine a society where time was measured by the sun passing overhead, by the changing seasons. The change from such a society to our own was accomplished, to a large degree, by the introduction of machinery into the workplace; machinery which would start at a given time, and would stop at a given time and in between had to be constantly tended by human "hands". 'Time' became precious, especially in households where mothers had to fit their household duties around paid employment.

We can speculate that perhaps, if the middle classes grew to see their children as expensive in money terms, the working class came to regard children as a demand on time. Could this have been one reason for the textile workers' desire to limit their fertility before the restrictions on children's work curtailed the ability of youngsters to "keep" themselves, the reason previously given for the adoption of birth control techniques by the working classes. This is only one possible example of the many changes which must have been occurring over the course of the nineteenth century. A mainly quantitative study such as this cannot do justice to such processes, being unable to measure the beliefs and perceptions creating the behaviour patterns which can be quantified. Until the cultural milieu in which the measurements are taken is fully appreciated, we can never be certain of the rationale behind observed changes in behaviour. In our post-permissive age, for instance, we often mock "Victorian prudery" which left young people untaught about sexual matters and women to praise their husbands for "not bothering them too often". In an age when contraception was unreliable, unobtainable or 'taboo' such attitudes may have developed to help suppress fertility. We can see a mirror image of this process when the oral contraceptive opened the way for the "permissive society".

Further changes wrought by the "Industrial Revolution" remain to be more fully explored. The physiological impact has long been hinted at but not fully documented, possibly because, again, local variations created contradicting and confusing evidence. Despite our fears that the restrictions of "measurability" straitjacket our interpretations of the processes underlying the Fertility Transition, further quantitative work is needed in various types of community and amongst different occupational or even ethnic groups to enable us monitor the

dimensions of the "Fertility Transition" in space and time. We do not yet know, for instance, whether any other working class group was experiencing fertility levels as low as those of the textile workers in the middle of the nineteenth century, or whether the textile community acted alone. If they did act alone did fertility controlling behaviour disseminate outwards from the textile centres or did it spring up spontaneously in other areas as the impact of the new ways of life struck there?

Before more 'local' studies are undertaken, using the census enumerators' books, the methods of measurement require reconsideration and honing.

The use of standard fertility schedules is robust, if the standard can be accepted to represent the fertility experience of the population under consideration, and if the fertility levels calculated from the enumerators' books are themselves accurate. The problems of using point-in-time data when dealing with longitudinal phenomena have been emphasised by this study. Changes in occupation over time, and the question of singulate mean age at marriage being affected by differential migration are just two examples. The impressions given by the two perspectives can be confusing and contradictory. This urges caution in future analyses, and a need for greater use of linkage technique with census material.

Finally, if the census enumerators' books are to yield accurate measures of fertility behaviour then a great deal more needs to be known about local infant mortality levels. Some attempt can be made to counteract the lack of information, but its accuracy can be difficult to gauge. Variations in infant mortality between and within cities, towns and rural districts are not yet fully understood. They, as well

as fertility rates, await further research.

The enigma of textile workers' historic fertility patterns has been examined by this study, and some progress has been made towards unravelling its components. The intracacies of the relationships revealed would seem to suggest that the final exposition of the complex entity which was the "Fertility Transition" still remains well in the future.