
Urban family reconstitution—a worked example

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Abstract

Family reconstitutions have been undertaken only rarely in urban settings due to the high mobility of historical urban populations, in both life and death. Recently Gill Newton has outlined a methodology for the reconstitution of urban populations and we applied a modified version of this method to the large Westminster parish of St. Martin in the Fields between 1752 and 1812, a period that posed particular difficulties for family reconstitution because of the rapid lengthening of the interval between birth and baptism.¹ The extraordinary richness of the records for St. Martin in the Fields made it possible to investigate burial and baptismal practices in great detail, and the extent and impact of residential mobility. We found that short-range, inter-parochial movement was so frequent that it was necessary to confine the reconstitution sample to windows in which families registered events at a single street address. Using birth interval analysis and the frequencies of twin births it was possible to demonstrate that the registration of birth events was fairly complete, but that many infant and child burials were missed. These missing burials probably resulted from the unreported export of corpses for burial in other parishes, a phenomenon for which we had considerable evidence. The limitations of family reconstitution in this highly mobile and heterogeneous urban population is discussed and we demonstrate some checks and corrections that can be used to improve the quality of such reconstitutions.

Introduction

Historically urban populations exerted an influence on national demographic trends out of all proportion to their share of the national population. During the ‘urban graveyard’ period of the seventeenth and early eighteenth centuries Wrigley famously estimated that half the natural increase of the national population was consumed by London’s high death rates.² However despite their importance, we still know relatively little of demographic trends in cities and large towns before the late nineteenth century, honourable exceptions being the work of Finlay, Landers, Galley and Newton.³

¹ G. Newton, ‘Recent developments in making family reconstitutions’ *Local Population Studies*, 87 (2011), 84-89. See G. Newton, ‘Family reconstitution in an urban context; some observations and methods’, *Cambridge Working Papers in Economic and Social History* 12 (2013) for greater detail regarding methodology.

² E.A. Wrigley, ‘A simple model of London’s importance in changing English society and economy 1650-1750’, *Past and Present*, 37 (1967), 44-70.

³ R. Finlay, *Population and metropolis: the demography of London 1580-1650* (Cambridge, 1981); J. Landers, *Death and the metropolis: studies in the demographic history of London 1670-1830* (Cambridge, 1993); C. Galley, *The demography of early*

Urban populations are notoriously difficult to study demographically mainly because of the high mobility of individuals. We also have very few censuses of towns and even fewer that give ages. Therefore, although towns often supply burial data by age and cause, details that were almost never recorded for rural populations, we cannot convert these to age-specific mortality rates (deaths per thousand persons at risk), especially given the often sex-skewed and adult-heavy age structures of urban centres. The most robust methodology for estimating demographic rates in this situation is family reconstitution, a method applied very successfully in single parish studies of rural or small market town populations. In these smaller communities the relatively stable portion of the population can be followed virtually from birth until death (with the exception of early adulthood, where temporary labour migration was almost the rule) and families can in some cases be studied over generations. This is not generally possible in all but the smallest urban populations for several reasons. First, the sheer size of the population in a major town or city makes it impossible to assume that two records of individuals with the same name refer to the same individual, in the absence of additional corroborating information. Second, there was a high turnover of urban populations. Urban populations grew mainly by in-migration in the early modern period and migrants could comprise a majority of the population when growth was rapid. Moreover, migration flows were large not only into but also out of towns and this makes it very unlikely that many individuals can be followed from baptism to adulthood. Third, residential mobility (the propensity of individuals to change address) *within* towns was high. These residential moves often involved moving only a couple of streets away, but this could easily include crossing a parish boundary in towns which comprised many parishes. This issue is particularly problematic in London (see below).

These limitations to urban family reconstitution became much more severe in the course of the eighteenth century with the rise of non-conformism and the increasing ‘fluidity’ of registration practices, in particular the lengthening delay between birth and baptism, and the development of a robust inter-parochial market for burials, at least within London. Therefore, apart from small market towns, the few urban reconstitutions carried out to date have been confined to the period before 1750—the notable exception being John Landers’ study of London Quakers where these problems were averted because Quakers scrupulously recorded membership and births and deaths rather than burials and baptisms.⁴ The results presented here therefore represent a first attempt to reconstitute a metropolitan parochial population in this most problematic period of urban demography. The population of St. Martin in the Fields appears to have included very few non-Anglicans at least with respect to registration practices;⁵ however, the fulsome Anglican records of the parish provide ample evidence of the very diverse and changeable registration practices that bedevil urban historical demography in this period.

St. Martin in the Fields

modern towns: York in the sixteenth and seventeenth centuries (Liverpool, 1998); G. Newton, ‘Infant mortality variations, feeding practices and social status in London between 1550 and 1750’, *Social History of Medicine*, 24 (2011), 244-59.

⁴ Landers, *Death*, chap. 4.

⁵ J.P. Boulton, ‘Traffic in corpses and the commodification of burial in Georgian London’, *Continuity and Change* 29,(2014), 189.

St Martin in the Fields was a very large metropolitan parish in several senses, with an area of 286 acres and a population of c.25-30,000 throughout the period 1750-1821. Although the parish was well known for its fashionable housing and elite residents (including the royal residence of Carlton House), its sheer size meant that it resembled a large town in its range of economic functions and its male occupational structure was similar to that of London as a whole.⁶ The presence of many wealthy families was associated with substantial numbers of female domestic servants and an excess of single adult women, and in 1803 its workhouse was the third largest in London.⁷

The parish is outstanding for the quality and richness of its Anglican records. In addition to the burial and baptism registers, the sextons' burial books and the christening and marriage fee books survive for most of the period 1752-1812.⁸ The baptism fee books recorded dates of both birth and (public) baptism, making it possible to trace the very substantial lengthening of intervals between birth and baptism over the last quarter of the eighteenth century.⁹ The inclusion of birth date, a relatively unusual feature in most baptism registers, was crucial to family reconstitution in this period. Where public baptism was often delayed for months after birth, date of birth information made it possible to assign a correct birth date for calculation of mortality rates and birth intervals. The fee books also recorded parents' names, street address and the fee paid for baptismal registration. The street address information also proved crucial both in linking events within families, and in determining whether families remained 'in observation' within the parish.

The sextons' books recorded age and street address of the deceased, cause of death, and the fee paid for burial. 'Stillborn' and 'abortive' burials were also recorded. These details are very rare and were essential to successful family reconstitution. Age at death of young children was given in days, weeks or months, and together with date of birth (and street address) made it possible to make confident links between baptisms and burials. Where burials were exported to other parishes for burial, certificates were supposed to be issued, and details of these burials and the fee for certification recorded in the sextons' books.¹⁰ This made it possible to link individuals in reconstituted families to their burials even when these occurred outside the parish. However, as discussed below, not all exported burials were recorded in the sextons' books. In order to address this potential omission the burial registers of adjacent parishes were also searched for burials of St. Martin's residents but, unfortunately, only three, St. Giles in the Fields, St. Anne Soho and St. Paul Covent Garden, recorded abode, enabling St. Martins residents buried there to

⁶ Based on a comparison of male occupations listed in the baptism registers of St. Martin's and in Middlesex as a whole, 1813-18, and occupations of grooms resident in St. Martin's and grooms from London as a whole, marrying at the Fleet Prison 1750-52, (Cambridge Group Occupational Structure of Britain project, data not shown).

⁷ 'An abstract of the answers and returns made pursuant to Act 43 Geo. 3, relative to the expense and maintenance of the poor in England' Parliamentary Papers, House of Commons XIII (1803-04).

⁸ The sextons' books survive in complete form from 1752-1812, with some periods of incomplete recording of causes of death. There was a gap in the baptism and marriage fee books between 1 June 1765 and 22 March 1769 that was filled from the parish registers, which recorded date of birth but omitted street address and fee.

⁹ See J. Boulton and R.J. Davenport, 'Few deaths before baptism: clerical policy, private baptism and the registration of births in Georgian Westminster: a paradox resolved', *Local Population Studies* 94 (2015), 28-47, for a discussion of baptismal practices in the parish. Many children were baptised privately soon after birth, but were not publicly baptised, and registered as such, until many months had elapsed.

¹⁰ Boulton, 'Traffic in corpses', 187-8.

be identified (see below). In the period 1752-1812 63,229 burials were recorded in the sextons' books, and 44,385 baptisms in the baptism fee books or registers.¹¹

Reconstitution methodology

The difficulties of establishing confident links between records referring to individuals of the same name made it unfeasible to attempt to derive age-specific fertility and mortality rates except for mortality rates of very young children.¹² Moreover the high mobility of families made it impossible to capture a couple's full reproductive history in most cases. Many or most couples married elsewhere before moving into St. Martin's (or chose to marry in another different parish despite residing in St. Martin's for reasons of fashion, economy or family ties). In these cases it was not possible to discover whether the first baptism observed to a couple in the parish was in fact the first baptism within the marriage. Therefore, rather than starting a reconstitution family with the marriage of a couple, as is conventional, it was necessary to reconstruct each family from the sequence of baptisms of children to a couple named in the baptism register. In many cases only two or three baptisms could be linked in this way, and it was unknown whether the family had moved out the parish after the last observed baptism, or whether this constituted the end of the couple's reproductive career.

The steps involved are set out below.¹³ Forenames and surnames were standardised using a modified version of the 'Double Metaphone algorithm', which groups names that are phonetically similar.¹⁴ The most common surnames, Smith and Jones, were excluded. The standardisation of names made it possible to create initial links between records with the same standardised names automatically. However the standardisation process was deliberately designed to create relatively large groupings of surnames, to avoid missing any links between name variants as a consequence of variant spellings. This meant that automated linkage generated a relatively large number of 'false positive' matches. The most extreme example was the standardised surname group 'WT', that included the surnames White, Whyte, Wyatt, Whitty, Withy, Wait, Weate, Weight, West, Wade and Wood. Obviously the automated links between some of the surnames in this group were highly implausible, but these could only be identified by manual checking. Therefore all automated links were checked manually for plausibility.

1. Baptism—baptism linkage. The (partial) family was reconstructed from successive baptisms of children identified as born to the same couple by the standardised fore and surnames of the parents recorded in each baptism record. The baptism records recorded date of birth as well as baptism and baptisms were linked only if the spacing between successive births in a family (the 'intergenesic interval') was above a biologically plausible minimum of nine months and less than ten years.

¹¹ These datasets have been deposited in the ESRC data archive.

¹² Finlay, *Population and metropolis*, 45; Newton 'Reconstitution in an urban context'.

¹³ These steps do not include the requirement that all events in a family shared the same street address. This constraint was imposed after the reconstitution was assembled, and is described in the next section.

¹⁴ Newton 'Reconstitution in an urban context'.

2. Baptisms were then linked to burial records with stated age five years or under and occurring within six years of the birth of each child. In the case of child burials the St. Martin's records contained one outstanding deficiency; they omitted the names of parents. However they did record age at death and this made it possible to match child burials to baptismal records on the basis of an approximate match between age at death and the age of the baptised child at the same date. The degree of mismatch allowed between age based on birth date and age at death depended on the precision of the age at death record, and was small for infants where age was given in days, weeks or months, and larger at older ages where age at death was often given only in whole years. Matching burials to baptisms was performed using the full parochial baptism dataset to avoid biasing linkages towards reconstitution families.

3. Baptisms were then linked to burials with *no* stated age occurring within five years after the birth of each child. These were almost all burials that were exported from the parish. Age at burial was not recorded for exported burials in the sextons' books before 1767 and was also absent throughout the period 1752-1812 for burials of St. Martin's residents recorded in adjacent parishes, but not recorded in the St. Martin's sextons' books. It was however possible to identify child burials, because all burials were marked as child ('C'), adult ('M' or 'W') or stillborn ('S'). Child burials with no further age information were linked to reconstitution families where a baptism of the same name existed and where the street address, if given, matched one or more baptisms in the family closest to the date of death (that is, where there was evidence that the family was resident at the street address matching the burial around the time of burial). Age at death was then calculated from the dates of birth and burial.

4. Burials with no match to a baptism were then considered for inclusion in the reconstitution. The often long intervals between birth and formal registration of baptism meant that many children died before baptismal registration (although almost all except those dying in the first few days of life had been named and probably privately baptised).¹⁵ There were two categories of child burial with no baptism that could potentially be included in a reconstitution family:

- a. Stillborn burials. There was a marked dearth of burials of newborn infants in St. Martin's, and a surfeit of 'stillborn' and 'abortive' burials. We considered that stillborn but not abortive burials included a very high proportion of live-born early neonatal deaths.¹⁶ These infants had not been baptised in any sense and had no forename. Where a sufficient gap existed between baptisms in a reconstitution family we inserted a stillborn burial into the family if it matched the surname and additionally the street address of at least one flanking baptism. Stillborn burials were assigned a date of birth three days before the date of death (three days being the most common interval between death and burial) and were given an age of half a day for event history analysis—that is they were assumed to be live-born and to have lived half a day on average.¹⁷

¹⁵ Boulton and Davenport, 'Few deaths'.

¹⁶ Boulton and Davenport, 'Few deaths'.

¹⁷ Stillborn burials represented 15 per cent of infant burials in the parish as a whole, but only 5 per cent of infant burials incorporated into the reconstitution sample. Their inclusion was likely to compensate only partially for the dearth of neonatal deaths in the sample and was very unlikely to cause an overestimation of neonatal mortality.

- b. Burials of children with stated age at death and no matching baptism. Burials of children aged two and under and not matched to a baptism were matched where possible to baptisms of putative siblings (using the full baptism database) on the basis of surname.¹⁸ Where such burials appeared to belong to a reconstituted family then the burial was incorporated into the family if there was a suitable gap in the baptism series and if the address at burial matched the address of one or other event in the family that immediately flanked the burial. Where these criteria were met then a 'dummy' birth was created for the dead child based on the age at death, and the birth inserted into the family between existing baptisms. The insertion of burials and dummy births was restricted to burials with exact age because it was considered too tenuous to assign a date of birth and age at death to burials of unknown age in the absence of a baptism record.¹⁹

5. The final step in the reconstitution process was to link couples named in the baptism registers to their marriages using the marriage fee books and marriage registers for the parish of St. Martin's and also marriages registered at the Fleet prison for the period before 25 March 1754, when Hardwicke's Marriage Act came into force. Marriage entries which recorded one or both partners from St. Martin's were linked to couples on the basis of groom's surname and the forenames of groom and bride. Only marriages occurring in the six years before the earliest baptism in a family were linked to a family (although the initial linkage exercise relaxed this rule to allow for the possibility of false linkage of baptisms or retrospective legitimation of baptisms). Only 23 per cent of reconstitution families could be linked to a marriage record.

6,740 families were partially reconstituted in this way and these contained 23,127 baptisms and 6,659 burials of children aged under five. Families remained in observation from marriage or the birth of their first child in the baptism series until the date of the last baptism in the series, and children were not followed beyond the age of five.²⁰

Assessment of the accuracy of record linkage

The reliability of any family reconstitution depends critically not only on the registration processes underlying the records used, but also on the completeness and accuracy of the linkages created between those records. With respect to completeness of linkage the issues are: (1) whether all records relating to an individual were identified as such and linked together, and (2)

¹⁸ Burials aged 0-5 years and of unknown age were linked to their *own* baptisms in steps 2 and 3. However only burials aged 0-2 years and with *no* baptism match were linked to sibling baptisms and assigned dummy birth dates. The more stringent age restriction for burials with no matching baptism was imposed because few birth-baptism intervals exceeded two years, and therefore children dying older than two years without a baptism record were likely to have been baptised outside the parish, implying an unobserved migration event. This issue is discussed at length in the next section.

¹⁹ The usual practice in parishes where baptism generally followed very closely after birth and where no age at death or baptism was recorded is to assign a child burial of unknown age a dummy baptism with the same date as the date of burial. This was not possible in St. Martin in the Fields because the potentially long delays in baptism and the very high death rates throughout childhood made it dangerous to assume that unbaptised burials were confined to the very young.

²⁰ The exact rules for determining when families entered observation were complex and will be set out in a future publication.

whether all individuals in the database that belonged to a given reconstitution family were in fact linked to that family. A third issue is whether the links created between individuals and between events were correct (that is, were all individuals included in a reconstitution family in fact members of that family, and did burial or marriage entries indeed belong to the same individuals identified in the baptism records?). We could not readily assess whether burial records indeed belonged to individuals baptised with the same name, except by the criteria employed for creating the links themselves. However for the period 1813-24 we could assess the completeness and accuracy of the linkages between baptisms used to construct proto-families (step 1 above). The reconstitution was initially extended to 1824 but changes in registration practices after 1812 (in particular the frequent failure to record birth dates in the baptism register) meant that these data were not used for analysis. Occupational information was supplied for most fathers after 1812, in accordance with Rose's Act. This information was not used in the original linkage process to assess the likelihood of baptisms belonging to the same couple (step 1 above). Therefore it could be used to assess the plausibility of proto-families constructed using nominal and address evidence. Of course this test only applied to baptisms linked to reconstitution families after 1812. However the criteria for record linkage and the process of linkage were the same for all data from 1752-1824, and therefore these results gave a reasonable indication of the quality of record linkage for the reconstitution as a whole.

We used paternal occupation recorded in the baptism entries to test for the erroneous inclusion of baptisms in a reconstitution family ('false positives'). This could occur where two couples with the same names co-existed in the parish but were not readily distinguished in the baptism records. The extent of false positives could be tested by comparing father's occupation as recorded for successive baptisms within proto-families. 'Error' was assessed as the presence in a proto-family of a baptism with a father's occupation that was incongruous with the other occupations (false positive). Of 1,609 proto-families with two or more entries with occupations stated after 1812, 1,410 (87.6 per cent) contained only matches or near matches (e.g. 'shoemaker' and 'cordwainer', or 'jeweller' and 'goldsmith'). In a further 145 families (9.0 per cent) there was some ambiguity in paternal occupations. Most of these ambiguous cases consisted of fathers with exactly the same fore- and surnames, and with the same street address (including the number of the house, which was given for most entries in this period), but with apparently incongruous occupations. An example is given in Table 1. It was difficult to assess the validity of the proto-family in these instances, but in most cases it seemed very likely that the differences in occupational descriptor were a function of genuine occupational mobility rather than false linkage. It seems more probable for instance that the Thomas Leonard who resided at number 7 Hungerford Market and baptised five children at very regular two yearly birth intervals was a single individual who was simultaneously or sequentially employed as a revenue officer and hatter, rather than that two men of the same name with wives named Mary residing intermittently or concurrently at the same house. In a further 54 cases (3.4 per cent) there was substantial incongruity between given paternal occupations, as in the case of the Kocher family in Table 2. It seemed plausible that the couple Charlotte and Henry Kocher were in fact a consistent pair of individuals, given that this was the only example of this surname in the database, and that the maternal name was unusual. However these criteria sometimes proved misleading, since otherwise unusual names were often favoured within particular families, so

individuals with very rare names (such as Charlotte Kocher) were not necessarily unique. Therefore the Kochers were scored as a case of probable false linkage of baptisms.

[Tables 1 and 2 about here]

We also used paternal occupation to assess whether some baptisms were incorrectly omitted from reconstitution families ('false negatives'). This could occur because the name standardisation process failed to group correctly all the name variants used by the family, or because some entries were mis-transcribed and so were not recognised as belonging to the same name group as other entries for the family. Using the full dataset of parochial baptisms 1813-24 we compared paternal occupations of baptisms linked together within reconstitution families with unlinked baptismal entries that met only two of the three criteria used to make a nominal link between baptisms. These criteria were:

- (1) a family name in the same name group as other entries in the reconstitution family;
- (2) a paternal forename in the same name group as other entries in the reconstitution family;
- (3) a maternal forename in the same name group as other entries in the reconstitution family.

The omission of a baptism was considered likely if paternal occupation was similar or the same in an unlinked baptism entry as paternal occupation given for baptisms within the reconstitution family, and if the parental names were a plausible match. In the Mackintosh family, see Table 3, the baptism of Alexander Mackintosh was omitted in the linkage process because his father's name in this entry, Collum, was not identified by the name standardisation algorithm as belonging to the same name group as the other forename variants (Colyear, Colyare). Using this method we identified missing entries in only 23 families (1.4 per cent). Most of these were cases where the forename of one parent was not recognised as consistent.

[Table 3 about here]

Comparison of father's occupation recorded for baptisms linked to proto-families, and amongst excluded but eligible baptisms, indicated a potential error rate of *c.*5 per cent, with most of these false inclusions probably not belonging to the family. If the period 1813-24 was representative of the quality of the reconstitution as a whole, then less than one in twenty five families would have included the baptism of a child or children not belonging to the family, and less than one in fifty would have a gap in the sequence of baptisms resulting from a failure to link an existing baptism to the family. In the event it proved necessary to confine all proto-families to those baptisms occurring sequentially at the same address (see below), and so even the relatively low level of mis-linkage identified here will be an overestimate.

This exercise also suggested that where a number of variables can potentially be used for linkage (such as address, occupation and familial relationships) it can be useful to exclude one variable (such as occupation) from the linkage process, so that it can then be used later to assess the

validity of the links made. The process of linking baptismal records to form reconstitution families appeared fairly robust. However a more fundamental issue was whether the underlying records provided a fair record of events within reconstitution families. A persistent criticism of family reconstitution using Anglican registers has been that many demographic events were omitted from the registers through sheer clerical negligence. In St. Martin in the Fields there were additional reasons for thinking that many births and child deaths that occurred within reconstitution families were missing from the parochial records not incorporated into the reconstitution, and these are discussed below.

The porous parish: estimation of micro-migration rates

Historically almost all but the smallest towns comprised multiple parishes, but demographers are usually restricted, for reasons of population size and the patchy survival or quality of records, to reconstituting only one or a few parishes. The existence of contiguous, poorly bounded urban parishes outside the parish of interest then constitutes a major problem because a residential ‘micro-move’ of a couple of streets could have taken a family into another parish and out of observation. Most problematically, families may have moved in and out of observation through a series of residential moves, without these moves being recorded. In this case the family could appear to have been continuously resident in the parish, because a series of baptisms was recorded to the family, but some of the baptisms and burials properly belonging to the family may have taken place and been recorded elsewhere.²¹ Figure 1 illustrates the potential for this behaviour in St. Martin in the Fields. In the mid-eighteenth century it was bounded by nine parishes, including the small parish of Covent Garden that was wholly contained within St. Martin’s.

[Figure 1 about here]

To get some idea of the potential scale of inter-parochial mobility we studied the propensity of parishioners to change their residence *within* the parish, using the addresses given at baptism and burial for children dying in the first two years after baptism. Amongst children who were buried in the parish within a year of their baptism, nearly a quarter (23 per cent) had moved within the parish before burial (Table 4). This is higher than most turnover rates estimated from annual listings of householders in seventeenth-century London.²² Moreover, this method is likely to underestimate residential mobility within the parish, because before 1813 the sources recorded

²¹ Conversely, families could move out of a parish but continue to register events at the parish church. We could detect this behaviour in St. Martin’s when the street address recorded in an entry was outside the parish. The registration of events outside the parish of residence was relatively common in the case of marriages and burials (see below), but appears to have been very limited in the case of baptisms in the eighteenth century. In St. Martin’s less than one percent of baptisms recorded extra-parochial addresses before 1795, see Boulton and Davenport. ‘Few deaths’, pp. 40-41. Families giving extra-parochial addresses at burial or baptism were deemed to have left observation.

²² Finlay, *Population and metropolis*, 45-7; J. Boulton, ‘Neighbourhood migration in early modern London’ in P. Clark and D. Souden (eds.), *Migration and society in early modern England* (London, 1987), pp. 107-49.

only street address, not house number or name, and so this method would not reveal moves along the same street. Many of the streets in St. Martin's were indeed very long, with St. Martin's Lane and the Strand traversing the length and breadth of the parish respectively. We cannot estimate the average distance moved within the parish, due to the absence of house-level information and the length of many streets, but the geographical position of St. Martin's within the patchwork of Westminster parishes makes it likely that these kinds of local moves would also have resulted in rapid bidirectional fluxes across parish boundaries.

[Table 4 about here]

Indeed this Brownian-type motion of micro-mobility did appear to distort demographic rates. If we consider the intervals between successive births within reconstitution families, then there was a much higher frequency of long periods between apparently successive births if a change of address occurred between the baptisms, see Figure 2. Where families were known to have moved in the interval between two baptisms then 13.4 per cent of birth intervals were four years or more, compared with 7.4 per cent of intervals when no residential move intervened. This difference in the distribution of birth intervals suggested that some proportion of baptisms in more mobile families may have occurred outside the parish and had been omitted from the reconstitution, leading to the inclusion of birth intervals that reflected the interval between births a and c because the intervening birth b was not observed.

[Figure 2 about here]

An example of this problem is given in Tables 5 and 6. Thomas and Rachel Rustall were living in Newport St when their first child, Thomas, was baptised in October 1786, ten months after their marriage in the parish. Between October 1786 and May 1796 they moved at least five times and baptised five more children, two of whom died in this period and were buried in St. Martin's. The intervals between the first six births were fairly regular (between 18 and 25 months). However after the birth of John Durant (23 April 1796) there was an interval of 65 months to the next *recorded* birth (Ann Catherine Rustall, born 17 Oct 1801), well over double the couple's average previous birth intervals. Such an interval could occur as a consequence of miscarriage or of events that disrupted coital frequency, such as ill health or paternal absence. However, an Ann Rastall from Charles Court, St. Martin's, was recorded as buried in the sextons books in March 1800 aged one year five months. There was no corresponding baptism record for Ann Rustall in St. Martin's, but she was linked to the Rustall family on the basis of surname, a street address in common with the nearest baptism in the family, and a suitable gap in the birth sequence. Her insertion into the family (with a birth date one year five months and three days before her burial) reduced the 65 month birth interval to two more credible birth intervals of 29 and 36 months. The absence of a baptism record for Ann one and a half years after her birth suggests strongly

that she was baptised outside the parish. This accords with the evidence of at least one intervening move within the parish between the baptisms of her flanking siblings (to Church Lane, where John Durant died in 1797). It was possible to detect Ann's birth only because she died and was buried in the parish. However, any children who were born and registered as baptised outside the parish and who survived could not be recovered. Nor can we know whether any of the children in the family died while the family was in another parish and were buried there.

[Tables 5 and 6 about here]

The Rustall family was very mobile, but not necessarily atypical. What is unusual about this case is that we were able to reconstruct so many of their moves. In most cases families only appeared in observation for two or three baptisms before they disappeared from view. What is clear is that this type of mobility resulted in the 'loss' of many events occurring in families that otherwise appeared, according to their sequence of baptisms, to be in observation. Thus, to reduce the proportion of missing events it was necessary to include families in the reconstitution only so long as they remained at the same street address. When this rule was imposed then the proportion of long birth intervals was reduced to levels similar to those observed in more robust reconstitution samples.²³ The number of families in this 'stable' sample was reduced to 5,560, 382 of whom appeared exactly twice at different addresses, and a further 40 at three different addresses. A higher proportion of families consisted of only two births (Figure 3). Therefore the removal of migration events resulted in a very significant loss of observations, because in the case of families with just two births, only the first could be considered to be in observation and at risk of dying, and the period of observation extended only until the baptism of the second child. This is just one example of the more general limitations attending this type of partial reconstitution, where the parity of children is rarely known, the age of the mother is always unknown (unless given in marriage records), and the last observed birth must perforce be excluded from analysis in the absence of other means apart from baptism for ensuring that the family remained in observation.

[Figure 3 about here]

Migration after death—clandestine burials and the traffic in corpses

²³ Space precludes a full discussion of this issue here. Very briefly, given estimates of fecundability in the English population in this period, E.A. Wrigley, *Poverty, progress, and population*, Cambridge (2004), pp. 406-10, estimated that around 1.8 per cent of birth intervals following the early death of an infant would be longer than five years, if registration of births were complete. Using a different method Chris Wilson estimated that two per cent of birth intervals in the analogous cases between marriage and first birth would exceed five years (see Wrigley, *Poverty*, p. 407). Among 'stable' families in St. Martin's 1.0-2.1 per cent of birth intervals following the death of an infant in the first year of life were longer than five years, implying fairly complete capture of births in the sample.

Even where a family could safely be assumed to have been living continuously in the parish, it remained evident that many deaths within these families went unrecorded. There were several reasons for this, discussed in the sections below, but the most prominent was again a consequence of the geographical position of St. Martin's within the patchwork of Westminster parishes. Even where families remained living in the parish, family members could escape across a parish boundary after death if their corpses were exported for burial in another parish. As described above, exported burials were meant to be certified by the parish of residence in London in this period, and the charge for this was recorded in the sextons' books. However, as Boulton and Schwarz have demonstrated, some parishes operated 'clandestine' burial grounds that attracted large numbers of uncertified burials from other parishes. Soho, contiguous with the northern boundary of St Martin's, operated such a burial ground before 1791.²⁴ Fortunately the Soho St. Ann's burial register recorded the parish of residence and so the burials of St. Martin's residents could be recovered despite their absence from the St. Martin's sextons' books. 81 per cent of St. Martin's residents recorded as buried in Soho 1747-1825 were not recorded at all in the sextons books of St. Martin's.²⁵

Table 7 gives an interesting example of the use of Soho as a clandestine burial ground. William and Margaret Reynolds first appeared in the parish records in July 1765 and then baptised ten children in the parish over the next eighteen years. Baptism fees were not recorded for the first two baptisms (because the fee books were missing in this period and were substituted with baptism register entries), but a fee of one shilling and sixpence was recorded for baptisms 3 and 4. This was the standard fee for a public baptism and was associated with families who were poor but not paupers. Four children with names matching those of the first four children and recorded as residents of St. Martin's appeared in the Soho burial register in this period (but not as exported burials in the St. Martin's sextons' books), and these were linked to the Reynolds family. The fifth child, Richard, was baptised in May 1772 and from this point until the tenth baptism the family was described in the baptism fee book as 'poor' and excused baptism fees. Two of the children born in this period died and were buried in St. Martin's, in the lowest category of burial fees. Without the recording of abode in the Soho register we would have detected only these two of the six child deaths in this family. The family had apparently lost its pauper status by August 1783 when the last child, Robert, was baptised. One plausible explanation for the patterns of burials observed here is that while the family was considered non-pauper by the parish it was possible, and probably cheaper, to evade burial (and payment of an export fee) in St. Martin's and to use the Soho burial ground. However, once the family was accorded pauper status for the purpose of baptism fees then they may have been subject to closer scrutiny by parochial officials making it harder to avoid registering burials in St. Martin's. Alternatively or additionally the family may have been offered cheaper burial fees in the parish than was the case when they were not considered poor.

[Table 7 about here]

²⁴ J. Boulton and L. Schwarz, 'Yet another inquiry into the trustworthiness of eighteenth-century London's Bills of Mortality', *Local Population Studies* 85 (2010), 28-45.

²⁵ Boulton, 'Traffic in corpses', 192.

In the case of the Reynolds family it was possible to reconstruct most and possibly all child deaths in the family, because the Soho burial register recorded the parish of origin of burials. The registers of St. Giles in the Fields and St. Paul Covent Garden similarly recorded parish of origin, however the registers of the other parishes adjacent to St. Martin's did not. Therefore, burials of St. Martin's residents that were exported to these parishes for burial could not be recovered except where these exports were recorded in the St. Martin's sextons' books. Space precludes a demonstration of the impact of unrecorded and undetected burial exports on the completeness of burial capture within reconstitution families. However the application of Henry's technique of birth interval analysis indicated substantial under-recording of burials of baptised children from reconstitution families.²⁶ Henry's method also made it possible to estimate and adjust for the impact of this type of under-recording on calculations of infant and child mortality, an analysis that will be presented elsewhere.²⁷

[Figure 3 about here]

Completeness of capture of burials of infants dying in the early neonatal period

The evidence of high residential mobility amongst reconstitution families, and of under-registration of exported burials, made it very likely that some proportion of events occurring within reconstitution families was missed. In the case of events missed due to unobserved residential moves, we could largely avoid this type of omission by restricting analysis to events occurring at a single street address. With respect to missing burials of *baptised* children we could estimate the extent of omission of burials using birth interval analysis. However the age group usually considered at greatest risk of under-registration in the historical record is very young infants. This group was at greatest risk of dying before baptism, and where the burial of unbaptised infants was not recorded, then neither the births nor the deaths of these infants could be retrieved from baptismal or burial records. It was with respect to these infants that the sextons' burial books of St. Martin's proved particularly rich, because the burial of 'stillborn' infants was recorded.

As we have argued elsewhere, 'stillborn' burials in St. Martin's consisted mainly of live-born but unbaptised infants.²⁸ This conclusion is based on the relative rarity of burials of children aged less than one week at death, and the superabundance of 'stillborn' burials. The first day of life is statistically the most dangerous, and mortality rates drop rapidly with every hour a newborn infant lives over the first few days of life. Therefore, the virtual absence of burials of day old infants in the burial register and sextons' books implies severe under-registration of deaths in this

²⁶ L. Henry, *Manuel de démographie historique*, (Paris, 1967); R.J. Davenport and J. Boulton, 'Infant feeding practices and infant mortality by social status in St. Martin in Fields, 1752-1812', unpublished paper. For an elegant demonstration of Henry's method, see E.A. Wrigley *et al.* *English population history from family reconstitution 1580-1837*, (Cambridge, 1997), pp. 99-106.

²⁷ Davenport & Boulton, 'Infant feeding practices'.

²⁸ Boulton and Davenport, 'Few deaths'.

age group. However, a failure of parents to register early neonatal deaths is inconsistent with their apparent assiduousness in registering the deaths of stillborn infants. The most plausible explanation is that most of the infants who died in the first few days of life were unbaptised, and that the term 'stillborn' was used to describe this state. Stillborn burials were not recorded in the burial register, but the burial, and the fees paid for interment and the attendance of the minister, were recorded in the sextons' books.²⁹ This information, together with street address of the parents, made it possible to incorporate some of these stillborn burials into reconstitution families (step 4a, above).

To test the extent to which early neonatal burials (and associated births) were still missing after the inclusion of stillborn burials in the reconstitution, we examined the proportion of twin births in the sample.³⁰ Multiple births were and are still subject to much higher mortality than singleton births, and excess mortality is highest during and immediately following birth, due to the greater difficulties of delivery and the higher incidence of low birth-weight and prematurity in multiple births. Therefore, multiple births were more likely than singleton births to result in very early neonatal deaths, and so a deficit of twins in the reconstitution would suggest that the capture of very early deaths was incomplete. Wrigley *et al.* found twin births to represent 1.36 per cent of all maternities ending in live birth in their sample, a figure that compared favourably with the 1.18 per cent of cases where both twins were born alive in the Registrar-General's data for England and Wales 1950-54.³¹ In St. Martin in the Fields the percentage of birth events that gave rise to live-born twins ranged between 1.59 and 1.31 per cent, see Table 8. These values were within the range expected if both live-born twins in any pair were registered (either at burial or baptism), suggesting that relatively few early neonatal burials were missed from the sample.³²

[Table 8 about here]

The relative completeness of capture of burials of unbaptised children is at first glance surprising given the evidence that many burials of baptised children escaped observation due to the practice of clandestine export of corpses. However there was a distinct age pattern to exports, at least amongst those recorded in the sextons' books (Table 9). Few burials of early neonates (infants in the first week of life, including stillborns), and only 15 of 1,257 stillborn burials (1.2 per cent) were recorded as exported. If we can assume that the characteristics of burials exported and unreported to the sextons were broadly similar to those exported and recorded as such in the

²⁹ Fees for 'abortive' burials were lower because they included only the interment fee, suggesting that this category included only dead-born (true stillborn) infants. Boulton and Davenport, 'Few deaths'.

³⁰ Biometric analyses will be reported elsewhere, however where the proportion of infant deaths that occurred in the first month of life may be expected to have been relatively low, as in the extreme disease environment of eighteenth-century London, then the proportion of births that were twins is a more sensitive measure of capture of 'endogenous' infant mortality.

³¹ E.A. Wrigley *et al.*, *English population history*, 243.

³² Despite the apparent fall in the percentage of twin births after 1774, the differences in percentages between the first and subsequent periods were not statistically significant when tested by pair-wise two-tailed z-tests ($P > 0.2$ in each case).

sextons' books then it seems likely that the unrecorded export of burials was a problem that affected mainly the capture of burials of older (baptised) infants and children.

[Table 9 about here]

Conclusions

The second half of the eighteenth century is a notoriously difficult period for the study of English urban demography.³³ The richness of the records for St. Martin in the Fields in this period reveals some of the extraordinary complexity of residential patterns and registration practices in this period, when birth-baptism intervals lengthened dramatically and a very lively and often clandestine market for burials operated in the capital. However, the quality of the records also made it possible to estimate and to adjust for some of these problems. Crucially, the recording of street address in burial and baptism entries made it possible both to estimate residential mobility rates and to exclude events that followed a change of address. This procedure reduced the risk of unobserved exits from the parish and helped to ensure that families included in the reconstitution were indeed in observation. The sextons' burial books were invaluable in several ways: they provided information on burial export practices, and they recorded stillborn burials, most of which were in fact unbaptised live-born neonates. The inclusion of stillborn burials made it possible to capture most early neonatal deaths, in an age group that is usually the most elusive in the historical record. However, birth interval analyses suggested that large numbers of burials of baptised infants were missing, a conclusion supported by the evidence from the registers of adjacent parishes of a significant clandestine export of corpses for burial. The size of the deficit of burials caused by this phenomenon can be estimated and will be used to adjust mortality rates. We argue therefore that where registration was sufficiently detailed, and where non-conformism was not a major factor, then partial family reconstitution of urban populations in the late eighteenth century can be viable despite the high mobility of metropolitan residents and deficiencies of Anglican registration in this period. Conversely, where there is inadequate information on age at death, date of birth and abode, then family reconstitution is probably unfeasible.

Acknowledgements

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³³ J.T. Krause, 'The changing adequacy of English registration, 1690-1837' in D.V. Glass and D.E.C. Eversley (eds.), *Population in History* (London, 1965), 379-93; Galley, *Demography*, chapter 7; S. Basten, *Registration practices in Anglican parishes and dissenting groups in northern England, 1770-1840* (unpublished University of Cambridge Ph.D. thesis, 2008).

Table 1. Example of a family with ambiguous paternal occupations recorded in baptism entries

Surname	Mother's forename	Father's forename	Child's forename	Paternal occupation	Address	Baptism date
Leonard	Mary	Thomas	Edmund	Revenue officer	7 Hungerford Market	14 Mar 1815
Leonard	Mary	Thomas	Sarah	Hatter	7 Hungerford Market	5 Feb 1817
Leonard	Mary	Thomas	Ann	Hatter	7 Hungerford Market	18 Apr 1819
Leonard	Mary	Thomas	Elizabeth	Hatter	7 Hungerford Mkt	24 Jun 1821
Leonard	Mary	Thomas	Frederick	Excise officer	7 Hungerford Market	30 Jun 1823

Source: Family reconstitution of St. Martin in the Fields. City of Westminster Archives Centre (COWAC) Baptism Fee Books, Accession 419/210-227; St. Martin in the Fields sextons' burial books, CWAC, Accession 49/123,233-244, F2469; St Martin in the Fields Baptism and Burial Registers.

Table 2 Example of a family with dissonant paternal occupations recorded in baptism entries

Surname	Mother's forename	Father's forename	Child's forename	Paternal occupation	Address	Baptism date
Kocher	Charlotte	Henry Ernest	Charlotte	Cabinet maker	15 Russell Ct Drury Lane	1 Jul 1813
Kocher	Charlotte	Henry	Emma	Gentleman	Cranbourne Street	28 Jun 1818
Kocher	Charlotte	Henry	Caroline	Cheese monger	19 Cranbourne Street	2 Apr 1820
Kocher	Charlotte	Henry	Henry	Cabinet maker	Exeter Change	30 Jan 1822

Source: as for Table 1.

Table 3 Example of an omission of a baptism entry from the family (omitted entry in bold)

Surname	Mother's forename	Father's forename	Child's forename	Paternal occupation	Address	Baptism date
Mackintosh	Martha	Colyare	Charlotte	Servant	8 Monmouth Court	24 Dec 1820
Mackintosh	Martha	Colyear	Henry	Labourer	8 Monmouth Court	17 Feb 1822
Mackintosh	Martha	Collum	Alexander	Messenger	8 Monmouth Court	5 Oct 1823
Mackintosh	Martha	Colyear	Colyear	Messenger	Monmouth Court	10 Jul 1825

Source: as for Table 1.

Table 4 Per cent of children with different addresses at baptism and burial by age of child (adjusted for address mismatch rate in the first week)

Age (in completed months)	Workhouse pauper burials	Non-workhouse pauper burials	Burials with fee 1d – 8s 5d	Burials with fee 8s 6d+	All burials
1	3	7	7	3	4
3	9	16	13	10	11
6	10	12	17	15	15
12	19	30	26	19	23
24	31	51	29	19	27
N	602	367	3,096	1,352	5,417
Per cent of all links	11	7	57	25	100

Note: all baptisms and burials in the parish were used in the linkage exercise. Changes of address between baptism and burials occurring within a week of baptism were considered to reflect discrepancies in the practice of recording addresses between the baptism and burial books, and so residential stability in the first week after baptism was assumed to be 100 per cent, and rates at older ages were calculated relative to the proportion remaining at the same address after seven days.

Source: City of Westminster Archives Centre (COWAC) Baptism Fee Books, Accession 419/210-227; St. Martin in the Fields sextons' burial books, COWAC, Accession 49/123,233-244, F2469; St Martin in the Fields Baptism and Burial Registers.

Table 5 Family of Thomas and Rachel Rustall (née Cakebread), both of St. Martin in the Fields, married 13 November 1785

Birth Date	Baptism date	Child's forenames	Address at baptism	Burial date	Address at burial	Stated age and cause of death	Bapt-ism fee paid	Burial fee paid	Birth interval
07 Sep 1786	16 Oct 1786	Thomas	Newport St				1s 6d		-
17 Mar 1788	15 Apr 1788	Mary Ann	Great Newport St	2 Jul 1792	Church Lane	4 years convulsions	1s 6d	7s 4d	18
05 Apr 1790	02 May 1790	Christian	Moors Yard				1s 6d		24
24 May 1792	17 Jun 1792	Charles Durant	Church Lane	17 Nov 1793	St. Martin's Lane	1.5 years smallpox	1s 6d	7s 4d	25
09 May 1794	08 Jun 1794	Elizabeth	St. Martin's Lane				1s 6d		23
23 Apr 1796	18 May 1796	John Durant	Moors Yard	20 Nov 1797	Church Lane	1.5 years convulsions	1s 6d	7s 4d	23
(16 Oct 1798)	(No record)	Ann	(No record)	20 Mar 1800	Charles Court	1 year 5 months inflammation		7s 4d	29
17 Oct 1801	08 Mar 1802	Ann Catherine	Charles Court				1s 6d		36
16 Jan 1805	03 Mar 1805	Robert Thomas Jennings	Charles Court				18		39

Source: as for Table 1.

Table 6 Residential moves of the Rustall family within St. Martin's, identified from baptism and burial records

Street address	First recorded date of residence	Event	Last recorded date of residence	Event
Newport St [Great Newport St]	16 Oct 1786	baptism	15 Apr 1788	baptism
Moors Yard	2 May 1790	baptism		
Church Lane	17 Jun 1792	baptism	2 Jul 1792	burial
St. Martin's Lane	17 Nov 1793	burial	8 Jun 1794	baptism
Moors Yard	18 May 1796	baptism		
Church Lane	20 Nov 1797	burial		
<i>Period of residence outside the parish?</i>				
Charles Court	20 Mar 1800	burial	3 Mar 1805	baptism

Source: as for Table 1.

Table 7 Family of William and Margaret Reynolds (no marriage date)

Birth Date	Baptism date	Child's forenames	Address at baptism	Burial date	Address at burial	Stated age and cause of death	Baptism fee paid	Burial fee paid	Birth interval
6 Jul 1765	14 Jul 1765	James	Not given	2 Jun 1766	SMF [Soho]		-		-
21 Sep 1767	4 Oct 1767	William	Not given	27 Apr 1768	SMF [Soho]		-		26
15 Feb 1770	25 Feb 1770	Thomas	Hedge Lane	7 Apr 1771	SMF [Soho]		1s 6d		28
12 Mar 1771	24 Mar 1771	Mary Ann	Hedge Lane	12 Apr 1771	SMF [Soho]		1s 6d		12
13 May 1772	31 May 1772	Richard	Hedge Lane				0 'poor'		14
7 May 1774	29 May 1774	Mary	Hewitts Court	8 Mar 1778	Charles Court	3 yrs 10 mths, Decline	0 'poor'	7s 4d	23
4 Jan 1776	21 Jan 1776	Charles	Hewitts Court	10 Jan 1777	Charles Court	1 year, Smallpox	0 'poor'	4s	19
8 Mar 1777	6 Apr 1777	Ann Sarah	Charles Court				0 'poor'		14
11 Jul 1779	8 Aug 1779	Margaret	Charles Court				0 'poor'		28
5 Aug 1783	24 Aug 1783	Robert	Charles Court				18		48

Note: burial address 'SMF [Soho]' refers to burials in St. Anne Soho register with abode given as St. Martin in the Fields. These burials were not recorded in the sextons' books of St. Martin in the Fields.

Source: as for Table 1.

Table 8. Numbers of birth events giving rise to live-born singleton, twin and triplet infants

Period	Single	Twin	Triplet	per cent twin	N infants
1752-74	6,751	109	1	1.59	6,972
1775-94	6,005	81	0	1.33	6,167
1795-1812	4,900	65	1	1.31	5,033
Total	17,656	255	2	1.42	18,172

Note: each birth event was associated with two births in the case of twins, or three births for triplets, therefore the number of live-born twins in each period was double the number of birth events given in the third column.

Sources: as for Table 1.

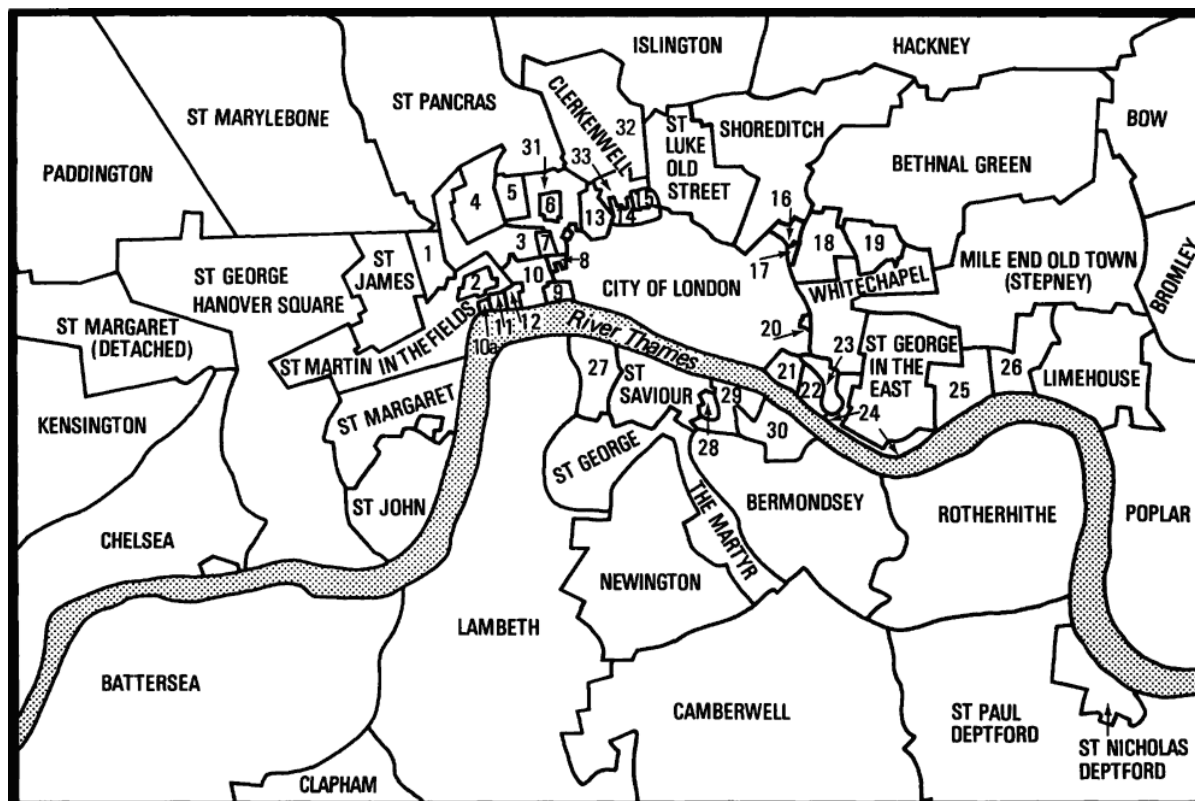
Table 9. Percentages of all burials recorded as exported in sextons' books of St. Martin's 1767 – 1812.

Age at death	Per cent exported	N
0-6 days	3.2	1,746
7 – 29 days	9.4	1,864
1 – 11 months	10.7	8,444
12 - 23 months	13.1	5,081
2 – 9 years	13.1	6,760
All burials	14.1	47,569

Note: Age was not recorded for exported burials before 1767.

Sources: St. Martin in the Fields sextons' burial books, COWAC, Accession 49/123,233-244, F2469; St Martin in the Fields Burial Registers.

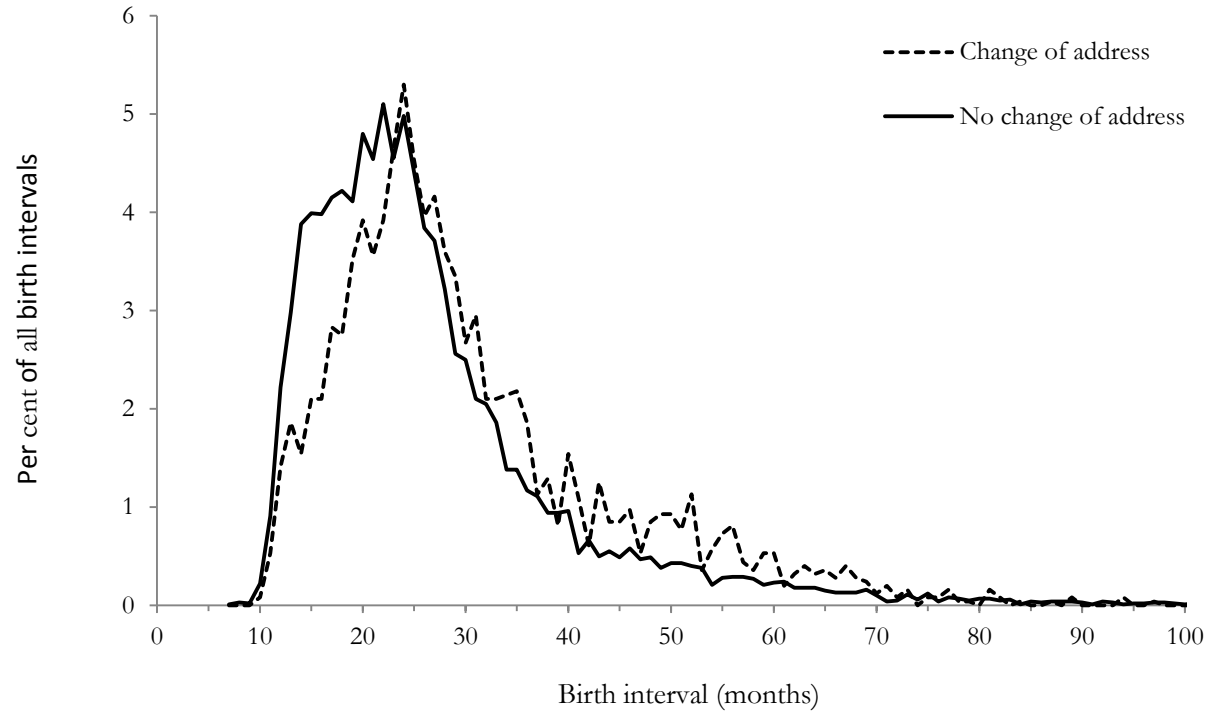
Figure 1 London parishes in the mid-eighteenth century



Note: Key: 1, St. Anne Soho; 2, St. Paul Covent Garden; 3, St. Giles in the Fields; 10 and 10a, St. Clement Danes; 11, Precinct of the Savoy; 12, St. Mary le Strand.

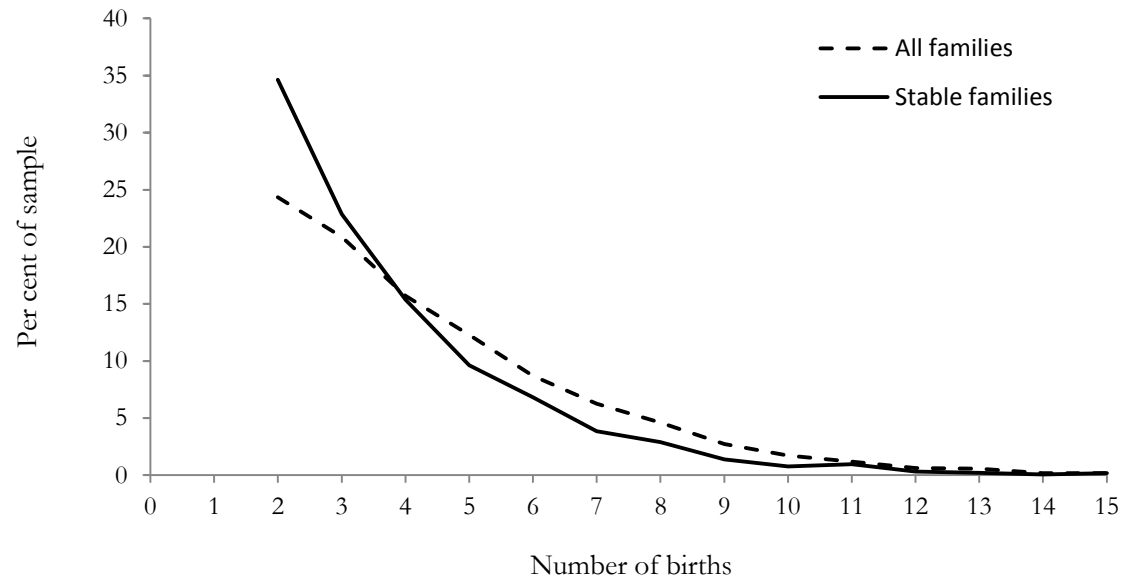
Source: M.H. Port (ed.) *The commissions for building fifty new churches. The minute books, 1711-27, a calendar* (London, 1986), xxxviii-ix.

Figure 2 Percentage distributions of birth intervals, 1752-1812



Sources: as for Table 1.

Figure 3. Percentage distribution of family sizes (numbers of births per family while in observation)



Sources: as for Table 1.