

# **The age structure and meaning of causes of death in English urban areas between 1583 and 1812: a case study approach**

## **Abstract**

This paper assesses the use of Early Modern cause of death and age information stated in urban parish burial registers as a means of obtaining greater precision and broader geographical coverage than is possible from the use of Bills of Mortality alone. The London Bills of Mortality are the main source of English statistics on cause-specific mortality prior to the mid-nineteenth century Medical Officer of Health Reports and Annual or Quarterly Reports of the Registrar General. However, other than for the most clearly identifiable infectious diseases, such as plague, smallpox, measles and whooping cough, much uncertainty surrounds the meaning of cause of death descriptors used in the Bills, and the consistency with which they were applied, both over time and between different administrative units of the metropolis. The annual Bills do not provide age breakdowns until 1728, and even after that date the age structure by cause of death is not given.

Beginning with sixteenth century London and the contextual clues given in John Graunt's pioneering work *Natural and Political Observations Made Upon the Bills of Mortality*, we trace the meaning and age applicability of selected cause of death descriptors. Using data collected from late sixteenth century to early nineteenth century burial registers in London, Leeds, York, Liverpool and Newton Heath near Manchester, we examine the descriptors applied to infants, the section of the population most likely to die, and then focus in particular on three case studies of cause of death descriptors pertaining to rickets, teething and old age.

## **Introduction**

When John Graunt prepared and published his famous *Observations* on the London Bills of Mortality, death must have been much on his mind for personal reasons as much as his intellectual interests.<sup>1</sup> The parish burial register of St Michael Cornhill, the small, wealthy central London parish in which he was living at the time, reveals that in the preceding year he had lost both his parents and a daughter. On March 24 1661/2 his father, Henry Graunt, was buried, dying of old age. A few months later in May 1662 his mother Mary Graunt died, also of 'old age', and in September the same year he and his wife lost their daughter Frances to 'consumption'.<sup>2</sup> The dedicatory epistle Graunt wrote to preface his book is dated January 1652/3, four months after the last of this unhappy trio of losses.<sup>3</sup> As the eldest son he most likely arranged his parents' funerals within a couple of days of their deaths.<sup>4</sup> The arrangements would have involved 'bespeaking' a grave from the parish sexton, and Graunt may well have been in the house when the two parish Searchers came to view the bodies to ascertain cause of death to report to the parish clerk for inclusion in the Bills of Mortality. When Graunt describes the system of compiling Bills of Mortality from information gathered in the deceased's parish of residence, we can therefore be sure he was speaking from practical experience as much as any hypothetical description of the process.

Graunt was a well-informed Londoner with a working knowledge of living and trading in the city and strong connections to the civic authority of the guilds. He was a freeman and later liveryman of the Drapers' company and held several civic offices.<sup>5</sup> He also served in the City militia, from whence came his title of Captain (later Major).<sup>6</sup> This meant that as well as being able to negotiate ready access to the Parish Clerk's Company Hall to view the Bills of Mortality, he was well-placed to comment on the context of the information contained within them. Indeed, his combination of empirical rigour in analysing their content and a good general grasp of conditions in his city were perhaps the ideal combination for a pioneering consideration of the demographic and epidemiological significance of the London Bills. As well as the statistical contributions for which he is well-known, Graunt furnishes us with many details of how to interpret the information given in the Bills, and descriptions of how the system for creating the Bills of Mortality worked. He expounds at some length on the probable meaning and significance of cause of death descriptors, attempting to divide them between those afflicting young children, who he knew were at greatest risk of dying, and those afflicting adults. Where he speculates, he tells us so, and usually explains by what reasoning he arrives at his conclusion. His reasoning yields important clues as to the likely relationship between certain causes of death and age groups. Though he had no medical training, there was in fact little medical involvement, or even interest in, the causes of deaths reported in the Bills of Mortality in Graunt's day.<sup>7</sup> The Searchers who determined the causes of death that were collated and reported in the Bills had no medical training either, being old women of the parish who learned by long experience. Graunt's remarks were similarly drawn from general experience as a longstanding Londoner, and no doubt from personal experience of deaths in his own family and among his acquaintances. His account is probably as close as we may now get to an eye-witness report of how causes of death were identified by laypersons, forming the basis for the categories reported in the London Bills of Mortality.

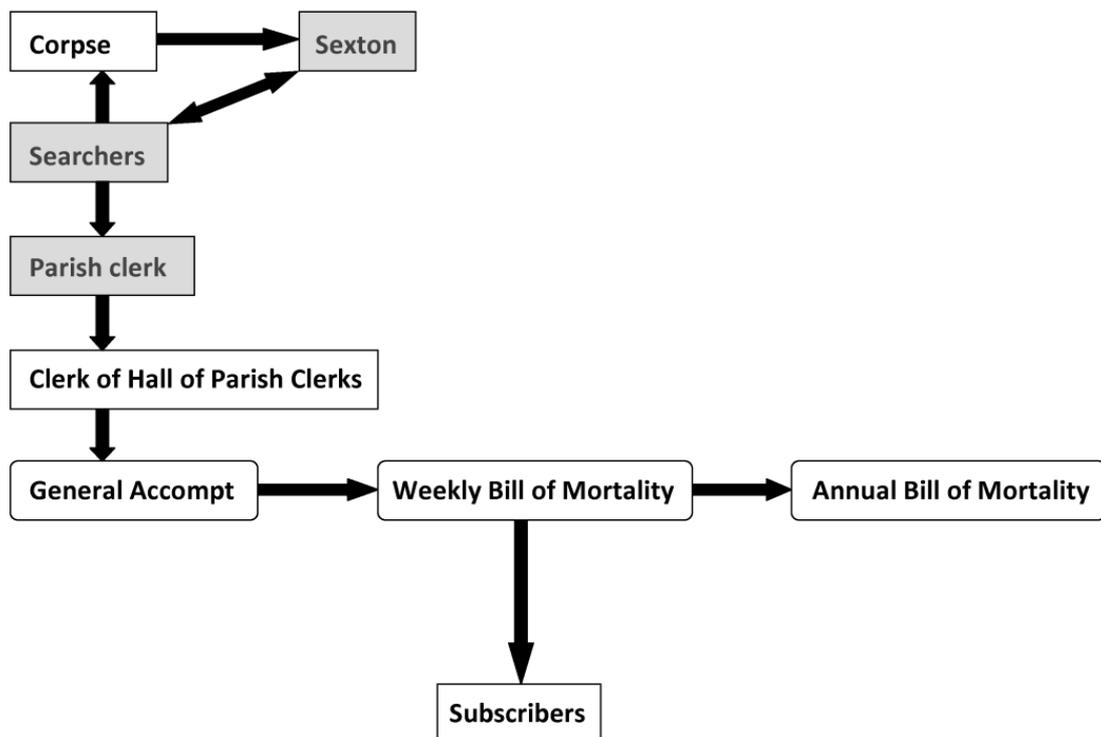
Graunt devotes three of the twelve sections of his work wholly to the 'casualties', or causes of death, in the Bills of Mortality, and one further section on plague in particular as chief among these causes, as well as making many remarks elsewhere on particular diseases.<sup>8</sup> He ponders on the identity of these causes of death, and on the likelihood of the Searchers consistently reporting them. Some causes of death he considers to be clearly identifiable and not liable to be confused with other conditions. In this category he includes smallpox and rickets. Others he tells us are more ambiguous, and perhaps conjoined with or caused by other conditions. In this group he includes 'teeth' and old age. Lacking age reporting cross-tabulated by cause of death, he makes assumptions about the age groups affected by these and other diseases. With evidence from London parish registers, and from registers elsewhere, it is possible to test some of the assumptions Graunt made about the age structure of disease. In later sections of this paper we shall look in particular at three case studies: 'teeth', rickets and old age.

### **The relationship between Bills of Mortality and Parish Registers**

The system for compiling the Bills of Mortality that Graunt describes is illustrated in Figure 1. As should be immediately evident, it was not independent from the parochial

system of baptism, burial and marriage registration first instituted by the state in 1538 and administered by ecclesiastical authorities, but complementary to it. The raw data from which the Bills were compiled came from the parish clerk supported by other parochial officers (the boxes representing these parish officials are shaded grey in Figure 1).<sup>9</sup> However, the age and separately tabulated cause of death information that is consistently present in the annual Bills of Mortality after 1629 was not usually recorded in the parish burial register. Graunt's home parish of St Michael Cornhill was for a brief period an exception, recording causes of death (but not ages) for most of the 264 burials between October 1653 and March 1663. Most parish clerks viewed their responsibility to prepare a report of burials, ages and causes of death each week as separate from keeping parish registers. Although sexton's accounts record this information in some parishes (in London notably for the large Westminster parish of St Martin in the Fields), they often do not survive.

**Figure 1: The process of compiling Bills of Mortality, based on Graunt's description**



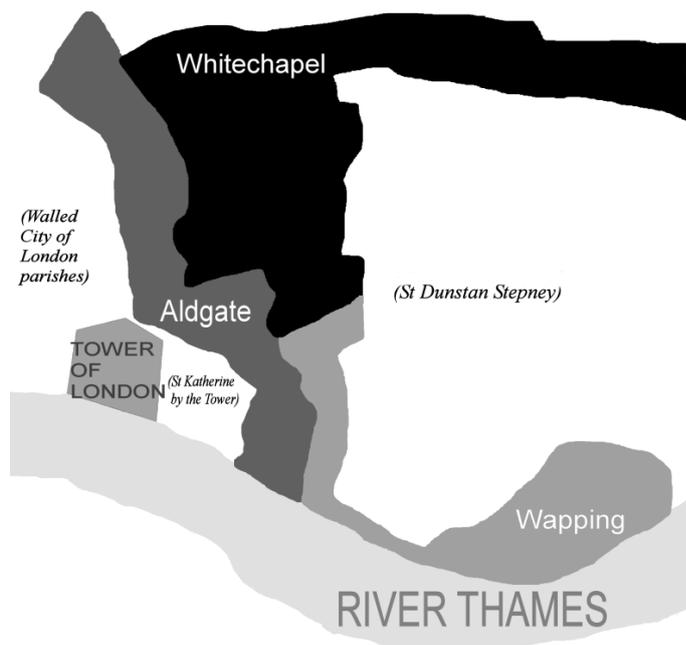
Source: see text.

As noted above, Graunt's remarks on the causes of disease used in the Bills of Mortality frequently speculate on the ages of individuals likely to found within that category, but as the Bills did not cross-tabulate the age and cause of death information they reported, no direct evidence was available to him. Even if he had negotiated access to the burial register in his home parish of St Michael Cornhill with its unusual run of cause of death information, no ages were given there either. However, among the many London parishes there are a few exceptional cases where for a time the parish accounts or registers did state

causes of death and ages for each burial, and from these we are now able to reconstruct age-specific causes of death. Some examples of London parishes from the sixteenth to the nineteenth century which contain cause of death and age information were analysed many years ago by the medical historian Thomas Forbes, who first drew attention to the Aldgate records which form part of the analysis below.<sup>10</sup> Forbes provides an excellent interpretation of the apparent meaning of causes of death in use in London, and of which descriptors were most prevalent in different time periods, but his sense of the meanings of individual descriptors is little nuanced by shifts over time. Importantly, Forbes did not compare the age specificity of particular causes of death in detail, and did not compare them in different parts of London, or indeed in other locations.<sup>11</sup>

Later sections of this paper will concern age and cause of death information from urban parish registers, beginning with the eastern suburbs of London, a strongly manufacturing-orientated and relatively poor part of the metropolis. The location of the three London parishes providing the evidence and their close geographical relationship are shown in Figure 2. We will compare these to similar information from the parishes of and adjacent to the major towns of Liverpool, Leeds, York and Manchester.

**Figure 2: Map showing location of London parishes sampled for cause of death and age information**



Source: Parish boundaries taken from Richard Blome's London parish plans created c. 1690, published in John Stow *A Survey of the Cities of London and Westminster* (1755).

### Background to the case studies

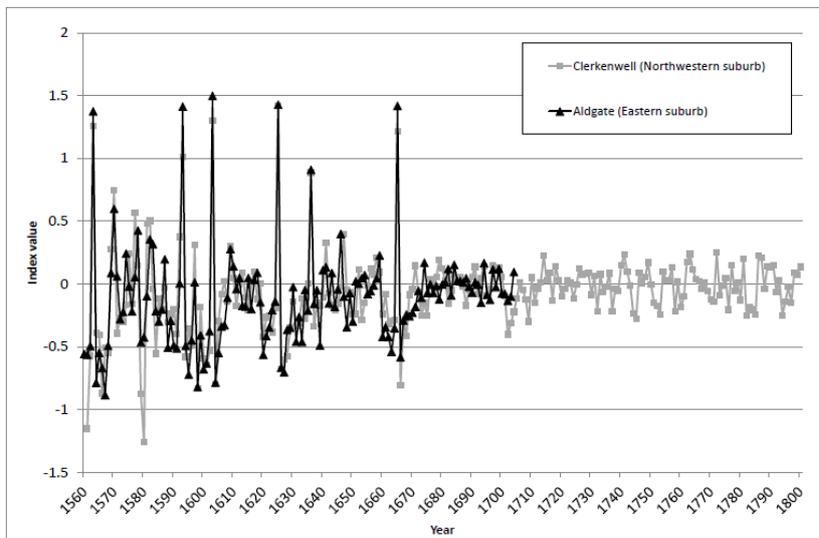
However, to take a step back from causes of death for the time being, it is helpful to consider first the point at which our present investigations of these parish registers began. Our original rationale for seeking out cause of death and age information from burial registers

was to gain a better understanding of the drivers of short-term fluctuations in mortality, in connection with a pilot project funded by the Wellcome Trust currently underway at the Cambridge Group for the History of Population and Social Structure. Initially, we considered the general issue of the long-term change in burial volatility between the sixteenth and eighteenth century in different communities, including London. Graunt himself observed fluctuations of the annual and seasonal numbers of burials in the Bills of Mortality, although he had much shorter runs of information available to him than subsequent research has provided, and less sophisticated methods.

Writing from the perspective of plague-ridden mid-seventeenth century London, in noting the annual variability in the burial total, Graunt finds it useful to distinguish between three types of year. Plague years he takes to be those with at least 200 burials where the cause of death is ascribed to plague. 'Sickly' years are those non-plague years in which the total of burials was higher than the preceding and following years, and 'healthfull' years are the remaining ones. Graunt's observations are necessarily largely confined to a 60 year period post 1603, for which Bills of Mortality were most readily and continuously available. However, by using parish burial registers we can now observe continuous annual burial totals in London for a much longer period, extending back into the sixteenth century, and further forwards too into the seventeenth and eighteenth centuries. This makes it easier to consider changes in the long term and to distinguish them from cyclical variations.

The annual counts of burials from two large suburban London parishes, each by the mid seventeenth century already as populous as major towns elsewhere in England, are graphed in Figure 3. The counts are detrended to remove the effect of population growth, and presented relative to an index where zero indicates an annual burial count equal to the expected number of burials for that year, as predicted by other values in the series. Thus, to borrow Graunt's terminology, 'healthful' years approximate those where the point is below an index value of 0; plague years are represented as prominent spikes with index values well above zero (to give some indication of the relative shift in the number of deaths this represents, the crisis mortality ratio in these years was typically between 5 and 7, meaning that the number of burials was between five and seven times higher than in the surrounding years), and sickly years are the less prominent spikes above an index value of zero. Over the long term, a diminution in volatility is apparent in both parishes, but is most obvious in the north-western suburb of Clerkenwell where the information has been gathered for a longer period. Once plague disappears from London after 1665, a mortality regime with periodic large upswings and downswings transitions to one in which the degree of variation between one year and the next was reduced. However, from family reconstitution studies we know that infant and child mortality, responsible for the bulk of deaths, remained high and in some areas rose until at least 1750.<sup>12</sup>

**Figure 3: Annual burial volatility between 1560 and 1800 in two large London suburbs, detrended to remove the effect of population growth and indexed**

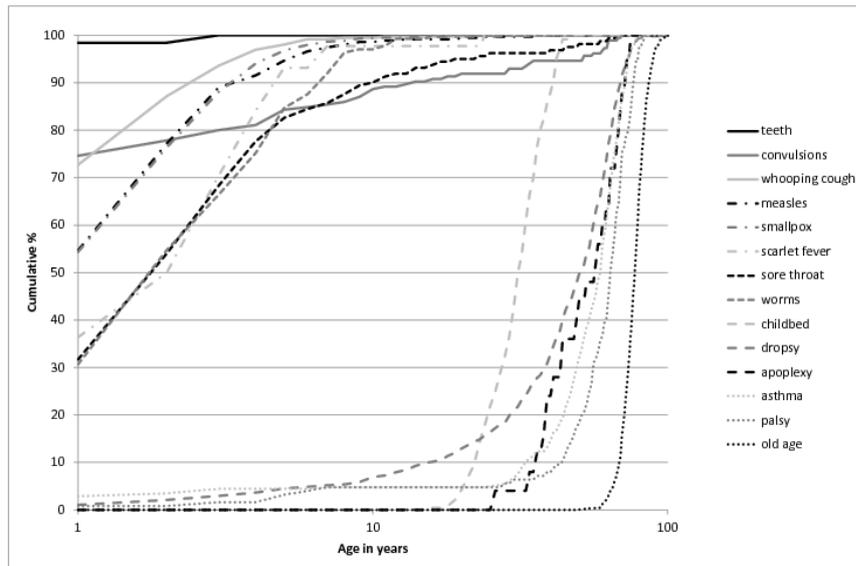


Source: Parish registers of St James and St John Clerkenwell and St Botolph Aldgate.<sup>13</sup>  
 Burials in Clerkenwell abstracted by Amanda Copley.

A useful feature of parish register burials data is that children dying while in the same household as their parents were usually identified as such, by the relationship ‘son’ or ‘daughter’. This permits us to consider the contribution to burial totals of individuals aged under 18 years or so separately from the adults. Since mortality is heavily concentrated in the youngest age groups, we know that most of the persons described in the burial register as ‘son’ or ‘daughter’ will be young children. Further refinements are possible where the burial register states the age of the deceased.

Our investigations to date of short term fluctuations in mortality make it clear that adult and child mortality did not necessarily rise and fall in the same years: they operated at least quasi-independently. This decoupling of adult and child mortality becomes more pronounced during the eighteenth century, when parts of Britain were undergoing urbanisation and very rapid population growth. Furthermore, there are diseases that afflict infants and young children especially, and which rarely or never affect adults. Graunt tries to surmise which these are in London, but cannot know for sure. The existence of parish registers that give both causes and age allows more direct scrutiny of the ranges of ages represented under each cause of death. As Figure 4 below illustrates for Leeds parishes in the late eighteenth century, some causes of death do indeed apply primarily to children, and others to adults. The causes of death in the key are listed in order of where the line representing that series meets the y-axis, or for those afflicting older persons, the age at which it begins to rise steeply. Thus causes primarily ascribed to infants appear first in the key, then diseases of older children, and finally diseases of adults. The ages are plotted on a log scale, so it is not possible to show deaths at age 0 here.

**Figure 4: Cumulative distributions of selected causes of death by age in Leeds, 1763–1799**



Source: Parish registers of Leeds St John, St Peter and St Paul together with the surrounding parishes of Beeston, Bramley, Chapel Allerton, Farnley and Headingley.<sup>14</sup>

Returning to London to compare causes of death among those aged under 1 year, Table 1 below lists the causes accounting for at least 95 per cent of all deaths aged under 1 year in sampled parish registers. Stillbirths (where given) are listed separately at the bottom of the table. In sixteenth century Aldgate, ‘chrisom’, meaning a child buried soon after baptism (see below), accounted for a very high proportion of infant burials. Many of the neonate chrisoms were subsumed under the new descriptor of convulsions by the mid eighteenth century, so that Whitechapel reports no chrisoms between 1744 and 1747, although almost half of its infants died of convulsions.

**Table 1: Causes of death accounting for >95% of infant burials in sampled London parishes**

Aldgate 1584-93	%	Whitechapel 1744-7	%	Whitechapel 1800-2	%	Wapping 1800-2	%
chrisom	58.5	convulsions	48.0	convulsions	54.7	convulsions	79.5
pining	17.2	teeth	12.0	teeth	19.9	smallpox	8.0
consumption	13.1	thrush	8.6	smallpox	8.5	whooping cough	4.5
plague	5.6	horseshoe head	7.4	decline	4.5	decline	2.3
teeth	1.0	smallpox	5.3	whooping cough	3.0	thrush	1.1
smallpox	0.7	overlaid	3.9	inflammation	3.0		
		consumption	3.0	fever	3.0		
		watery gripes/gripes/flux	3.1				
		fever	1.4				
		measles	1.4				
		whooping cough	1.2				
Total deaths under 1	609		906		331		88
Stillborns	236		89		0		0

Source: Parish registers of St Botolph Aldgate, St Mary Whitechapel and St John Wapping.<sup>15</sup>

In Graunt's day convulsions had only recently begun to be used as a cause of death, rising rapidly in incidence in the Bills of Mortality from mere tens of deaths in 1629–31 to thousands of deaths per year by the 1660s, at which level it stayed until the nineteenth century. The author of a pamphlet published in 1701 entitled 'History of Cradle Convulsions' observes that '... such a strange distemper as that we call convulsions ... was not known in Civil Societies 200 Years ago; nor heard of in England, 'till after the Rise of the Bills of Mortality 1603 nor yet had any Established Name in the said Bills, 'till Anno 1629 ....'<sup>16</sup> The mid seventeenth century origins of convulsions as a replacement cause of death for chrisom is corroborated by the mixture of the two causes found in the registers of London St Michael Cornhill between 1653–63, where 6 children died as chrisoms and 18 of convulsions. In the registers of Aldgate, the abbreviation "con" might at first appear to denote either consumption or convulsions, as Forbes believed.<sup>17</sup> However, the chronology of convulsions established above, together with the absence of any unabbreviated reference to convulsions in the sixteenth century Aldgate registers (which do nonetheless contain several instances of consumption being stated in full) confirms that "con" meant consumption and not convulsions in this period. It has been represented accordingly in the figures for Aldgate shown in Table 1. Convulsions continued to be the major death category for infants in early nineteenth century London, in both Whitechapel and Wapping. However, the convulsions category did not refer exclusively to infants, although in London it primarily indicated this age group. In Whitechapel about 1 in 7 of the deaths attributed to convulsions occurred in older individuals aged anywhere between 1 and 60. In Leeds more than 1 in 3 of deaths attributed to convulsions occurred in adults.

More generally, it is quite clear from Table 1 that parishes did not use the same descriptors to distinguish the major causes of infant death. Sometimes this reflected genuine change over time in the incidence of the disease, as with plague and smallpox, the two most unmistakable infectious diseases listed. It is worth bearing in mind that the Bills of Mortality existed to provide a warning of epidemic outbreaks in London, so there is good reason to suppose that epidemic diseases were recorded most faithfully, provided that the Searchers' visual inspection of the corpse and questioning of family members could easily identify the disease. However, many deaths in each age group tend to be piled to a greater or lesser extent into one or two major categories, which are often vague, catch-all descriptors that encompass a wide range of conditions – a phenomenon that Graunt suspects in his consideration of 'consumption'. This is true for older age groups as much as for infants, and consumption and/or decline are indeed the most prevalent catch-all categories. But some parishes heaped a smaller proportion of deaths into these categories. Eighteenth century Whitechapel used a much wider range of descriptors than other sampled parishes and time periods, and even in the early nineteenth century when it too was using a smaller range of descriptors, it still recorded more distinct causes of death than neighbouring Wapping. This disparity between cause of death descriptors used in different parishes has important implications for the composition of the totals present in the Bills of Mortality, especially the annual Bills. Apparent increases or decreases in some diseases may have been a consequence in changes in descriptors used in some parishes but not others, perhaps when Searchers died and had to be replaced. Given the huge differences in population between London parishes, a

shift in the descriptors used by just a handful of large suburban parishes could certainly have swayed the overall figures.

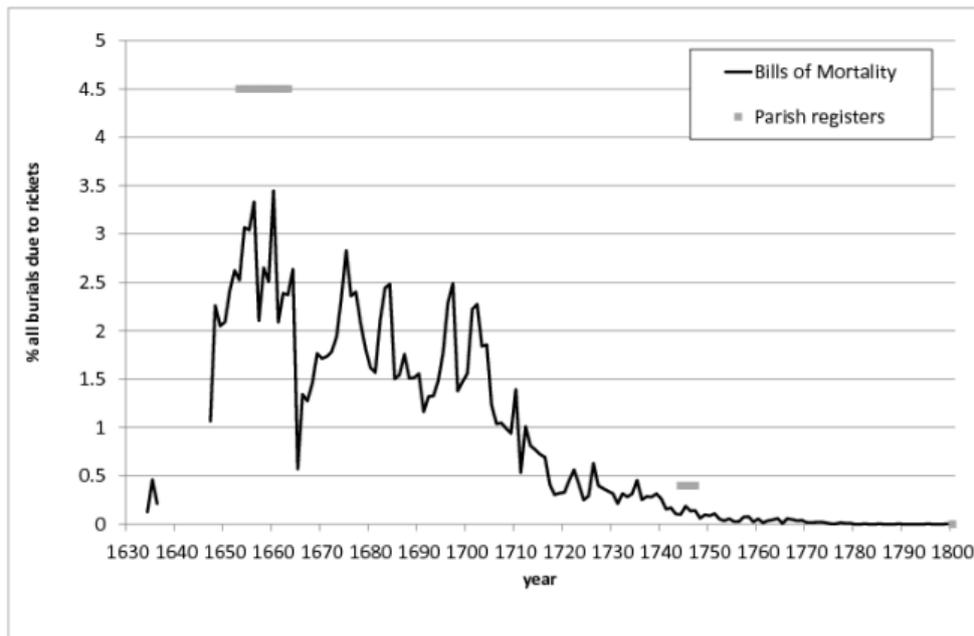
The catch-all major cause of death categories conflate too many diseases for it to be profitable to use them to gain further appreciation of the degree of consonance or difference between London and other urban parishes. Since we expect that major infectious diseases such as smallpox, measles, whooping cough and so forth genuinely did exhibit different age specificity at different times and in different places, it would not be appropriate to use these either. What are needed are causes of death that appear to be referring to relatively specific conditions, but which might apply across different places and time periods. For this purpose three causes that also attracted Graunt's attentions were chosen: rickets, teeth and old age.

### **Three case studies of cause of death recording: rickets, teeth and old age**

#### **Case study 1: Rickets**

Comparing parish-level causes of death for London parishes and indeed elsewhere immediately reveals that some causes of death are more popular in some parishes than others, or in some time periods than others, as we began to see above. Disentangling genuinely new or changing phenomena from shifting customary practice in reporting cause of death is not easy. Graunt noted that certain causes of death used in the Bills of Mortality had emerged in recent times, most especially rickets among children. We now know that rickets is caused by Vitamin D deficiency, and that Vitamin D is mostly obtained from exposure to sunlight, although there are also dietary sources. Graunt offers an eye-witness account of local environmental changes that might plausibly explain why the incidence of rickets might have increased by the mid-seventeenth century, noting the increase in coal as fuel over the last half-century and build-up of smog in London. Smog can limit the amount of ultraviolet radiation reaching the skin, thus preventing Vitamin D from being synthesised, especially among young children who are likely to be kept indoors and thus spend little time in sunlight. However, examination of the Bills of Mortality subsequent to Graunt's time reveal that rickets declined markedly as a cause of death in the eighteenth century (see Figure 5 below). By 1800 it had dwindled from causing several hundred deaths per year to less than one per year. This was not a consequence of the individually reported causes of death being aggregated differently, since we can observe a similar decline over time in the number of rickets deaths recorded in London parish registers (also shown in Figure 5 below). Rickets is not found as a cause of death in late sixteenth century Aldgate, but by the middle decade of the seventeenth century in Graunt's own central London parish of St Michael Cornhill between 1653 and 1663, there were 12 rickets fatalities, 4.5 per cent of the total number of burials, and all were children. Just outside the eastern city boundary in St Mary Whitechapel, by 1744–7 the proportion of deaths due to rickets was only 0.4 per cent of the total, comprising 21 rickets deaths of children aged between 21 months and 4 ½ years. By 1800–2 in the same parish of Whitechapel and also in neighbouring St John Wapping there were no recorded rickets deaths.

**Figure 5: The rise and fall of rickets burials in London**



Source:

Marshall (1832) and parish registers of St Michael Cornhill, St Mary Whitechapel and St John Wapping.<sup>18</sup>

This apparent decline in rickets mortality does not fit the probable incidence of rickets morbidity given increasing air pollution over this period, as the expansion and industrialisation of the metropolis accelerated. Nor does it accord with the archaeological evidence, where 15-20 per cent of analysed skeletal remains buried in London between the sixteenth and nineteenth centuries have been found to be suffering from rickets.<sup>19</sup> We must assume that rickets simply passed gradually out of common usage as a cause of death descriptor in eighteenth century London, although the reasons for this remain obscure. The proportion of parish register burials attributed to rickets in two London parishes, one wealthy and one poor, appears noticeably higher than that recorded in the Bills of Mortality as a whole. Most likely this is an artefact of the small numbers involved in the parish samples, but it is also possible that rickets deaths were identified unevenly in different parishes, with the Searchers of some parishes using rickets as a cause of death descriptor while others did not, or some parishes abandoning it earlier than others. As discussed above, some parishes do appear to have favoured particular descriptors over others.

In modern studies of rickets in developing countries, the disease has been found to be associated with pneumonia, with thirteen times higher incidence of rickets among Ethiopian children suffering from pneumonia as among other children, and young children with rickets in Jordan commonly hospitalised owing to respiratory infections.<sup>20</sup> It seems likely that those described as dying of rickets in early modern London actually died from respiratory infections too, while displaying sufficiently pronounced outward malformations characteristic of rickets to induce the Searchers to report rickets as the cause of death. Interestingly, the age distribution of rickets deaths in mid-eighteenth century Whitechapel suggests that the

descriptor was not used for neonatal rickets where outward deformations would be less apparent, but for slightly older children aged 1 year 9 months and upwards.

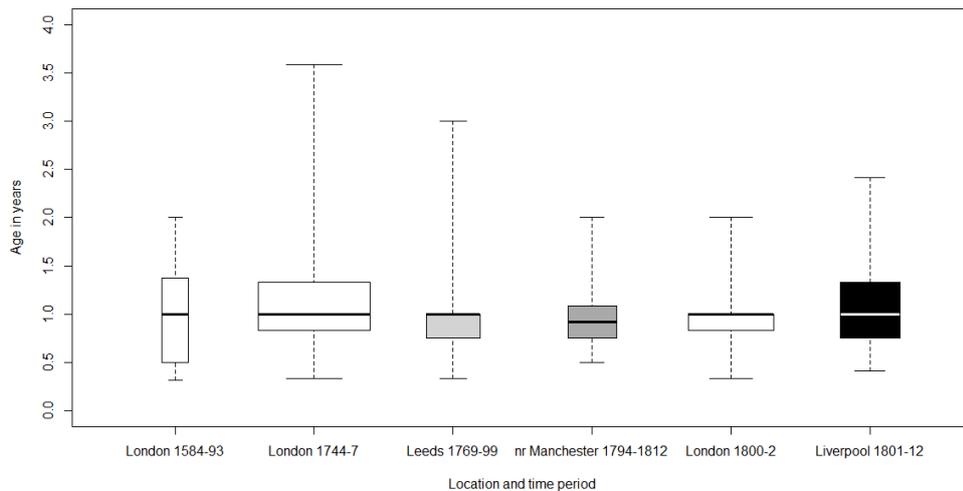
The presence of rickets in London from a relatively early date is attested by both Bills of Mortality and parish registers, but it is clear from a closer examination of the evidence that prevailing levels of the disease and changes in its incidence in time cannot reliably be obtained from these sources. The recording of rickets as a cause of death seems to have been largely a London-based phenomenon, although a Bill of Mortality for Chester in 1772 analysed by the physician John Haygarth gave 7 rickets deaths, some 1.8 per cent of the total.<sup>21</sup> Burials registers that give cause of death from the 1760s to 1812 in Leeds and 1770 to 1812 in York record no instances of rickets. Similarly, burial registers that record causes of death from early nineteenth century industrial towns: Toxteth Park in Liverpool and Newton Heath near Manchester, are devoid of rickets deaths.

### **Case study 2: Teeth**

Among the diseases Graunt attributes to infants, ‘teeth’ was the second largest category after chrisom and ‘infant’ in the mid seventeenth century London Bills. All three of these causes are more usefully understood as age categories rather than causes of death, but they are nonetheless useful since they offer the possibility of more precise analysis of mortality in the earliest years of life than the age tabulations given in the Bills from 1728 onwards allow, and furthermore they are available from an earlier date. A chrisom was a child dying close to its date of baptism, and most chrisoms will therefore be neonates aged under one month. ‘Infant’ means burials under 2 years of age when used in a parish register and presumably in the Bills of Mortality as well. As we shall see, ‘teeth’ usually meant children who died while their deciduous or ‘milk’ teeth were erupting, who were generally aged between 6 and 18 months, with a median age of 1 year. However, not all parish Searchers seem to have used chrisom or infant as cause of death (or, indeed, age) descriptors, which means that the totals for these categories reported in the Bills of Mortality will under-report the extent of mortality in these age groups by an unknown factor. Teeth was more widely in use as a cause of death descriptor, at least until the early nineteenth century.

The range of ages covered by the ‘teeth’ descriptor in London parishes and elsewhere is shown in Figure 6. The width of each box is indicative of the number of observations, the largest being the 275 cases in London Whitechapel between 1744 and 1747.<sup>22</sup> As per usual convention, the solid line bisecting each box represents the median, with the lower and upper edges of the box representing the first and third quartiles respectively, and the bars beyond indicating the minimum and maximum values (14 outliers are not shown).<sup>23</sup> Although the interquartile range (represented by the height of the box) varies, the medians are remarkably consistent across all parishes that use this descriptor, both in London and in other major cities, and in every time period.

**Figure 6: Reported ages of those dying of ‘teeth’**



Source: Parish registers of St Botolph Aldgate (London 1584–93), St Mary Whitechapel (London 1744–7 and 1800–2), Leeds St Peter and Leeds St John, All Saints Newton Heath near Manchester, and Toxteth Park, Liverpool.<sup>24</sup>

Graunt appears to conflate teeth and worms as causes of death among young children, and in Leeds there are almost as many instances of ‘worms’ or ‘worm fever’ as of ‘teeth’. However, comparing the age structure of these two causes of death reveals that they are unlikely to be different names for the same thing. Nearly half of the worms deaths in Leeds are of children over three years of age, and many are above five years. It appears that older children were assigned this cause of death than is the case with ‘teeth’. The confusion may have arisen because in Graunt’s day tooth decay was sometimes attributed to worms, although the parish registers make it quite clear that eruption or ‘cutting’ of teeth is meant rather than tooth decay.<sup>25</sup> In the sampled London parishes, worms is used as a descriptor only in a handful of cases from sixteenth century Aldgate, but not in Whitechapel or Wapping, nor in Graunt’s own parish of St Michael Cornhill.

The understanding that ‘teeth’ indicates a child dying while teething invites comparison with modern studies of the ages at which deciduous teeth erupt. A study based on 129 living Finns gives deciduous teeth eruption timings of 3-41 months, with most concentrated at 6-36 months, whereas a London study based in part on historical skeletal remains of known age gives 4.5 months to 27 months, depending on the exact definition of eruption (measured precisely as degree of emergence from the jawbone).<sup>26, 27</sup> These ranges are consistent with nearly all the reported ages for ‘teeth’ shown in Figure 5. In eighteenth century Whitechapel, for example, 95 per cent of teeth deaths are indeed within the range 6-36 months identified for deciduous tooth eruption by the Finnish study, and more than 97 per cent are in the 4.5 to 27 month period identified by the London study (these proportions include three outliers not shown in the figure). The ages for young children are usually given quite precisely in the sampled parish registers, to the last week or month lived, so in this respect it is a reasonably fair comparison. Of course, we cannot know for sure at what age each of these children began teething, and the overall distribution of ages is almost certainly skewed to younger ages than in the living population simply because the risk of dying is

higher among the youngest. In fact there is reason to suspect that teething must have been later on average in the living population than the bounds suggested by the Finnish study at least, for we would expect that rickets and other nutritional deficiencies were more prevalent in historical Britain than modern Finland, and delayed eruption of deciduous teeth is recognised as a symptom of rickets.<sup>28</sup>

Teeth as a descriptor is used for a fairly narrowly defined range of ages in early childhood that are consistent with its usage to denote a who died while teething, but this alone is not helpful in suggesting what the true cause of death might have been for these individuals. Writing in the mid-sixteenth century, the paediatrician Thomas Phaer considered: “About the seventh month, sometimes more, sometimes less, after the birth, it is natural for a child for to breed teeth, in which time many one is sore vexed with sundry diseases and pains”.<sup>29</sup> But what were those sundry diseases? Graunt again makes some helpful remarks, stating that teeth, convulsions and ‘scouring’ (diarrhoea/vomiting) often went together. Most of the children dying of ‘teeth’ were old enough that it is unlikely they were exclusively breast-fed, and weaning was a particularly hazardous time for infants and young children, because of the risk of infection from contaminated food and water supplies, lack of hygiene in food preparation, and in some cases the unsuitability of foods fed to them. This and Graunt’s remarks make it likely that diarrhoeal disease, and perhaps febrile infections giving rise to convulsions, were the underlying causes of death for those dying of teeth. The seasonality of deaths from ‘teething’ that Landers observed from the Weekly Bills of Mortality in 1670–9 indicates an August peak, the same as that for ‘griping in the guts’, but in other respects the monthly totals resemble those for convulsions, particularly the low total in September and the rise in incidence in the spring months.<sup>30</sup> This and the lower degree of seasonal variation among teeth deaths overall is probably a consequence of the descriptor conflating diarrhoeal disease otherwise represented as griping in the guts with fevers that gave rise to convulsions.

### **Case Study 3: Old age**

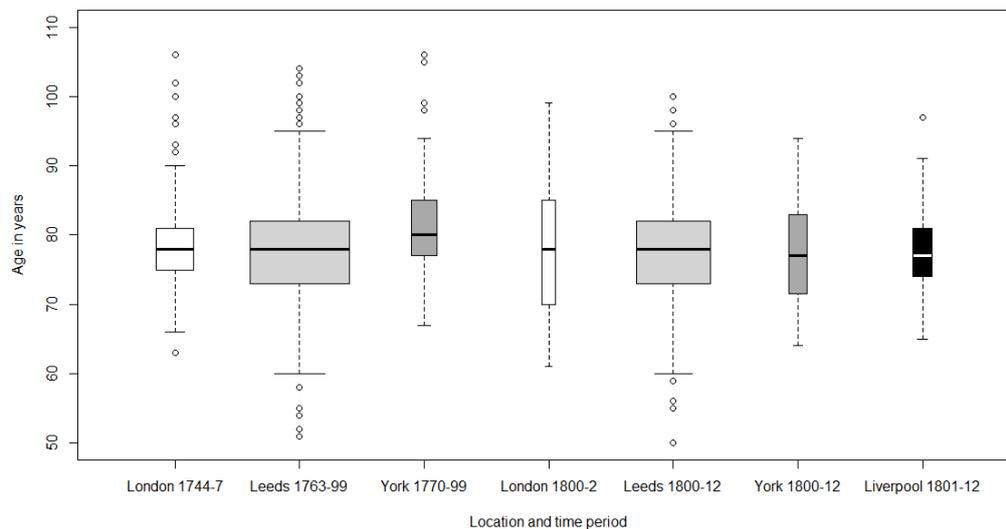
Just how old is ‘old’, or ‘aged’? It would be very convenient for demographers if Gilbert’s suggestion that the definition of old age in the past related to the modal age of death held true, as it appeared to among the sixteenth century Italian artists he studied.<sup>31</sup> If it did, shifts in the ages attributed to deaths by ‘old age’ could be used as a proxy for changes in life expectancy, and even morbidity if it is assumed that healthier, more able individuals are less likely to be regarded as having died from old age. As we shall see, however, matters are not so straightforward, owing to a combination of practical limitations and cultural factors.

Graunt gives two answers on how old a person has to be for the Searchers in seventeenth century London to describe them as dying of old age. At first he considers it to be ‘above sixty years old, or thereabouts’, then a few pages later invokes biblical authority to recast it as 70 years, explaining ‘which I conceive must be the same, that David calls so, viz. 70’.<sup>32</sup> It may be significant that Graunt’s own father Henry was recorded in the parish burial register in March 1661/2 as ‘aged,’ when he died at 70 years old.<sup>33, 34</sup> Aubrey’s biographical information provides Henry Graunt’s date of baptism, allowing his age at death to be

calculated, although it is not stated in the St Michael Cornhill parish register.<sup>35</sup> It is apparent from the two differing ages that he gives that Graunt was much less certain of ages in this cause of death category than for diseases that affect infants and children. This was not without reason. Age reporting in parish registers does become less precise, and is probably less accurate besides, for persons dying at older ages. This is partly owing to failing memory or perhaps a desire to exaggerate, and partly owing to a lack of surviving witnesses to corroborate the age of the deceased, especially among such a highly mobile population as the inhabitants of early modern London. We may suppose that in some cases the Searchers simply guessed an age from the appearance of the corpse, and rounded to the nearest 5 years. Age heaping on the decadal years and those ending in '5' is widespread for older ages. In mid-eighteenth century Whitechapel of 205 persons dying of old age whose age was reported as between 63 years and 106, 85 were said to be 70, 75, 80, 85 or 90 years old.

Figure 7 shows the age ranges reported under the old age or aged cause of death category in several locations and time periods. Values outside 1.5 times the interquartile range above the upper quartile or below the lower quartile are shown as outliers. As before, the width of the box represents the number of observations, the largest representing the 1394 Leeds observations between 1761 and 1799 and the smallest representing the 27 London observations between 1800 and 1802, which amalgamates the available data for Whitechapel and neighbouring Wapping. Unfortunately old age is not used as a cause of death in sixteenth century Aldgate, London, where most persons over the age of 70 years are assigned to the consumption category. Similarly, in the late eighteenth century registers of Newton Heath near Manchester, old age is also not used as a descriptor, and most persons over the age of 70 are said to die from decline, consumption or weakness.

**Figure 7: Reported ages of persons dying of old age**



Source: Parish burial registers of: London St Mary Whitechapel and additionally in 1800–2 St John Wapping; Leeds St John, St Paul and St Peter together with Beeston, Bramley, Chapel Allerton, Farnley and Headingley; York St Mary Castlegate, St Crux, St Laurence and St Olave; and Liverpool Toxteth Park.<sup>36</sup>

By the eighteenth century old age was used as a cause of death descriptor for individuals dying over the age of 70 years (or who *appeared* to be aged over 70 years), and especially those dying between the ages of about 75 and 85. This is somewhat older than Graunt's supposition of the seventeenth century London Searchers' definition of above 60 or 70 years, but the lack of earlier data from Graunt's own time or before makes it difficult to tell whether there had really been any shift in those ages commonly reported as old age before the 1740s. Medical authorities in the sixteenth century and early seventeenth century certainly placed the *onset* of old age at very young ages. The Tudor physician Thomas Cogan defined old age as "from 49 years until the ende of life".<sup>37</sup> In a treatise on blood-letting by Simon Harward published in 1601, it begins even earlier at "about the fortieth year of age".<sup>38</sup> However, as Paul Johnson and Pat Thane wisely remind us, historical texts can yield a wide range of contradictory chronological ages, and it is difficult to be certain which sources reflect the most prevalent ideas.<sup>39</sup> It is easy to find eighteenth century examples, too, of old age described as beginning at young ages.<sup>40</sup> The strongest evidence provided in this paper, of more than 2000 individuals dying of old age in Leeds and its satellite parishes between the 1740s and the early nineteenth century, is that the working definition of old age changed very little in this period, despite a great deal of social upheaval and the accelerating rate of change in urban living conditions attendant upon the Industrial Revolution.

Only in Whitechapel, London was there any pronounced shift in ages between the eighteenth and early nineteenth century, but this may be an artefact of the near-extinction of old age as a cause of death descriptor in Whitechapel by the later date. Only five old age deaths were recorded in Whitechapel between 1800 and 1802, and all were of individuals dying well above the age of 80 years, considerably older than in earlier decades. Still, the Searchers of different London parishes were quite happy to be inconsistent in their application of old age as a cause of death descriptor. In the much smaller neighbouring parish of Wapping old age burials actually got younger, the reverse of the situation in Whitechapel. The median reported age of the 22 Wapping old age burials after 1800 was just 73 years, 5 years younger than in Whitechapel half a century earlier. Once Whitechapel and Wapping are combined to provide a viable sample for London in the early nineteenth century as shown in Figure 7, the two divergences cancel each other out.

In York there is tentative evidence of some change over time, since in late eighteenth century York the 80 year median age of old age burials was two years older than in London or Leeds. But by the early nineteenth century the distinction had disappeared and York old age burials encompassed similar ranges of ages to those found in other cities. More evidence is needed before this can be evaluated with confidence. Life expectancy in York might compare favourably to the faster-growing and more heavily industrialised cities represented here, but the disappearance of any apparent advantage by the early 1800s is more difficult to explain. Still, the possibility of regional differences notwithstanding, the overall picture is of little real change in the ages that were considered eligible for the old age cause of death category. While adult life expectancy may have improved somewhat between 1740 and the 1810, perceptions of what constituted old age seem to have remained largely static.<sup>41</sup>

Continuity over time in the meaning of old age refutes Gilbert's suggestion of a relationship between the descriptor and modal life expectancy and regrettably, therefore, any

simple use as a proxy for this aspect of demographic behaviour, but is in agreement with findings from more recent scholarship on definitions of old age in the past.<sup>42</sup> In her detailed consideration of ageing in eighteenth century England, Ottaway also demonstrates empirically that there was no apparent change over the course of a century in the ages at which persons were considered old, despite improvements in life expectancy. Four-fifths of a sample of 81 persons mentioned in Poor Law accounts were first deemed 'old' between the ages of 60 and 80 years.<sup>43</sup> Since she takes these ages from mentions of living individuals, it is to be expected that the age distribution is younger than we see from deceased individuals recorded in burial registers.<sup>44</sup>

The ages encompassed by old age may have varied little over time, but its popularity as a cause of death descriptor did vary considerably by time and place. In Whitechapel, between 1744 and 1747 nearly 6 per cent of all deaths were attributed to old age, but this fell to less than 1 per cent by 1800–2, although still 4.8 per cent of deaths in neighbouring Wapping were attributed to old age. Both parishes were recording fewer old age deaths than in the Bills of Mortality representing London as a whole, where the proportion of deaths due to old age declined only slightly from an average of 8.3 per cent of all deaths per year in the 1740s to 7.9 per cent in the 1800s.<sup>45</sup> In Leeds 8 per cent of deaths were due to old age in the eighteenth century period, but this fell to 5.8 per cent by the nineteenth century. In York, deaths due to old age grew in proportion, from 5.6 per cent to 7.4 per cent by 1800–12. Where old age did fall into disuse it was not, as we might assume, because of greater sophistication in medical diagnosis, with more specific causes of death supplanting old age. In fact, dwindling proportions of those assigned to the old age category did not entail any greater precision in the causes of death ascribed to those over 70 years. In every case decline and consumption were the categories into which the overwhelming majority of those dying over 70 years but not of old age were placed, irrespective of the extent to which old age was used as a descriptor. Small numbers of deaths attributed to fevers, dropsy and asthma give some indications of the underlying true causes of death that afflicted this age group.

## **Conclusion**

In addition to his pioneering statistical contributions, Graunt made many useful insights into the meaning of early modern causes of death used in the London Bills of Mortality, based on careful reasoning from his general and personal knowledge as a seventeenth century Londoner. While the Bills of Mortality do not provide causes of death cross-tabulated by age, exceptional parish registers can yield both cause of death and age information. This can help to refine our understanding of both the age structure and the meaning of historical causes of death. In this paper we have seen that the information is available for several urban areas besides London, including Leeds, Liverpool, York and Manchester, and over a longer period than is possible using the surviving Bills of Mortality, beginning in the sixteenth century. However, most parish registers recording cause of death information date from the 1760s or later.

In London, parish registers that do record causes of death are not an independent source from the Bills of Mortality, since the same parish officials gathered the basic

information in both cases. From the parish cause of death data it is evident that there were considerable variations in the cause of death descriptors used by the Searchers of different parishes, both over time and between different parishes at the same time, even when those parishes were in the same part of the metropolis and socially homogenous. These idiosyncrasies have important implications for the aggregated totals for specific causes of death represented in the Bills, especially given the huge disparity in population size between different London parishes.

Three case studies of rickets, teething and old age have illustrated further problems of interpretation of causes of death, but also shed some light on the meaning and age-applicability of these descriptors. The disappearance of rickets as a cause of death during a period in which rickets was still prevalent shows that some cause of death descriptors passed into, and out of, fashion, without necessarily entailing any underlying change in the prevalence of the disease. Studies of modern populations in developing countries suggest that acute respiratory infections were the true cause of death of many of those assigned to the rickets category. The 'teeth' descriptor is much more consistent over time and place, identifying quite precisely children aged between 6 and 18 months on average, which is consistent with the descriptor signifying that the deceased died while still teething. The seasonality of teeth deaths in conjunction with Graunt's remarks on the confluence of teeth, convulsions and diarrhoea or vomiting suggests that a combination of diarrhoeal diseases and convulsions probably caused by fevers were the actual causes of death of these children, many of whom would have succumbed to food or water-borne infections following weaning. Deaths assigned to 'old age' or 'aged' in the eighteenth and early nineteenth centuries tended to identify individuals aged between 75 and 85, somewhat older than Graunt's seventeenth century supposition of 60 or 70 years. However, there is insufficient evidence to deduce whether the range of ages implied by this descriptor changed over the long term. Little change was evident between the late eighteenth and early nineteenth century, although there was some improvement in adult mortality in this period. The popularity of old age as a descriptor did not affect the precision of causes of death applied to others aged over 70, so that parishes using it less tended instead to assign those in this age group to the largest 'catch-all' categories of decline or consumption.

Much remains to be done in ascertaining the meaning and universality or otherwise of historical cause of death descriptors, and this task is much more feasible where ages are also available and comparisons can be made between different locations. Initially it may seem disheartening that so many deaths overall are placed in the same, large 'catch-all' categories, but analysis of other causes or in different age groups can reveal remarkable consistency in time and place. In London, the Searchers' role in reporting causes of death has often been lamented because they had no formal training, and their sex has probably not helped in raising the esteem in which they are commonly held. Certainly our task would be much easier if they had all worked to a consistent list of causes of death standardised across every parish! However, what they did have in common was many years of practical experience in a high mortality environment where death and disease was an everyday occurrence. The women who became Searchers had almost certainly been mothers, and perhaps grandmothers, learning from the experience of their own families' illnesses and deaths. Many would also

have nursed children or adults privately or on behalf of the parish, since poorer widows could earn an income, and some social respect as well, by this means. In sixteenth century Aldgate, in the only instance where the Parish Clerk's Memoranda Book names a Searcher she is referred to as 'Goodwyfe' Hunt, the title being a respectful honorific.<sup>46</sup> Graunt was realistic about the capacity of the Searchers to be swayed by bribes from the minority of rich Londoners who did not want their relatives to be recorded as dying from embarrassing or inconveniently monitored diseases, but also careful to note that the Searchers were sworn to their office, and his remarks about them are not wholly derogatory. Finally, it is worth remembering that seventeenth and eighteenth century medical diagnoses were often crude and inconsistent, and it would not necessarily have been any better for our modern understanding if medical practitioners had certified the cause of death. The symptoms of many ailments, and perhaps especially the infectious and epidemic diseases that afflicted children, were probably more familiar to the Searchers than to many contemporary doctors.

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<sup>1</sup> John Graunt, *Natural and Political Observations Made upon the Bills of Mortality*, (London: Thomas Rycroft, 1662/3)

<sup>2</sup> Burial Register of St Martin Cornhill, London Metropolitan Archive P69/MIC2/A/003/MS04063.

<sup>3</sup> In seventeenth century England, each year began on 25 March. Hence 25 January 1662 gives the year as Graunt would have understood it. Transposed to years beginning on 1 January as we are now accustomed, the same date becomes 25 January 1663.

<sup>4</sup> Most funerals in early modern London took place within two days of death, although high status funerals could take longer to arrange. See Vanessa Harding, *The Dead and the Living in Paris and London, 1500–1670* (Cambridge: Cambridge University Press, 2002), 187.

<sup>5</sup> For modern biographical summaries of Graunt's life see: Ian Sutherland, 'John Graunt: A Tercentenary Tribute', *Journal of the Royal Statistical Society Series A (General)*, 126, 4 (1963), 537-56; DV Glass, ME Ogborn and I Sutherland, 'John Graunt and His Natural and Political Observations', *Proceeding of the Royal Society, Series B, Biological Sciences*, 159, 974 (1963), 2-37. See also note 6.

<sup>6</sup> Richard Stone, *Some British Empiricists in the Social Sciences: 1650–1900* (Cambridge: Cambridge University Press, 1997), 207-209.

<sup>7</sup> See pages 117 and 119 in: George C Alter and Ann G Carmichael, 'Classifying the Dead: Toward a History of the Registration of Causes of Death' *Journal of the History of Medicine*, 54 (1999), 114-32.

<sup>8</sup> Graunt, op. cit. (note 1), Chapter II, "General Observations upon the Casualties", 12-18; Chapter III, "Of Particular Casualties", 19-32; Chapter IV, "Of the Plague" 33-36; Chapter V, "Other Observations Upon the Plague, and Casualties", 37-46.

<sup>9</sup> For the developing role of the parish clerks and their company in compiling the Bills in sixteenth and seventeenth century London see especially pages 328-334: J C Robertson, 'Interpreting the *Bills of Mortality* before John Graunt', *Urban History*, 23, 3 (1996), 325-350.

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<sup>10</sup> See Thomas R Forbes, 'By What Disease or Casualty: the Changing Face of Death in London', in Charles Webster (ed) *Health, Medicine and Mortality in the Sixteenth Century* (Cambridge: Cambridge University Press, 1979), 117-39; Thomas R Forbes *Chronicle from Aldgate: Life and Death in Shakespeare's London* (New Haven, Conn.: Yale University Press, 1971).

<sup>11</sup> Forbes did, however, construct a table giving an overview of the age group distribution of common causes of death for sixteenth century Aldgate. See Forbes (1971), *ibid.*, 103-4.

<sup>12</sup> See John Landers, *Death and the Metropolis: Studies in the Demographic History of London 1670–1830* (Cambridge: Cambridge University Press, 1993), 137-56, 169-70 and 184-7; Gill Newton, *Infant Mortality Variations, Feeding Practices and Social Status in London between 1550 and 1750*, *Social History of Medicine*, 24, 2 (2011), 260-280, especially 270 and 274-7; Gill Newton and Richard Smith, 'Convergence or Divergence? Mortality in London, its suburbs and its hinterland between 1550 and 1750' (forthcoming). For infant and child mortality in seventeenth century London see: Roger Finlay, *Population and Metropolis: The Demography of London 1580–1650* (Cambridge: Cambridge University Press, 1981), 24-39 and 83-110. For London post-1750 see: Louise Humphrey, Silvia Bello and Emily Rousham, 'Sex Differences in Infant Mortality in Spitalfields, London, 1750–1839', *Journal of Biosocial Science*, 44, 1 (2012), 95-119.

<sup>13</sup> The original parish registers of Clerkenwell and Aldgate and of the other London parishes of St Michael Cornhill, Wapping and Whitechapel referred to elsewhere in this paper are held at Guildhall Library, London. Guildhall's manuscript collection is now administered through London Metropolitan Archive.

<sup>14</sup> The original parish registers for Leeds and surrounding area are held at the West Yorkshire Archive Service.

<sup>15</sup> See note 13.

<sup>16</sup> Anonymous, 'History of Cradle Convulsions', London, September 1701 (British Library Gale Manuscript Z2000501573).

<sup>17</sup> Forbes (1979), *op. cit.* (note 10), 125-6.

<sup>18</sup> John Marshall, *Mortality of the Metropolis* (London: J Haddon, 1832), Tables 9, 10 and 15.

<sup>19</sup> R Pinhasi, P Shaw, B White and AR Ogden, 'Morbidity, Rickets and Long-bone Growth in Post-Medieval Britain – a cross-population analysis', *Annals of Human Biology*, 33, 3 (2006), 372-89. In Broadgate cemetery, East London, of 35 individuals analysed who were buried between 1569 and 1720, 7 persons or 20 per cent showed evidence of rickets. In more prosperous Spitalfields, 14 of 95 skeletons (15 per cent) buried between 1729 and 1859 showed evidence of rickets (*idem* Table 1). See also Theya Molleson and Margaret Cox, *The Spitalfields Project Volume 2: The Anthropology, The Middling Sort* (York: Council for British Archaeology Research Report 86, 1993).

<sup>20</sup> Lulu Muhe, Sileshi Lulseged, Karen E Mason and Eric AF Simoes (1997) 'Case-control Study of the Role of Nutritional Rickets in the Risk of Developing Pneumonia in Ethiopian Children', *The Lancet*, 349, 9068 (1997), 1801–4; Abdelhamid S Najada, Moen S Habashneh and Maher Khader, 'The Frequency of Nutritional Rickets among Hospitalized Infants and its Relation to Respiratory Diseases', *Journal of Tropical Pediatrics*, 50, 6 (2004), 364-8.

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<sup>21</sup> John Haygarth, ‘Observations on the Bills of Mortality in Chester for the Year 1772’, *Philosophical Transactions of the Royal Society*, 64 (1774), 67-78.

<sup>22</sup> The number of observations in each location and time period is as follows: 16 in London Aldgate 1584–93; 275 in London Whitechapel 1744–7; 64 in Leeds 1769–99; 53 in Newton Heath near Manchester 1794–1812; 164 in Liverpool 1801–12 and 80 in London Whitechapel 1800–2.

<sup>23</sup> The excluded outliers are: London Aldgate (1584–93) 4 years; London Whitechapel (1744–7) 21 days, 70 days, 2 months, Newton Heath near Manchester (1794–1812) 6 years; London Whitechapel (1800–2) 1 month, 2 months, 4 years, 4 years, 6 years, 6 years, 8 years; Liverpool Toxteth Park (1801–12) 2 months, 12 years.

<sup>24</sup> The parish registers of Newton Heath near Manchester have been transcribed and published. See: George C Cadman (ed.), *The Registers of All Saints, Newton Heath*, (Lancashire Parish Register Society, 2004–5). The original parish registers of Liverpool Toxteth Park are held at Lancashire Archives. See also notes 13 and 14.

<sup>25</sup> For contemporary medical and popular belief in tooth worms see: WE Gerabek: ‘The tooth-worm: historical aspects of a popular medical belief’, *Clinical Oral Investigations*, 3, 1 (1999), 1-6.

<sup>26</sup> Marjatta Nyström, Leena Peck, Eija Kleemola-Kujala, Marjut Evälahti and Matti Kataja, ‘Age Estimation in Small Children: Reference Values Based on Counts of Deciduous Teeth in Finns’, *Forensic Science International*, 110, 3 (2000), 179-188.

<sup>27</sup> See Table 10 in: SJ AlQahtani, MP Hector and HM Liversidge, ‘Brief Communication: The London Atlas of Human Tooth Development and Eruption’, *American Journal of Physical Anthropology*, 142, 3 (2010), 481-90.

<sup>28</sup> Brian Wharton, ‘Rickets’, *The Lancet*, 62, 9393 (2003), 1389-1400.

<sup>29</sup> Cited in Forbes (1979), op. cit. (note 10), 128.

<sup>30</sup> See John Landers, op. cit. (note 12), 208-9.

<sup>31</sup> Creighton Gilbert, ‘When Did a Man in the Renaissance Grow Old?’, *Studies in the Renaissance*, XIV (1967), 7-32.

<sup>32</sup> Graunt, op. cit. (note 1), 13 and 18.

<sup>33</sup> Burial Register of St Michael Cornhill, op. cit. (note 2).

<sup>34</sup> Glass also noted the consonance between Henry Graunt’s age on dying from ‘old age’ and his son’s judgement of the age in years at which a person might be deemed aged. See page 24: Glass, Ogborn and Sutherland, op. cit. (note 3).

<sup>35</sup> Andrew Clark, ed. *Brief Lives, Chiefly of Contemporaries, Set Down by John Aubrey, Between the Years 1669 & 1696*, Vol. I (Oxford: Clarendon Press, 1898), 271.

<sup>36</sup> The parish registers of the York parishes have been transcribed and published. See Margaret FM Mulgrew (ed.), *The Parish Register of St Mary Castlegate, York: Volumes II, II & IV 1705–1837*

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(Yorkshire Archaeological Society Parish Register Section, 1972); Barbara Whitehead (ed.), *The Parish Register of St Olave, York, 1650–1785* (Yorkshire Archaeological Society Parish Register Section, 1993); R Beilby Cook and F Harrison (eds) *The Parish Register of St Crux, York: Volume II Marriages and Burials 1678–1837* (Yorkshire Archaeological Society, Parish Register Section, 1985); Egbert C Hudson, *The Parish Register of St Laurence, York 1606–1812* (Yorkshire Parish Register Society, 1935). See also notes 13, 14 and 23.

<sup>37</sup> Thomas Cogan, ‘Of the Age of the Partie’, in *The Hauen of Health* (London, William Norton, 1584), 193-9, reproduced in Lynn Botelho and Susannah R Ottaway (eds) *The History of Old Age in England 1600–1800 Volume I: The Cultural Conception of Old Age in the Seventeenth Century* (London: Pickering & Chatto, 2008), 57.

<sup>38</sup> Simon Harward, *Simon Harward’s Phlebotomy: or, a Treatise of Letting of Bloud* (London, Simon Waterson, 1601), 72-7, reproduced in Botelho and Ottaway (eds), *ibid.*, 61.

<sup>39</sup> Paul Johnson, ‘Historical Readings of Old Age and Ageing’, in Paul Johnson and Pat Thane (eds), *Old Age from Antiquity to Post-modernity* (London: Routledge, 1998), 1-18, especially 4-5.

<sup>40</sup> From a ballad printed c. 1750: “Then Man appears to fifty Years/ Old Age doth on him call”; from another printed in 1775: “At eight times seven I waxed old”; from a medical treatise published in 1727 referring to: “the Case of Mr Meadows, who being upwards of Fifty six, was by many suppos’d to labour under the Effects of Age”. All taken from Lynn Botelho and Susannah R Ottaway (eds), *The History of Old Age in England 1600–1800: Volume 2: The Cultural Conception of Old Age in the Eighteenth Century* (London: Pickering and Chatto, 2008), 73, 94 and 120.

<sup>41</sup> For a discussion of changes in adult life expectancy in eighteenth and early nineteenth century England see 280-93 in E A Wrigley, R S Davies, J E Oeppen and R S Schofield, *English Population History from Family Reconstitution* (Cambridge: Cambridge University Press, 1997).

<sup>42</sup> See for example Lynn Botelho and Susannah R Ottaway (eds), *The History of Old Age in England 1600–1800* (London: Pickering and Chatto, 2008, 8 volumes); Susannah Ottaway *The Decline of Life: Old Age in Eighteenth Century England*, Cambridge: Cambridge University Press (2004); Pat Thane *Old age In English History: Past Experiences, Present Issues* Oxford: Oxford University Press (2000); Paul Johnson and Pat Thane (eds) *Old Age from Antiquity to Post-modernity* (London: Routledge, 1998); Shulamith Shahar *Growing Old in the Middle Ages: Winter Clothes Us in Shadow and Pain* (London: Routledge, 1997).

<sup>43</sup> Susannah R Ottaway, ‘The Decline of Life: Aspects of Aging in Eighteenth-century England’, PhD thesis, Brown University (May 1998), 62-64 and Figure 1.2.

<sup>44</sup> However, when information from personal diaries is added to Poor Law accounts, as is done in Ottaway (2004), *op. cit.* (note 42), Figures 1.2 and 1.3, page 60, the number of older individuals seems to increase. From inspection of these figures, 24 in 91 individuals, or just over one quarter, appear to have been labelled ‘old’ when aged 80 years and over, as compared to what looks to be 12 individuals in 81 cases in Ottaway’s thesis (*ibid.*). Nonetheless, Ottaway reports “no noticeable differences in the ages at which people of different social classes were considered old” (*idem*, 61).

<sup>45</sup> Marshall, *op. cit.* (note 18), Tables 10 and 15.

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<sup>46</sup> St Botolph Aldgate Parish Clerk's Memoranda Books, Guildhall Library MS 9234 Vol. 6 fol. 242r.