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The Female Mortality Advantage in the Seventeenth-Century Rural Low Countries

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ABSTRACT

Data from famines from the nineteenth century onward suggest that women hold a mortality advantage during times of acute malnutrition, while modern laboratory research suggests that women are more resilient to most pathogens causing epidemic diseases. There is, however, a paucity of sex-disaggregated mortality data for the period prior to the Industrial Revolution to test this view across a broader span of history. We offer a newly compiled database of adult burial information for 293 rural localities and small towns in the seventeenth-century Low Countries, explicitly comparing mortality crises against 'normal' years. In contrast to expected results, we find no clear female mortality advantage during mortality spikes and, more to the point, women tended to die more frequently than men when only taking into account those years with very severe raised mortality. Gender-related differences in levels of protection, but also exposure to vectors and points of contagion, meant that some of these female advantages were 'lost' during food crises or epidemic disease outbreaks. Responses to mortality crises such as epidemics may shine new light on gender-based inequalities perhaps hidden from view in 'normal times' – with relevance for recent work asserting 'female agency' in the early modern Low Countries context.

As a reflection on the various challenges and potential pitfalls facing evaluations of gender as a factor in demographic trends, this article provides empirical information that examines whether women in rural communities in the early modern Low Countries were dying at a reduced degree compared to men during periods of significantly raised mortality by systematically comparing the situation to 'normal times'. We find that contrary to expectations, women's potential biological or physiological advantages did not always translate into superior chances of survival. Gender-related differences in levels of protection, but also exposure to vectors and points of contagion, meant that some of these female advantages were 'lost' during food crises or epidemic disease outbreaks. Although much has been written in recent years on female agency, independence and participation in the context of the early modern Low Countries, the findings from this paper suggest that these facets did not lead to female welfare gains, may only have described urban women's experiences and/or had no positive impact on women's capacity to survive during crises. In fact, hyper-mortality events such as epidemics may shine new light on gender-based inequalities perhaps hidden from view in 'normal times'.

The primary evidence here is drawn from a newly compiled dataset of burial records from rural localities spread all across the Low Countries – comprising the

Dutch Republic to the north and the Southern Netherlands to the south – and which span the entirety of the seventeenth century.[1] Overall, this is one of the largest samples of sex-disaggregated mortality information for the pre-industrial period so far produced for anywhere in the world. The area covered includes a wide range of rural societies with diverse forms of agricultural organisation: from large-scale capital-intensive tenant farms (often, though not always, in coastal areas), to smaller-scale labour-intensive farms combined with proto-industries typical of inland Flanders, to peasant smallholders with extensive common lands more often found in eastern parts of the Dutch Republic.[2] Included in the database are villages and hamlets, but also small towns of fewer than 5,000 people (and frequently fewer than 3,000 people). The particular quality of this database lies in its arguable consistency and representative character. The data collected is based on the same (relatively) standardised source over time and space, encompassing a large number of localities over a significant time span. Moreover, the records show low levels of female exclusion, with the proportions of males and females recorded matching statistical expectations for demographic structure in early modern northwest Europe.

Female demography: Between the missing and the advantaged

Discussions of gender and demography are bedevilled by problems of evidence and assumption that stand as a problematic counterpoint to the urgent issues of women's status and existence – what we might term their 'biopolitical precarity' – in specific contexts. Some parts of the world today such as China have 'missing women' – fewer women in the population than men – likely the consequence of sex-selective infanticide and other forms of son preference.[3] However, in most contemporary, economically developed countries – and now increasingly in many developing and underdeveloped countries – women have a mortality advantage, exhibiting higher life expectancy than men.[4] This is a departure from the situation in the nineteenth and early twentieth centuries in industrialising Europe, where historical case studies have shown considerable levels of excess adult female mortality compared to men, an imbalance attributed to factors such as capitalistic transformations of the agricultural sector and the rise of male breadwinner economic culture – with excess female mortality much more prominent in rural areas.[5] What, however, can be said for female mortality trends during specifically 'crisis' conditions? Although development agencies and charities, and also some academic literature, often suggest that terrible contemporary disasters hit women and children to a much harsher degree than men, evidence from sex-disaggregated mortality figures often runs counter to this.[6] Indeed, during famines, for example, an assortment of modern and historical mortality data has been produced which point to a so-called 'female mortality advantage'.[7] Indeed, it has been stated that 'the evidence that females survive [famines] better than males is by now overwhelming'.[8] Although scholars have advanced a number of social and cultural factors in the phenomenon, still the dominant explanation relies on biology and physiology. According to the 'body fat hypothesis', females store more body fat than males, with less muscle, and being smaller and lighter with a slower metabolism, are likelier to survive acute malnutrition.[9]

On the surface we may question the logic of the 'body fat hypothesis', since we now know that death through outright starvation during famines is not as common

as once thought, but rather lack of access to food instead exacerbates the spread of nutritional-deficiency-based diseases, diseases caused by dubious food replacements and exposure to new pathogens through migration and social upheaval.[10] Accordingly, since famine is a more complex problem than simple starvation, women's specific advantage in dealing with malnutrition might be considered less of a factor. Nevertheless, greater female body fat stores offer an advantage for women by also providing higher leptin levels – a key driver of the responsiveness of the body's immune system.[11] Testosterone, on the other hand, tends to reduce immunocompetence.[12] In fact, on the issue of epidemic disease alone, modern laboratory research into contemporary afflictions caused by bacteria, viruses, fungi and parasites suggests that women are intrinsically more resistant and therefore have lower mortality risk than men.[13] Only a few exceptions have been noted – such as malaria, chronic obstructive pulmonary disease and measles – that disproportionately affect women (particularly pregnant women in the first case).[14] In a recent study, a number of examples of both famines and epidemic diseases from the late eighteenth to the twentieth century show a female mortality advantage, and given that this female advantage was even stronger among infants – arguably an age before social factors could take hold – this provides further support for the biological explanation.[15] Overall, then, it is suggested that during times of raised mortality caused by epidemics – whether related to malnutrition or not – women are out-surviving men to a significantly discernible degree. Given that throughout the world going back into the past, but even today, women have often had unequal access to rights, freedoms, resources and welfare, this is curious, but suggests that biological factors may have had a strong role to play in this outcome.

One problem identified, however, is the lack of historical depth to this issue. For example, Cormac Ó Gráda optimistically asserts that there is 'overwhelming' evidence for a female mortality advantage during famines, but we might ask whether this is actually the case. Most information we have comes from the second half of the nineteenth century onward, and frequently later.[16] In fact, when we look at the few sparse examples of evidence for periods prior to the Industrial Revolution, documentary sources for the early seventeenth century and bioarchaeological investigations for the late Middle Ages have tentatively suggested that the sex-selective nature of famine mortality may not have been as sharp as seen for the modern period.[17] Furthermore, recent bioarchaeological studies for the medieval period have conversely emphasised the vulnerability of young urban women to respiratory and infectious diseases.[18] A major hurdle, however, is the general lack of sex-disaggregated mortality data for the pre-industrial period. Most historical studies on male–female mortality patterns tend to focus on the period after industrialisation.[19]

Where we do have sex-disaggregated mortality information for the pre-industrial period, sample sizes are often not large enough to make strong claims, especially given that any differences in the sex ratios are often small. This can be seen with some research on the potential sex-selective impact of plague (caused by the bacterial pathogen *Yersinia pestis*). Some literature points to higher male mortality, some to higher female mortality and some to negligible differences, and although very recent work has carefully employed a new micro-demographic database of information, it is still difficult to generalise based on case studies of individual localities at just one point in time.[20] One recent study has looked at a larger number of localities over a

longer time period using a standardisable source, although the conclusions are still tentative in light of the limitations of medieval demographic sources.[21] For bioarchaeological investigations, these sample sizes are even more limited in scope – sometimes only one or two burial sites at one moment in time, even if there is great potential in combining documentary and bioarchaeological data to better understand selectivity in mortality.[22]

Of course, there may be a number of factors that dissuade scholars from uncovering sex-disaggregated mortality information going back into the past. For the nineteenth and twentieth centuries, we have sophisticated censuses, often already digitised, which provide all of the demographic variables needed. Furthermore, scholars of the nineteenth and twentieth centuries tend to have reliable information on sizes of populations and the numbers of men and women proportionately living within those populations. For the pre-industrial period, we generally do not have these kinds of censuses, and often we cannot rely on digital databases and indexing but have to collect and transcribe all the information ourselves – even if the original manuscripts have been made available online. Furthermore, we have very inexact estimates of population levels for the late Middle Ages and early modern period (especially in the countryside), and a very limited understanding of the proportions of men and women that made up these populations. Another complication, especially for the medieval period, is that both documents and cemetery data sometimes have intrinsic biases that underrepresent women.[23] Just like mortality rates, attempts to calculate sex differences in life expectancy are also limited by the lack of direct information prior to the eighteenth century on ages of death (and in fact what we have is often just for males), where we are instead reliant on samples from unrepresentative environments or social groups, or have samples that are fairly small-scale in light of the arduous and time-consuming nature of family reconstitution methods.[24]

That is not to say that the situation is hopeless. Although we may not be able to calculate absolute figures of men and women dying in the pre-industrial period as a proportion of the resident population, we can instead calculate relative figures – how they change over time in the same localities. In particular, we can identify sex ratios in mortality during mortality crises and compare these to 'normal mortality' times – shedding light on whether women were indeed more resilient to diseases, as suggested in modern laboratory studies. The need for an understanding of how many men or women were resident in a particular locality is unnecessary since we are simply interested in the relative change. This is dependent on first being able to identify and separate mortality crises from non-crisis periods, and second having a large amount of sex-disaggregated mortality data from a standardised source across a large enough geographical area and a long enough chronological time series that allows us to place male–female mortality ratios within a relative spatial and temporal perspective. These two methodological aspects are now discussed in turn with regard to the database of burial records employed in this article.

Identifying seventeenth-century mortality crises

To understand the impact of mortality crises on sex differentials in mortality, we have to first determine which years were in fact marked by significantly raised mortality. We do this using the seventeenth-century burial records themselves. The burial records

are unsuitable sources for calculating absolute aggregate figures for total amounts of death in a particular locality because they likely do not fully record all deaths – children, in particular, were not always systematically recorded. Adults, however, do appear to often be systematically and quite fully recorded – burial in consecrated church ground was, in the early modern Low Countries, both for the Dutch Reformed and the Catholics, and poor people often received a cemetery burial paid through the local poor table.[25] Even poor migrants were recorded – sometimes anonymously and sometimes with their place of origin. Furthermore, an increased value of the burial records is that they can be used *relatively* to compare deaths across space and time: thus, we can compare adult deaths in one year to an average trend level within a locality and repeat these comparisons between localities. The only assumption here is that quality of scribal practice remains roughly constant across time within those localities chosen.[26] Although the burial records give more specific dates of death and burial (sometimes just burial, sometimes both), for the purposes of such a large database used in this article with 262,985 individual adult burials spread across 293 hamlets, villages and small towns, annual data is not only workable but also sufficient – particularly because the high mortality point for many epidemics rarely crosses from December into January since intensity tends to be lost over the winter after peaking in the late summer and autumn (especially August, September and October).[27]

The method of calculating severity of mortality crises used in this article is one recently employed by Guido Alfani and has had recent adaptation and use.[28] The technique is very suitable for the purposes of seventeenth-century burial records with gaps and missing years and requires no other information apart from burial data itself. It is simply a matter of comparing burials in a particular year in question to an average burials trend from the 'previous years', expressed as a percentage. To calculate the trend, we skip a year back in time from the year in question and take an average for the past five consecutive years, not including highest and lowest figures. An indicator of a mortality crisis was when 'short-term perturbation of mortality reduces the dimensions of the generations so much that they are unable to reproduce themselves entirely even when making full use of their potential for recovery' – that is through the twin powers of nuptiality and fertility.[29] It has been suggested that the minimum figure for that to occur was an increase in burials of 50 *per cent* above the previous years' trend.[30] However, for the purposes of this article, to increase our confidence that we are capturing actual mortality crises, we distinguish mortality crises for each locality as at least a 100 *per cent* increase in mortality over the trend – in other words, a doubling of mortality over the trend in a particular year. This process is repeated for every single locality within the database, and it is important to perform this on a locality-by-locality basis, rather than simply applying an overall yearly average for the whole rural Low Countries, since epidemics and famines did not always spread over vast territories or hit all localities with the same timing.

The approach here is to use a basic distinction between 'mortality crises' and 'normal' periods. We do not try to retrospectively diagnose the causes of mortality, and there are good reasons for not doing so. The difficulty in identifying and diagnosing diseases retrospectively for the pre-industrial period in the absence of confirmative DNA evidence is acute; indeed, it was the central issue behind a strong debate between historians over whether the Black Death of 1346–53 really was 'plague' – a

debate only resolved in recent years with advances in genetics.[31] Although it is possible to identify plague outbreaks, for example, based on explicit mentions of '*peste'* in the documentary sources, we have to assume that (a) *peste* refers to plague and is not being used as a generic term for any kind of disease, and (b) if it does refer to plague, contemporaries were correctly making the right diagnosis themselves (something difficult for trained medics in the twenty-first century).[32] Furthermore, we still have a remaining issue that many of the seventeenth-century plague outbreaks in the Low Countries also occurred simultaneous to a plethora of other diseases – typhus, dysentery, influenza, smallpox and tuberculosis being some of the most common.[33] As noted in the burial registers themselves, even in the worst plague epidemics such as in 1636, people were also dying of dysentery (referred to as '*rode loop*', '*rode melisoen*' or merely '*dissenteria*'), and in certain epidemic outbreaks such as in 1646 in parts of Flanders, some localities mentioned as many as eight different disease classifications, descriptions or symptoms all in that same year.[34] Furthermore, many of the terms often employed were vague: '*ex contagione*' could refer to many kinds of contagious diseases, while '*koorts*' or '*febris*' could refer to many kinds of diseases associated with fever – typhus, typhoid fever, malaria, sweating sickness, influenza and so on.

What we can say, at the very least, is that almost all mortality crises identified using the methods described above were caused by epidemic diseases. Indeed, floods brought with them minimal and at best localised casualties in the early modern Low Countries.[35] Military action rarely led to the direct mass killing of civilians, with most deaths caused by conflict stimulating either harvest failures or epidemic diseases or both.[36] Direct famine mortality through starvation was rare – perhaps almost absent – in the seventeenth-century Low Countries, but those periods in which spikes in rye prices (indicative of pressures on food) did occur, for example, any raised mortality seen was connected to the spread of diseases by the mechanisms described above.[37] Accordingly, the mortality crises that we distinguish from 'normal' periods were either diseases connected to hardship (perhaps caused by conflict or dearth or both together) – such as dysentery and typhus – or diseases unrelated to hardship and connected to exposure to vectors such as plague and malaria. The difficulty in unpacking the precise cause of mortality crisis between disease, food crisis, migration and conflict – where all features were often present at the same time – in a systematic way for all localities across all years of the seventeenth century (especially given food crises were often localised processes), dissuades us from using any further fine-grained typology of crisis beyond raised mortality at the annual level on a locality-by-locality basis.

Sex-disaggregated burials data: Source and methodological issues

The sex-disaggregated mortality data has been collected from the original burial record manuscripts, which have often been digitised by various archives across the Low Countries and from printed transcriptions (see Appendix 1 for the precise references and exact localities). Adult males are easily identifiable through their full names, and adult women are sometimes identifiable through their full names, though also often through their relationship status to others – either as wives, widows, mothers, sisters or daughters.

Table 1 below shows the overall temporal distribution of the specifically sex-disaggregated mortality data we have for the seventeenth-century rural Low Countries – separated by individual localities and numbers of individual adult burials. Overall, there are 293 localities (131 in the Dutch Republic, 162 in the Southern Netherlands), which comprise 262,985 individual adult burials. There is a higher proportion of burial data as we move further into the seventeenth century, since it is rare to find many localities that have series which cover the entire century.[38] This issue is particularly relevant for this article where we are only using rural data: localities in the countryside tended to begin to record burials later in the seventeenth century than urban ones. In fact, only two out of 293 rural localities provided adult sex-disaggregated burials unbroken for the entire period 1600–99 (Hombeek and Gierle in Flemish Brabant), although a larger number of localities provide burials for ninety or more years. The average coverage of the seventeenth century per locality across the whole dataset was just over fifty-three years. In order to make sure we have enough localities covering enough of the seventeenth century, we excluded all places with fewer than twenty-five consecutive years of data. In addition, we excluded all localities where across a period of twenty-five years the average annual number of burials is fewer than five to guard against any false identification of epidemics.

There are some methodological points to make with specific regard to the seventeenth-century burial records from the rural Low Countries and their specific use for reconstructing sex-disaggregated mortality information. First, this article only considers adult sex-disaggregated mortality – those aged fifteen and over. Although recent scientific studies have summarised large amounts of evidence that suggest the female mortality advantage during epidemics and famines also applies to infants and children, perhaps to an even greater degree based on greater biological frailties for infant boys, our sources do not allow us to approach this topic for the seventeenth-century Low Countries.[39] Unfortunately, not all burial records list children, and some that do only list them partially or unsystematically over time. In those localities where children were systematically recorded (more often in cities), infant mortality was roughly equivalent to adult mortality, and, in the largest cities, infant mortality frequently exceeded adult by some way (an adult–child mortality ratio of 0.74 for seventeenth-century Leiden, for example). However, those burial records that do explicitly separate adults and children often refer to them with generic terms such as '*proles*', '*kind*', '*enfant*' and so on, and therefore their sex is often hidden if their first names are not mentioned. One challenge is that specific ages are also not often provided, so it is difficult to say what 'childhood' status meant to the compilers of the burial records, although those that do simultaneously mention both 'child' status (such as '*kind van*') and a specific age tend to be below fifteen years. Sometimes the term 'son of' or 'daughter of' is used, and for the purposes of this article, they have been included as children in the database too (under the age of fifteen) and thus not part of the overall adult sex ratio in mortality figures. This term also sometimes referred to offspring who were actually adults (often young single adults still living in their parents' home), but in most cases where we do see the terms 'daughter of' or 'son of' together with a specific age, they tend to be below fifteen years.[40] If we find explicit evidence to the contrary (an actual age of fifteen or above together with 'son/daughter of' status), then they are included in the adult mortality figures. It goes without saying that the lack

Table 1: Temporal distribution of seventeenth-century sex-disaggregated adult burial data, rural Low Countries

	No. of localities	No. of burials	No. mortality crisis burials	No. normal burials	Average coverage of 17th century
Dutch Republic	131	114,235	26,315	87,920	47%
S. Netherlands	162	148,750	32,481	116,269	58%
TOTAL	**293**	**262,985**	**58,796**	**204,189**	**53%**
Years: 1600–35	165	40,689	11,047	29,642	n/a
Years: 1636–70	269	100,432	23,748	76,684	n/a
Years: 1671–99	271	121,864	24,001	97,863	n/a

Source: See the burial records database in the Appendix.

of systematic evidence for ages also means that a fine-grained disaggregation of sex-disaggregated mortality data by age, possible for nineteenth- and twentieth-century studies, cannot take place.

A second methodological point to address with specific reference to crisis mortality in the rural seventeenth-century Low Countries is that many were connected either directly (via infection) or indirectly (via hardships) to human conflict, even if this link is exceptionally complicated to unravel. The seventeenth century experienced a large amount of troop activity, which included the Dutch Revolt (1568–1648), the Thirty Years' War (1618–48), the Franco-Dutch Wars (1672–8) and the Nine Years' War (1688–97, among others. These conflicts were incredibly exacting for communities – particularly in the countryside – as soldiers caused more death than usual by spreading diseases among residents of the communities they interacted with.[41] Many soldiers died too, however. Some were buried in cemeteries connected to plague houses (*pesthuizen*) and hospitals (*gasthuizen*), especially if they were being treated there for injuries or sickness. This is seen from the burial records of Our Lady's Hospital in Mechelen, which listed 358 soldiers out of 853 total burials for the institution in the years 1692–7 (42 *per cent*), at the height of the Nine Years' War.[42] It is helpful, therefore, that this article restricts itself to rural localities or at least smaller towns – and thus in the process excludes these kinds of institutions more likely to be found in large cities. Furthermore, by not including large cities, we exclude those localities that were more likely to have extremely skewed sex distribution of mortality through large numbers of resident soldiers in garrison towns. It must be acknowledged, nonetheless, that some soldiers were also buried in ordinary parish churches or cemeteries, even in villages, and this has strong relevance for assessing sex differentials in mortality through the church burial records. Soldiers, more likely to have been men, skewed the sex ratios in mortality towards the male side, especially during mortality crises given their close causal connection with warfare.[43] Accordingly, all remaining soldiers have been manually removed from the rest of the rural data as they were generally 'outsiders' and not resident in the communities themselves.[44]

A third methodological point to make is that we only use rural localities or small towns for the sex-disaggregated mortality data in this article – despite having this information available for some large cities. This helps with the issue of the soldiers mentioned above, but it also is a decision based on other practicalities. All large cities with more than 5,000 inhabitants (and mostly the towns in the database have fewer than 3,000 inhabitants) were not included for a number of reasons.[45] A first significant reason was the fact that large cities were more affected by short-term migration than other smaller localities and, especially during epidemics and other forms of social distress, were the specific subjects of heightened intense inward migration. Indeed, cities such as Leiden, that lost possibly 35–40 *per cent* of their population during an epidemic of 1635, recovered and even greatly exceeded their pre-1635 populations within a matter of ten years.[46] People flocked to the Holland cities in the seventeenth century, for example, and especially Leiden, as migrants looked to benefit from the high real wages and employment opportunities offered in the textiles industries, sometimes immediately taking up vacancies from the dead.[47] Such rapid and intense migration, intrinsically related to mortality crises, could easily create very sudden short-term skews in the sex distribution of the resident population, in turn skewing the

male–female distribution of mortality in epidemic years. The point being that while rural localities and smaller towns experienced migration dynamics too (more likely some outward migration after crises), it was not of the same intensity and degree as a few select large cities being the specifically chosen post-epidemic destination for migrants.[48] Recent literature, furthermore, has also provided some evidence which suggests rural flight during epidemics, conflict and food crises might have been less significant in the seventeenth-century Low Countries than previous suppositions based on anecdotal examples.[49] Nevertheless, if we do accept the view that during mortality crises (a) rural-to-urban migration heightened, and (b) it was skewed more towards poor women moving to the cities (attracted by work, poor relief and medical care), a general trend already noted for the most urbanised areas of the early modern Low Countries, we could expect that any results in this article from our rural communities may overstate the proportion of male mortality – simply because more women have suddenly migrated away in the raised mortality year.[50] This process may have been limited by cities deciding to prevent inward migration during epidemics, perhaps out of concern over outside contagion sources (there are early modern examples of urban governments in the Low Countries instructing citizens not to harbour 'outsiders').[51] Nevertheless, the rapid recovery of urban populations within even a few years (see the Leiden example mentioned above) suggests this was entirely ineffective or at least a very temporary measure – understandable given that urban economies were entirely dependent on their networks and interaction with other localities.

A second reason for only focusing on rural localities or localities of fewer than 5,000 inhabitants is that many of the larger cities tended to bury their dead, especially during epidemics, in institutions separate from the ordinary churches – places such as cemeteries connected to hospitals and plague houses. This would not be a problem if these institutions offered no obvious selection or exclusion – like the church burial records. However, there is evidence that these institutions were socially selective – and this selection went along the lines of socio-economic status and sex. Indeed, reports from 1614 showed that the St. Catharine Gasthuis in Leiden had five women's rooms and only two men's rooms, while the St. Elisabeth Gasthuis accepted only women, and even the *dol-* and *pesthuizen* were inequitably divided (three women's and two men's rooms).[52] Accordingly, if a larger number of women were being recorded as deceased within these kinds of public health institutions then this has a knock-on male skew for city burials in the ordinary churches – further complicated because cities did not just have one church burial institution but often many scattered across various neighbourhoods or parishes. More problematic still was the fact that while some cities do provide burial records for plague houses and hospitals, many do not – therefore creating artificial disparities in the dataset (between localities with these institutions and those without) and more importantly the likelihood of large numbers of 'missing women' in the record. Furthermore, on those occasions where cities do provide plague house or hospital deaths, they are sometimes simply listed without a sex marker (that is, anonymous deaths), which has the same effect of us possibly upwardly exaggerating the level of male mortality through only having sex-disaggregated information from the churches.

This skew was exacerbated during mortality crises, when larger segments of the population found themselves in these kinds of institutions, and, in fact, being sent

to one of these institutions likely represented a death sentence in itself. For example, 56 *per cent* of those taken into the Gouda plague house in the period 1617–35 died, and similarly within the epidemic outbreak of 1624–6, 439 out of 865 intakes (51 *per cent*) in the Rotterdam plague house died.[53] Unsurprisingly then, people tried to avoid forced public health removals during plagues, and once confined were even found trying to escape – as seen in the case of two women from Delft in 1665 who fled the plague house and were later thrown into a house of correction as a result.[54] The same issue can also be attributed to deaths simply described as '*arme*' (burials financed through poor relief), which were also often listed without sex marker. Those marked as '*arme*' may also have been significantly made up of women given that it has been argued for seventeenth-century Delft and eighteenth-century Leiden that women were structurally receiving poor relief to a greater degree than men (generally, twice as many women as men).[55] Naturally, the number of '*arme*' or '*pauper*' deaths increased during mortality crises. Given the large number of 'unsexed' 'institutional' mortalities, the fact they increased during mortality crises, and that they may be artificially biased towards one sex over another, together with the basic issue that we do not always have surviving plague house and hospital records, means that large cities are too problematic to include in the seventeenth-century sex-disaggregated mortality data.

Overall, a number of steps are taken in this article to produce sex-disaggregated mortality evidence that allows for systematic comparison between mortality crises and 'normal times'. First, for each rural locality, we identify the main mortality crises (a 100 *per cent* or more increase in burials above the trend of the 'previous years'), and second, we calculate all the male and female adult deaths in years identified as mortality crises, and calculate all the male and female adult deaths in years with no discernibly high mortality. Third, this locality-by-locality data is consolidated into an overall total of male–female adult deaths across the seventeenth century – comparing mortality crisis and normal years. The sex ratio in mortality is simply male deaths over female deaths – the further over 1 the figure goes, the higher the proportion of men dying to women. A figure of 1 is parity in male–female deaths.

Sex differentials in mortality: Mortality crises and normal times

Table 2 reveals that of the 293 rural localities included in the seventeenth-century database, there was a statistically significant lower sex ratio in mortality for mortality crises when compared to normal years (1.03 compared to 1.05). According to the theories on the female mortality advantage, we might have expected a substantially higher sex ratio in mortality (more men dying) in years of higher excess mortality – so these figures immediately lend support to the cautionary warnings about the assumptions connected to the female mortality advantage principles that were presented in the introduction to this article. These are relative mortality figures rather than absolute figures, and thus the sex ratios of a locality's resident population should not matter since we are concerned with a locality's sex ratios in mortality in one year relative to another. That is to say, a 'skewed' sex ratio in a resident population – for example, substantially more adult women living in a locality – would be a 'starting condition' present for the mortality crisis years as much as the normal years. It could have been the case that sudden short-term outward migration from the rural communities during mortality crises might have affected these results; however, if we consider that

Table 2: Sex-disaggregated adult burials in 'mortality crisis' and 'normal' years in the seventeenth-century rural Low Countries

	1600–35		
	Male	**Female**	**Sex ratio**
Mortality crisis	5,605	5,442	1.03
Normal	15,211	14,431	1.05
Chi Square		1.053 with 1 degree of freedom, P value = 0.3049	
	1636–70		
	Male	**Female**	**Sex ratio**
Mortality crisis	12,047	11,701	1.03
Normal	39,237	37,447	1.05
Chi Square		1.379 with 1 degree of freedom, P value = 0.2403	
	1671–99		
	Male	**Female**	**Sex ratio**
Mortality crisis	12,134	11,867	1.02
Normal	49,971	47,892	1.04
Chi Square		1.954 with 1 degree of freedom, P value = 0.1621	
	Seventeenth century, 1600–99		
	Male	**Female**	**Sex ratio**
Mortality crisis	29,786	29,010	1.03
Normal	104,419	99,770	1.05
Chi Square		4.164 with 1 degree of freedom, P value = 0.0413	

Source: See the burial records database in the Appendix. For the Chi Square test, a P value of 0.05 should be seen as statistically significant: R. Fisher, *Statistical Methods for Research Workers* (London: Oliver & Boyd, 1950), p. 80.

rural–urban migration in the early modern Low Countries tended to be sex-selective towards women, this would mean fewer women in the villages themselves (compared to 'normal' times), and thus more women dying than men in mortality crises should be seen as an even stronger finding.

Nevertheless, given that we are assessing a long period of one century, migration could become an issue of significance if more men or women slowly decided to live in a locality over time, through long-term migration patterns, for example, and at the same time a skew in the ratio of mortality crisis to normal years occurred over time (that is, more epidemics clustered in a certain part of the century). Table 3 below does show that deaths during mortality crises were less frequent in the later stages of the seventeenth century than in the first half. This is not unexpected given that the final outbreak of the Second Plague Pandemic occurred in the late 1660s in the Low Countries, and that severe plagues in particular were seen in the rough years 1602–5, 1624–5 and 1635–7.[56] Other epidemics connected to dysentery in 1676 and famine-related diseases in 1693–4, for example, could not compensate for the eradication of plague-related mortality.[57] However, although there were fewer epidemic-related burials in the later phases of the seventeenth century, this does not appear to be overly problematic. This is because the overall male–female mortality ratios (where we include burials in both mortality crises and normal times) for the three sub-periods in Table 2 remained consistently at around 1.03–1.04 – *indirectly* suggesting that there was little shift in the male–female distribution of resident populations over time.[58] This is highly likely given that we limited ourselves to rural localities, and thus localities less subject to very sudden, rapid and intense migration dynamics as seen with the very large cities, as already explained above. The effects of long-term migration are also mitigated by splitting the sex-disaggregated mortality results into three shorter sub-periods. In further support of the argument here, we find there was little qualitative change in any of the results seen between the three sub-periods – each one producing a narrowly higher amount of female mortality during mortality crises when compared to normal years – even if we note that none of the results for the three shorter periods were statistically significant. We cannot yet be absolutely definitive with our assessment that mortality crises led to higher adult female mortality than normal in the seventeenth-century rural Low Countries, but at the very least we can assert that there was no clear female mortality advantage over men.

When we only focus on epidemics that caused very high mortality, however, the view that there was no clear female mortality advantage is strengthened further, as seen in Table 4. Indeed, previous literature has shown that different epidemic outbreaks could be more severe than others, and even within the same outbreak, not all regions, or even localities within a region, were equitably afflicted.[59] While a basic marker for a mortality crisis in a locality in this article has been set at a 100 *per cent* increase in burials above the trend of the 'previous years' (higher than the 50 *per cent* marker used in other recent works), it is clear that some localities experienced spikes that were incredibly damaging – sometimes as much as a 900 *per cent* (tenfold) increase compared to the trend mortality of previous years.[60] If we consider a 'normal' death rate per year of four *per cent* of the population at this time, this would amount to more than 40 *per cent* of the resident population.[61] Accordingly, then, sex-disaggregated burial results have also been provided in Table 4 (below), comparing only those years

Table 3: Mortality crisis adult burials to normal year adult burials in the seventeenth-century rural Low Countries

	1600–35	1636–70	1671–99	17thc., 1600–99
Mortality crisis	11,047	23,748	24,001	58,796
Normal	29,642	76,684	97,863	204,189
Ratio	0.37	0.31	0.25	0.29

Source: See the burial records database in the Appendix.

Table 4: Sex-disaggregated adult burials in 'severe mortality crises' and 'moderate crises/normal years' in the seventeenth-century rural Low Countries

	All		
	Male	**Female**	**Sex ratio**
Severe mortality crises	9,296	9,458	0.98
Moderate and normal	124,909	119,322	1.05
Chi Square	17.304 with 1 degree of freedom, P value = <0.0001		

Source: See the burial records database in the Appendix. For the Chi Square test, see notes to Table 2.

with mortality crises classified as 'very severe' with those years classified together as 'moderate/weak mortality crises' and 'normal times'. The benefits of this approach are that we also become much more confident in accurately recording 'true' and significant mortality crises and in turn reduce the likelihood of mistaking a spike in a certain locality for simply undiscerned changes in scribal recording processes. Given that previous literature has identified a 300 *per cent* increase in burials over the trend of the previous years as a relevant threshold to distinguish from 'moderate' mortality crises, 'severe mortality crises' are identified in all localities in which the yearly burials increased at or above this figure.[62] Interestingly, the results we take from just the severe crises database in Table 4 move us even further away from the expectations derived from previous research conducted into the female mortality advantage. That is to say, many more women tended to die during severe mortality crises when compared to a combination of moderate crises and normal years (0.98 compared to 1.05), with very strong statistical significance.

Social contextualisation of sex-selective mortality during crises

The empirical results from the seventeenth-century burial records in the Low Countries indicate that there was no female mortality advantage during mortality crises, and when isolating only severe mortality episodes, any female advantage completely disappeared when compared to normal times, and even reversed. That is to say, women did not survive in higher numbers compared to men during the most serious crisis periods, something that goes against our expectations taken from the nineteenth- and twentieth-century historical studies and modern laboratory research. Of course, given that this study has only focused on adults above the ages of fifteen, it may be the case that any extension of the female mortality advantage during raised mortality periods can only be found within younger cohorts. We cannot rule this out given that the female mortality advantage during crises was strongest among children in a recent *Proceedings of the National Academy of Sciences* study, and linked to biological vulnerabilities in boys at a very young age.[63] Given that this article only uses rural localities or smaller towns, it may also be the case that the female mortality advantage during mortality crises was more visible in larger urban environments. Indeed, previous historical literature for the nineteenth and twentieth centuries has shown cases of excess female mortality to be more exaggerated in rural environments for a number of different social and economic reasons.[64]

Nevertheless, the absence of favourable (relative) mortality outcomes for adult women during crises still contradicts expectations and is in need of explanation. Indeed, if we still accept the basic biological and physiological principles of the female mortality advantage during crises, these results suggest that certain societal conditions can conspire in certain contexts to reduce or even eliminate these biological advantages – perhaps through inequities in access to resources, welfare and protection, or exposure to points of contagion. This could represent a considerable difference behind the pre-industrial female experience of mortality crises and female experience of similar spikes after the Industrial Revolution. Curiously enough, the findings are doubly unexpected given that some historians in recent times have put strong emphasis on high levels of female agency or independence in the early modern Low Countries – pointing to late ages of marriage, a lack of universal marriage for women and high

levels of female participation in various economic activities beyond the household.[65] The results of this article suggest that, if we accept such a narrative, it may also be the case that female agency, independence and participation did not translate into female welfare gains, may only have described urban women's experiences and/or had no positive impact on women's capacity to survive during crises.[66] The last option may indeed be especially plausible given that scholars have suggested that those places with the lowest levels of economic development in pre-industrial Europe often exhibited the highest life expectancies; in other words, economic 'successes' are not necessarily linked to favourable mortality outcomes before industrialisation.[67] Accordingly, the heightened level of female mortality shown in this article might reveal certain kinds of structural gender-based inequalities – and vulnerabilities for certain adult women – that were obscured from view in 'normal times'.

There are clearly a number of female burdens, hardships and prescribed roles that might have been influential and future research beyond this article should look to systematically analyse their impact. A first and intuitively logical reason may lie in women's pregnancy conditions. Childbirth in 'normal times' was an exceptionally dangerous affair for women in practically all pre-industrial societies, and it has been suggested that risks during pregnancy and during childbirth increased substantially in conditions that could lead to outbreaks of disease. Malaria, for example, is known to be particularly debilitating for pregnant women through fevers and anaemia, which is highly relevant when considering that the condition was endemic in many parts of the Low Countries throughout the early modern period.[68] We may, however, have to question to what extent childbirth-related mortality was a quantitatively significant enough phenomenon to account for not only the loss of the female mortality advantage, but its complete reversal in the Low Countries figures.[69] This is difficult to substantiate through the burial records given that although death in childbirth was mentioned explicitly for many localities at certain times, it was not recorded systematically for all localities – just as disease symptoms were not recorded systematically.

A second, more plausible, reason for the loss of female mortality advantage during raised mortality in the seventeenth-century Low Countries may have been the higher proportion of women undertaking caregiving roles or providing dangerous disease-related services than men. Literature for late medieval England and Iberia has shown this gender-based inequality in household care tasks, and in the seventeenth century in England it was older women who were mainly charged with the task of examining and codifying diseased bodies during epidemics.[70] For sixteenth-century France, it has been remarked that 'piecemeal work performed by women was integral to maintaining public health', and women were also paid to take dysentery sufferers into their own homes for care.[71] Furthermore, even in times of epidemics, women's heightened close bodily contact with others continued – for example, in the form of wet-nursing infants.[72]

The same appears to have been the case in the seventeenth-century Low Countries. To begin with, diseases such as plague, dysentery and typhus clustered spatially and temporally at a household level; that is to say, when one person was infected or sick within a household, there was a greater likelihood of another from the same household also succumbing to the same fate.[73] Adult women then bore a disproportionate share of the risks of exposure in this regard, as they were the main provider of within-household

care when other family members were afflicted – especially children. During plagues, this may not even have been in their own households, as the majority of paid carers and cleaners (in Dutch, *schrobbers/scrobsters*; in French, *héridesses*) were in fact women – at least from evidence from surviving notarial documents and financial accounts. While some women undertook the role of cleaner because they had been infected once and survived, this did not apply to all *schrobbers* – many of whom were simply drawn to the dangerous work by the lucrative financial rewards.[74] Similar findings have been presented from eighteenth-century Sri Lanka: adult women from large and higher status households had tendencies towards excess mortality.[75] The fact that we only took a rural sample of data may have exacerbated this trend somewhat. In rural areas adult women were more likely to be married and more likely to be part of larger households (with more people to care for), while in the cities gender-differentiated household care roles featured less since more women were single or at least part of smaller households.[76] Of course, women continued to take on disproportionate levels of the care-giving tasks after the Industrial Revolution too, but the significance of this factor may have declined with the incipient stages of the 'demographic transition' – where diseases based on household contagion patterns such as plague no longer played a role in overall crisis mortality dynamics.[77]

Conclusion

While this article does not dispute the biological or physiological principles associated with the female mortality advantage during mortality crises caused by famines and epidemics, it also shows that women's potential advantages did not always translate into superior chances of survival. Gender-related differences in levels of protection and welfare, but also exposure to vectors and points of contagion, meant that some of these female advantages were 'lost' during crises – especially when interacting with particular types of disease. Although much has been written in recent years on female agency, independence and participation in the context of the early modern Low Countries, the findings from this article suggest that this may not have supported women's capacity to survive during crises. Furthermore, on a related point, it should be noted that epidemics in the early modern period did bring with them new or additional lines of social control and persecution, from both authorities and within communities, even if – in line with the 'agency' narratives – women did not always passively accept these restrictions. Indeed, during plagues, sex workers were condemned and scapegoated, while women were often banned from funerals – in Amsterdam in 1602 on the miasma-informed rationale that 'their presence increased the dangers of contaminated air rising from the graves'.[78] As seen during contemporary struggles with COVID-19, restrictions on customary practices regarding the marking and commemoration of the dead – including funerals and burials – is highly traumatic.

Overall, then, it remains to be seen how frequently throughout history women's natural advantages were actually lost – only further sex-disaggregated mortality evidence going back further in time for a wider range of places will tell us whether the seventeenth-century Low Countries was something of an anomaly, or part of a broader pre-industrial pattern which is quite distinct from findings seen in the nineteenth and twentieth centuries.

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Notes

1. The Dutch Republic is roughly consistent with the present-day Netherlands, while the Southern Netherlands is roughly consistent with present-day Belgium, Luxembourg and a small portion of Northern France. The term the 'Southern Netherlands' rather than the 'Spanish Netherlands' is preferred since we also include the Bishopric of Liege and other smaller ecclesiastical fiefdoms not part of the original 'Seventeen Provinces' inherited from the Habsburg Netherlands. While the database covers the entire seventeenth century, not all individual localities do so – as discussed in the sources and methods section. For the list of exact localities and sources see Appendix 1 consultable at https://eur.academia.edu/DanielCurtis.
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25. D. Teeuwen, *Financing Poor Relief Through Charitable Collections in Dutch Towns, c. 1600–1800* (Amsterdam: Amsterdam University Press, 2016), p. 62.
26. Short-term crises – especially during conflict – did lead to sudden 'missing years' in the burial records, but there is nothing to say that when information was actually recorded by priests, it was of differing quality. Scribal quality did differ between regions and localities, but this is less problematic since the comparisons made are temporal within individual localities: B. van Besouw and D. R. Curtis, 'Death at a Distance? Warfare and Mortality in the Seventeenth-Century Low Countries', in B. van Besouw, 'On the Economic Consequences of Warfare in Early Modern Northwest Europe: Four Conceptual and Empirical Contributions' (unpublished PhD thesis, Utrecht University, 2019), p. 44.
27. Also, this is seen in the patterns of warfare, where campaigns would be consistent with an actual year – starting in the spring but not extending beyond the autumn and the cold and wet weather: van Besouw and Curtis, 'Death at a Distance?', p. 44. That is not to say there were no back-to-back mortality crises, but they tended to follow a pattern of dampening down of deaths over the winter and spring and rising up once again the following summer and autumn: see seasonal mortality in D.R. Curtis, 'Was Plague an Exclusively Urban Phenomenon? Plague Mortality in the Seventeenth-Century Low Countries', *Journal of Interdisciplinary History* 47 (2016), pp. 139–70, here pp. 156–58.
28. G. Alfani, 'Plague in Seventeenth-Century Europe and the Decline of Italy: An Epidemiological Hypothesis', *European Review of Economic History* 17 (2013), pp. 408–30; Curtis, 'Was Plague an Exclusively Urban Phenomenon?'; Alfani and Ó Gráda (eds), *Famine*; D. R. Curtis and J. Dijkman, 'The Escape from Famine in the Northern Netherlands: A Reconsideration Using the 1690s Harvest Failures and a Broader Northwest European Perspective', *The Seventeenth Century* 34 (2019), pp. 229–58.
29. Alfani, 'Plague', p. 418.
30. Alfani, 'Plague', p. 418.
31. On this issue, with its implications for plague historiography: M. H. Green, 'Editor's Introduction', *The Medieval Globe* 1 (2014), pp. 9–26.
32. J. Roosen and D. R. Curtis, 'Dangers of Noncritical Use of Historical Plague Data', *Emerging Infectious Diseases* 24 (2018), pp. 103–10, here p. 108.
33. Curtis, 'Was Plague an Exclusively Urban Phenomenon?'. Other afflictions that appeared in the early modern burial records included '*koorts*' or '*febris*' (fevers), '*tering*' or '*phthysis*' (tuberculosis), '*pokken*' or '*variola*' (smallpox), '*hydropica*' (dropsy), '*dysenterie*', '*rode loop*' or '*rode melisoen*' (dysentery), '*gangraena*' (gangrene), '*pleuritis*' (pleurisy) as well as general references to a '*subito mortua*' (sudden death) or '*ex contagione*', '*maladie contagieuse*' or '*infection*' (by contagion/infection). It is, therefore, not entirely correct that in the Low Countries 'parish registers do not mention the cause of death': in I. Devos and A. Janssens, 'Reconsidering the Burden of Disease in the Low Countries in Past Centuries', *Tijdschrift voor Sociale en Economische Geschiedenis* 14 (2017), pp. 5–24, here p. 7; although they are correct in that systematic mentions of causes of death are missing.
34. In Merchtem, Flemish Brabant, for example, we have references to (what we can infer as) smallpox, tuberculosis, dropsy, fevers, dysentery, pleurisy, gangrene, and plague in the same year.
35. T. Soens, 'Resilient Societies, Vulnerable People: Storm Surges and Coastal Floods in the North Sea Area Before 1800', *Past and Present* 241 (2018), pp. 143–77, here p. 161.
36. van Besouw and Curtis, 'Death at a Distance?', pp. 41–2.
37. Curtis and Dijkman, 'The Escape from Famine'.
38. Burial registration was only formally required in the Southern Netherlands from 1614 onward, even if some localities have earlier series of burials: van Besouw and Curtis, 'Death at a Distance?', p. 45.
39. On frail infant boys: Zarulli et al., 'Women Live Longer than Men'.
40. We also often find the combination of terms 'son of/daughter of' together with the term '*kind*' or '*puer/puella*'.
41. On the toll taken on rural communities through warfare: M. Gutmann, *War and Rural Life in the Early Modern Low Countries* (Princeton NJ: Princeton University Press, 1980); M. 't Hart, *The Dutch Wars of Independence: Warfare and Commerce in the Netherlands, 1570–1680* (London: Routledge, 2014); L. Adriaenssen, *Staatsvormend geweld: overleven aan de frontlinies in de meierij van Den Bosch, 1572–1629* (Tilburg: Stichting Zuidelijk Historisch Contact, 2007). On epidemic mortality via warfare: van Besouw and Curtis, 'Death at a Distance?'.
42. The original manuscripts can be consulted online at http://www.mechelsegenealogischebronnen.be/Databank.
43. Although women were known to be soldiers in early modern Europe, albeit in much smaller numbers: for example, see R. Dekker and L. van der Pol, *The Tradition of Female Transvestism in Early Modern Europe* (London: Macmillan Press, 1989), p. 92. At times, women also travelled with early modern armies,

especially before 1650: on this trend, see J. Lynn, *Women, Armies and Warfare in Early Modern Europe* (Cambridge: Cambridge University Press, 2008). There were no women accorded soldier status in the burial records database, although there were some women and children said to be a family member of a soldier.

44. Accordingly, it does mean that some ordinarily resident soldiers in rural communities were removed, although these are so few in number that they have little quantitative significance in a dataset of more than 262,985 people. For the limited numbers of soldiers in the church burial records: van Besouw and Curtis, 'Death at a Distance?', p. 45.
45. Measured by having achieved that population total at least at some point in the seventeenth century, with population figures taken from the Appendix to the dataset provided in van Besouw and Curtis, 'Death at a Distance?'.
46. R. van Maanen, 'De Leidse bevolkingsaantallen in de 16de en 17de eeuw', *Leids Jaarboekje voor Geschiedenis en Oudheidkunde van Leiden en Omstreken* 101 (2009), pp. 41–70, here p. 64.
47. E. van Nederveen Meerkerk, 'Market Wage or Discrimination? The Remuneration of Male and Female Wool Spinners in the Seventeenth-Century Dutch Republic', *Economic History Review* 63 (2010), pp. 165–86, here p. 180.
48. Localities with 2,000–4,999 inhabitants could also be classified as 'towns', but often this was merely connected to inherited city rights from the Middle Ages, and many of these localities were barely distinguishable from large villages. van Besouw and Curtis, 'Death at a Distance?', p. 58, 101.
49. van Besouw and Curtis, 'Death at a Distance?', p. 65.
50. On female migration to the cities: L. van de Pol and E. Kuijpers, 'Poor Women's Migration to the City. The Attraction of Amsterdam Health Care and Social Assistance in Early Modern Times', *Journal of Urban History* 32 (2005), pp. 44–60; A. Schmidt and M. van der Heijden, 'Women Alone in Early Modern Dutch Towns: Opportunities and Strategies to Survive', *Journal of Urban History* 42 (2016), pp. 21–38. It could be the case that migration connected to crisis mortality inverted the 'usual' or 'normal' sex-selective migration pattern (i.e. fewer women and more men starting to move to cities), but at present there is simply no evidence for that outcome – thus it is merely a hypothetical.
51. As noted in a plague ordinance from Tilburg in 1616: L. de Brouwer, ''De aenclevende sieckte'. De pest in Tilburg voor 1630', *Tilburg: Tijdschrift voor Geschiedenis, Monumenten en Cultuur* 13 (1995), pp. 3–13, here p. 6. Also a plague ordinance from Sluis in 1605: Zeeuws Archief Middelburg, Vrije van Sluis 1584–1796, 7, Stukken betreffende maatregelen tegen besmetting met pest, 1605, 1770–1771, no. 363, fos. 1–2.
52. R. Ladan, *Gezondheidzorg in Leiden in de late middeleeuwen* (Hilversum: Verloren, 2012), pp. 102–3.
53. J. M. Buwalda and E. O. Buwalda-Prey, 'Eenige gegevens over de pest te Gouda in de 17de eeuw', *Nederlands Tijdschrift voor Geneeskunde* 83 (1939), pp. 5663–71, here p. 5664; H. G. H. Brunner, 'Pest-epidemieën van de 15e tot de 17e eeuw te Rotterdam', *Nederlands Tijdschrift voor Geneeskunde* 90 (1946), pp. 620–4, here p. 623.
54. See, for example, a case whereby surviving children who had lost their parents to plague, simply refused to be brought to quarantined huts on the moors: Brabants Historisch Informatie Centrum, Den Bosch, Notarieel protocol Den Dungen, 5115, no. 3, fo. 85 [21/11/1646]. For the plague house flight case: Stadsarchief Delft, Archieven van het stadsbestuur van Delft 1246–1813, Register van vonnissen in strafzaken, no. 2387, fo. 122v [6/4/1665]. Thanks to Eveline Kaiser, Stadsarchief Delft, for directing me to this document.
55. G. P. M. Pot, *Arm Leiden. Levensstandaard, bedeling en bedeelden, 1750-1854* (Hilversum: Verloren, 1994), pp. 263–64; I. van der Vlis, *Leven in armoede. Delftse bedeelden in de zeventiende eeuw* (Amsterdam: Prometheus, 2001), pp. 64–5.
56. Curtis, 'Was Plague an Exclusively Urban Phenomenon?', p. 146. Also R. Rommes, 'Plague in Northwestern Europe. The Dutch Experience, 1350–1670', *Popolazione e Storia* 16 (2015), pp. 47–71, here pp. 53–5.
57. Though this dampening down of epidemic mortality in the late seventeenth century was not inevitable, despite the disappearance of plague: see the increased death rates in this period in southeast England: M. J. Dobson, 'The Last Hiccup of the Old Demographic Regime: Population Stagnation and Decline in Late Seventeenth- and Early Eighteenth-Century South-East England', *Continuity and Change* 4 (1989), pp. 395–428. This might be because plague was a less significant disease for the seventeenth-century English countryside than the Low Countries.
58. The fact that the figures were always more than 1 conforms to our expectations that, by the seventeenth century, more women lived in the cities and more men lived in the countryside in the Low Countries.

59. Curtis, 'Was Plague an Exclusively Urban Phenomenon?', p. 168; Curtis and Dijkman, 'The Escape from Famine', p. 238.
60. On the 50 *per cent* marker: Alfani, 'Plague', p. 418; Curtis, 'Was Plague an Exclusively Urban Phenomenon?', p. 142.
61. A 'normal' death rate suggested in J. L. van Zanden and M. Prak, 'Demographic Change and Migration Flows in Holland between 1500 and 1800', in M. van der Linden and L. Lucassen (eds), *Working on Labor. Essays in Honor of Jan Lucassen* (Leiden: Brill, 2012), pp. 237–45, here p. 241; M. Schroor, *Rurale metropool: bevolking, migratie en financiën van de stad Groningen ten tijde van de Republiek (1595–1795)* (Groningen: University of Groningen, 2014), p. 79.
62. On the 'severe' threshold: Alfani, 'Plague', p. 417.
63. Zarulli et al., 'Women Live Longer than Men'.
64. Humphries, 'Bread'; McNay et al., 'Excess Female Mortality'; Klasen, 'Marriage'. Also an excess mortality of young girls from poor agricultural labouring families: F. van Poppel, J. Schellekens and E. Walhout, 'Oversterfte van jonge meisjes in de Nederland in de negentiende en twintigste eeuw', *Tijdschrift voor Sociale en Economische Geschiedenis* 6 (2009), pp. 37–69.
65. T. De Moor and J. L. van Zanden, 'Girl Power: The European Marriage Pattern and Labour Markets in the North Sea Region in the Late Medieval and Early Modern Period', *Economic History Review* 63 (2010), pp. 1–33; J. L. van Zanden, T. De Moor and S. G. Carmichael, *Capital Women: The European Marriage Pattern, Female Empowerment and Economic Development in Western Europe 1300–1800* (Oxford: Oxford University Press, 2019); D.W.A.G. van den Heuvel, *Women and Entrepreneurship. Female Traders in the Northern Netherlands, c. 1580–1815* (Amsterdam: Askant Academic Publishers, 2007); Schmidt and van der Heijden, 'Women Alone'; A. Schmidt and E. van Nederveen Meerkerk, 'Reconsidering the 'First Male-Breadwinner Economy': Women's Labor Force Participation in the Netherlands, 1600–1900', *Feminist Economics* 18 (2012), pp. 69–96.
66. There have been counter views on the role of the European Marriage Pattern in the Low Countries relative to other parts of Europe: see the criticisms of T. Dennison and S. Ogilvie, 'Does the European Marriage Pattern Explain Economic Growth?', *Journal of Economic History* 74 (2014), pp. 651–93; T. Dennison and S. Ogilvie, 'Institutions, Demography, and Economic Growth', *Journal of Economic History* 76 (2016), pp. 205–17. Others have called for us to be more attentive to the complexities and contradictions of the term 'agency' itself in a stimulating recent volume M. Howell, 'The Problem of Women's Agency in Late Medieval and Early Modern Europe', in S.J. Moran and A.C. Pipkin (eds), *Women and Gender in the Early Modern Low Countries, 1500–1750* (Leiden: Brill, 2019), pp. 21–31.
67. M.J. Dobson, 'Contours of Death: Disease, Mortality, and the Environment in Early Modern England', *Health Transition Review* 2 (1992), pp. 77-94, here pp. 88–9. On a broader conceptual level: A. Sen, 'Mortality as an Indicator of Economic Success and Failure', *The Economic Journal* 108 (1998), pp. 1–25.
68. I. Devos, *Allemaal beestjes: mortaliteit en morbiditeit in Vlaanderen, 18de-20ste eeuw* (Ghent: Academia Press, 2006), pp. 157–96. O.S. Knottnerus, 'Malaria around the North Sea: A Survey', in G. Wefer, W.H. Berger, K-E. Behre and E. Jansen (eds), *Climatic Development and History of the North Atlantic Realm* (Berlin: Springer-Verlag, 2002), pp. 339–53.
69. For early modern England, the contribution of childbirth-related mortality to overall female mortality has been downplayed in its quantitative contribution: R. Schofield, 'Did the Mothers Really Die? Three Centuries of Maternal Mortality in 'The World We Have Lost'', in L. Bonfield, R.M. Smith and K. Wrightson (eds), *The World We Have Gained: Histories of Population and Social Structure* (Oxford: Blackwell, 1986), pp. 231–60; Kowaleski, 'Gendering Demographic Change', pp. 184–5.
70. For the late-medieval cases: M. Cabré, 'Women or Healers? Household Practices and the Categories of Health Care in Late Medieval Iberia', *Bulletin of the History of Medicine* 82 (2008), pp. 18–51; H. Ingram, ' "Pottes of Tryacle" and "Bokes of Phisyke": The Fifteenth-Century Disease Management Practices of Three Gentry Families', *Social History of Medicine* 32 (2019), pp. 751–72. For the early modern case: R. Munkhoff, 'Searchers of the Dead: Authority, Marginality, and the Interpretation of Plague in England, 1574-1665', *Gender and History* 11 (1999), pp. 1–29.
71. S. Broomhall, *Women's Medical Work in Early Modern France* (Manchester: Manchester University Press, 2004), pp. 157–8.
72. R. L. Winer, 'The Enslaved Wet Nurse as Nanny: The Transition from Free to Slave Labor in Childcare in Barcelona after the Black Death (1348)', *Slavery and Abolition* 38 (2017), pp. 303–19.
73. Shown for the seventeenth century: Curtis, 'Was Plague an Exclusively Urban Phenomenon?', p. 152; also, for the late Middle Ages: Curtis and Roosen, 'The Sex-Selective Impact of the Black Death', p. 252.

74. L. F. W. Adriaenssen, 'Verdienen aan de gave gods: pest en hygiëne', *De Brabantse Leeuw* 47 (1998), pp. 32–7.
75. J. Kok and A. van den Belt, 'Malaria, mijnworm of mannen? Op zoek naar de oorzaken van de oversterfte van Vrouwen op Ceylon in de achttiende en twintigste eeuw', in K. Matthijs, P. Puschmann, A. Janssens and H. Bras (eds), *Gender in/en historische demografie* (The Hague: Acco, 2013), pp. 47–70, here p. 68.
76. A. Schmidt, I. Devos and B. Blondé, 'Single and the City: Men and Women Alone in North-Western European Towns since the Late Middle Ages', in I. Devos, J. De Groot and A. Schmidt (eds), *Single Life and the City 1200–1900* (Basingstoke: Palgrave Macmillan, 2015), pp. 1–24, here pp. 3–4.
77. Nevertheless, the household caring role still cited as a possible factor for sex differences in mortality in nineteenth-century Italy: A. Pinelli and P. Mancini, 'Gender Mortality Differences from Birth to Puberty in Italy, 1887–1940', in C. Corsini and P. Viazzo (eds), *The Decline of Infant and Child Mortality: The European Experience 1750–1990* (The Hague: Martinus Nijhoff, 1997), pp. 73–93, here pp. 89–91.
78. On the scapegoating of sex workers seen in Sluis during a plague in 1605: Zeeuws Archief Middelburg, Vrije van Sluis 1584–1796, 7, Stukken betreffende maatregelen tegen besmetting met pest, 1605, 1770–1771, no. 363, fo. 3r. On preventing female attendance at funerals: Leo Noordegraaf and Gerrit Valk, *De Gave Gods: De pest in Holland vanaf de late Middeleeuwen* (Bergen: Octavo, 1988), p. 120.

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