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In Search of the 'Urban Penalty': Exploring Urban and Rural Mortality Patterns in Spain during the Demographic Transition

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ABSTRACT

Making use of data on age-specific mortality and cause of death patterns for rural and urban areas of Spain during the first third of the twentieth-century, this paper explores the meaning of the 'urban penalty' and how it changed over the course of the demographic transition. The author finds ample proof of the existence of this penalty, especially visible among adult males in urban areas, where respiratory and other diseases, many of which were related to urban environments and lifestyles, took their toll on people's health. Despite these disadvantages, mortality decline, for the most part, was also much faster in towns than in the countryside. The author suggests that both the existence of the 'urban penalty' and the pioneering role of towns for mortality decline can best be understood in terms of the nature of towns and of urban life, society and government.

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INTRODUCTION

There is a considerable body of literature portraying aspects of urban demographic systems, setting them apart from those in the rural world.[1] Traditionally, urban mortality appears to have been substantially higher than in the rural world for a number of reasons. The fact that towns had population densities well above those in the rural world contributed to the propagation of many different diseases. Towns also tended to be dirty and unhealthy places, often situated near swampy areas, where in pre-industrial times public health measures were only enacted in moments of crisis and even then were hardly effective. Since they were centres of considerable migratory movement, towns were also important foci for the transmission of most epidemic diseases. It has often been posited that there was a considerable heterogeneity in urban mortality due to the specific make-up of urban populations, with some groups such as migrants and other marginal urban groups having higher mortality, as opposed to natives for whom mortality levels at any give age are supposed to have been substantially lower, although probably still higher than in rural areas. Finally, the presence in towns of institutions such as hospitals, foundling homes, orphanages and jails also contributed to higher overall urban mortality levels. This excess urban mortality, which has been called the *urban penalty* or the *urban graveyard effect*, may well have been the most

important drawback of urban life and was an important hindrance to incipient demographic modernisation.[2]

During the initial phases of the demographic transition, towns appear to have been an obstacle to mortality reduction because not only did it take longer for mortality to decline in urban areas, but with ever increasing percentages of population living in towns, mortality indicators for aggregate administrative units (provinces, national totals, etc.) may well have even increased despite ongoing reductions in mortality taking place in rural areas.[3] Once under way, however, the decline of mortality appears to have been much faster in towns, and excess urban mortality eventually disappeared entirely.[4] This process was helped by the progressive cleaning-up of urban water supplies, by educational policies for public health and infant hygiene that were far more effective in urban centres, and by generally higher cultural and educational levels of the urban population and especially among mothers living in towns. These factors ended up neutralising the initial disadvantages of towns in health matters and many of the risks inherent in urban jobs, turning towns into the pioneers of mortality reduction (e.g. Haines, 1991).

The central purpose of this paper is to reach a viable understanding of this '*urban penalty*' within the context of Spain during the demographic transition. What were the most visible characteristics of higher urban mortality, and how did they change over the course of the demographic transition? What was it about urban life that ended up making higher mortality a fact of life, and what was it about urban life that gradually made towns the pioneers of mortality reduction, or at least certain segments of their populations? What were the co-determinants of mortality reduction in towns and how were they different from those in the rural world? In the final assessment, the question that really interests us here is why were towns different, and how and why did they change? We feel that these issues must be addressed squarely, and fairly precise answers must be obtained before our understanding of the role towns played in the process of demographic and social change can rest on stable foundations. Many of the issues raised in this paper can appropriately be considered pertinent to urban and rural areas in the initial stages of the demographic transition everywhere.

DATA: CHARACTERISTICS AND INTERPRETATION

This study of urban mortality and of the role played by towns in the process of demographic modernisation is conditioned by the nature of Spanish source material. One of the ongoing characteristics of modern demographic data in Spain is the fact that census and vital registration data have normally been published both for provinces and for provincial capitals.[5] This enables us to estimate mortality for capital towns as well as for the non-capital areas of provinces in a very straightforward way. It is important to bear in mind here that the results shown for capital towns do not show exactly the reality of urban mortality, and those of non-capital areas of provinces are not a perfect example of truly rural populations. The problem here concerns our definition of urban areas.

This structure is inherent in the source material, and is therefore unavoidable, although it counsels caution when interpreting results. The data corresponding to provincial capitals unquestionably refer to urban behaviour, although they do not reflect the totality of the urban world. The 'rural' data, on the other hand, refer to a world that is mostly rural but which has some towns as well. If we use population size as the definition of urban and rural, and using a relatively low threshold (population centres with more than 10,000 inhabitants), in 1900, 20.9% of the Spanish population lived in towns, and in 1930, 28.2% of the population was urban (Reher, 1994: 25–26). If the population of the provincial capitals is subtracted from this total (about two-thirds of the total urban population), the weight of the urban world which has been classified as 'rural' would be 7.4% in 1900 and 11.4% in 1930. This suggests that the vast majority of the 'rural' population we have used is truly rural once the population of the provincial capitals has been removed. This situation might change substantially from province to province, where the urban component in provinces of rapid industrialisation such as Barcelona or Vizcaya,

or those in traditionally urbanised areas like the Guadalquivir river valley, would be substantial, while it was negligible in other provinces. In any case, it is an approximation to urban/rural differences which, as we shall see, will yield extremely interesting results. Life tables have been constructed for capital towns and for surrounding rural areas in 1900–01, 1910–11 and 1930–31 and will supply the basic demographic data used in our analysis.[6]

Our analysis of the urban penalty will also make use of existing cause of death data. A massive database on cause of death has been compiled recently with classifications by sex and age, rural and urban, for 1905, 1906, 1931 and 1932, although in this paper only 1906 and 1932 have been used.[7] These dates were chosen for a number of reasons: they reflect two very distinct moments on the path to low mortality; the cause of death classifications during the two periods are fairly easy to compare; they refer to moments in which there are strictly parallel data for provinces and capitals; and they are close to the years in which we have life tables. Baseline life tables have been generated for 1906 and for 1932 by applying constant rates of growth of m_x functions for the 1900–01/1910–11 and for the 1910–11/1930–31 periods. Cause of death classifications will be expressed as central age- and cause-specific death rates. In this paper, in order to assure maximum clarity, we will only make use of national urban and rural data (the sum of provincial and capital totals), leaving regional analysis for future papers.

Most of our analysis will centre on respiratory and digestive tract diseases. Since the dates used are fairly close in time, we are confident that the two classification systems have been merged with a minimum of loss. In 1906, respiratory diseases included respiratory tuberculosis (TB), acute bronchitis, chronic bronchitis, pneumonia and 'other diseases of the respiratory tract' (rubrics 13, 21–24), while in 1932 they included respiratory TB, acute bronchitis, pneumonia and 'other diseases of the respiratory tract' (rubrics 10, 26–28). Digestive tract diseases in 1906 included cholera *nostras*, diseases of the stomach except cancer, diarrhoea and enteritis (age two and above), diarrhoea and enteritis (under two), hernias and intestinal obstructions, and cirrhosis of the liver (rubrics 10, 11, 25–29), while in 1932 they included diarrhoea and enteritis, appendicitis, diseases of the liver, and other diseases of the digestive tract (rubrics 29–32). Information about these general categories will be supplemented with data on other causes of death whenever considered pertinent. The most important elements of uncertainty are 'other diseases' and 'unknown or ill-defined diseases' (39, 40) in 1906 or 'non-specified or improperly defined causes' (43) in 1932. These represent about 17% of all deaths in 1906 and about 4.75% in 1932. Caution, therefore, is called for in interpreting results, especially those taken from 1906 or those affecting rates of change between 1906 and 1932.

Table 1. Life expectancy at birth in years (e_0) in urban and rural Spain, 1900–1930.

Year	*Provincial capitals*	*Rural areas*	*Difference (rural–urban)*
1900–01	29.52	35.98	6.46
1910–11	37.17	42.40	5.23
1930–31	47.35	50.70	3.35

URBAN–RURAL MORTALITY DIFFERENTIALS: A NATIONAL PERSPECTIVE

In accordance with the results of many studies of mortality in other European contexts, during the first third of the twentieth century in Spain, urban mortality levels were substantially higher than in rural areas. A brief review of the data on life expectancy (e_0) in Table 1 attest to this fact. In 1900, the average life-span of a person living in a provincial capital was between six and seven years shorter than that of a person in a rural area. This excess urban mortality was very important and conditioned a social dynamic in which natural growth rates were strongly positive in the countryside and often negative in towns. In 1887, for example, 31 of the 49 provincial capitals in Spain had negative natural growth rates.[8]

The demographic transition, however, was to introduce significant changes in the traditional ties between town and country on these matters, as the struggle against mortality was

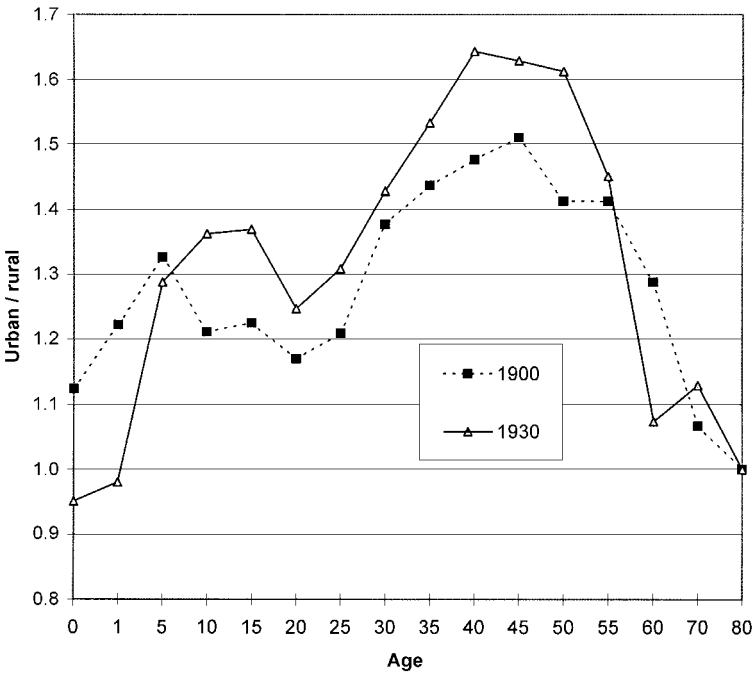

Figure 1. Urban–rural mortality differentials in Spain, 1900–1930 ($q_x$urb/$q_x$rur).

more successful in towns than in the surrounding rural areas. Between 1900 and 1930 the average length of life of urban dwellers increased by 18 years, as opposed to gains of less than 15 years in rural areas. While increases in life expectancy were appreciable everywhere, different rates of mortality decline led to a reduction in the urban/rural differences in life expectancy (e_0) from about 6.5 years in 1900 to 3.4 years in 1930. The likelihood of survival continued to be higher in the countryside, but this advantage was decreasing. Eventually urban mortality was to became lower than in rural areas, although this threshold would not be crossed until after the Spanish Civil War.

Available life table data enable us to draw the basic profiles of the age structure of excess urban mortality in Spain during the first third of the twentieth century. Figure 1 summarises many of these differentials. Basically, the data shown at the two dates are complementary, thus suggesting that the patterns emerging are long-standing ones. The excess urban mortality can be seen at all ages, although not in the same measure. During the first five years of life, urban excess mortality was relatively small (between 10 and 20%), but increased substantially for children aged 5–9. After that age it once again declined, reaching its lowest levels outside of infancy for the 20–24 year age group. From that point onward, the incidence of excess urban mortality increased, reaching a high point between 40 and 49 years of age and declining afterwards. Thus it was among the adult population 30–59 years of age where excess urban mortality was most visible. Interesting changes over time also take place. For children under 5 there is a clear reduction in the level of excess urban mortality, which disappears by 1930.[9] Among adults (30–59), however, the opposite pattern emerges, and urban/rural differences increase substantially.

For adult age groups, the Spanish data are coincidental with the results obtained by Kearns (1993) in his analysis of urban and rural mortality in England in 1851–60 and 1891–1900. For both dates, differences were smallest for the 20–24 year age group and highest among those aged 45–54. In the first age group, the excess urban mortality in England was somewhat lower than in Spain (12% as opposed to about 23%), and in the second one differences were similar (89% as

Table 2. Male/female differences in life expectancy (e_0), in provincial capitals and in rural areas, Spain, 1900–1930 (rural–urban).

	Towns		*Rural areas*	
Year	e_0	e_5	e_0	e_5
1900–01	−3.09	−4.01	−0.69	−0.20
1910–11	−3.46	−3.72	−0.89	−0.32
1930–31	−5.55	−5.63	−2.67	−2.02

opposed to about 55%). It was only during the first years of life where the situation was very different, since in England excess urban mortality was far greater than in Spain. This is most apparent for the 1–4 year age group, where English urban mortality was more than 2.5 times that in the countryside. These differences may have been due to the relative lack of breastfeeding among English mothers who were working in the labour force, as opposed to Spanish women in urban areas whose labour force participation was much lower than in England. In more general terms, it is safe to say that the health of English towns of the nineteenth century was considerably worse than in the countryside, and that the excess mortality corresponding to younger children should be understood within the context of rapid industrialisation and deplorable living conditions in urban areas. Even though England started with overall levels of mortality below those of Spain, its rush to industrialise made its towns play a fundamentally negative role for the demographic transition until well into the twentieth century. In Spain, on the other hand, even when bearing in mind its generally higher levels of mortality, the weight of the urban world in the process of demographic modernisation was not nearly so negative as it was in England.

An analysis of the sex composition of mortality enables us to see other significant differences between the urban and rural worlds (Table 2). Whereas in rural areas life expectancy among women was slightly higher than among men, in towns the differences were much greater. These disparities were not only the product of differences in childhood, but continued to affect mortality patterns after the age of five, where life expectancy (e_5)

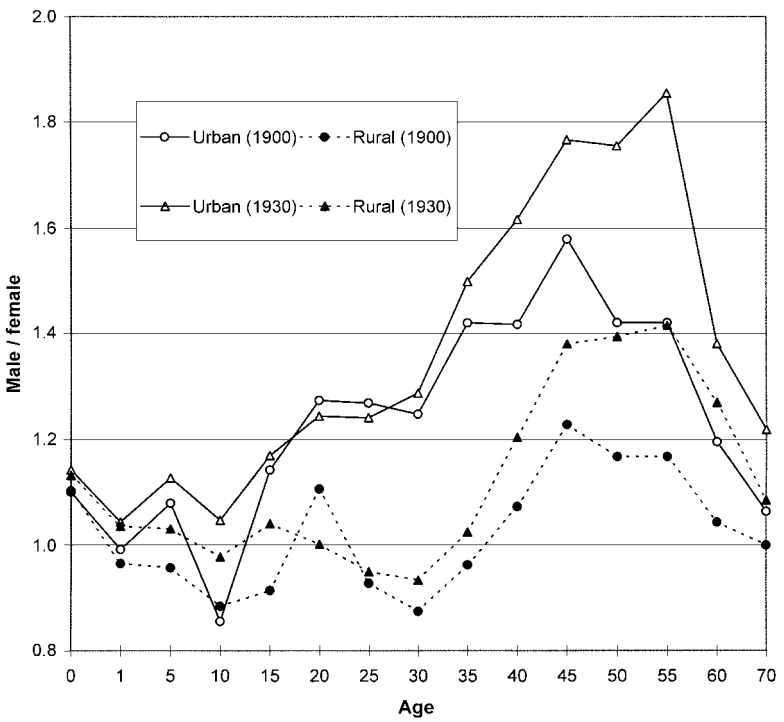

Figure 2. Male–female mortality differentials in urban and rural areas in Spain, 1900–1930 ($q_x(m)/q_x(f)$).

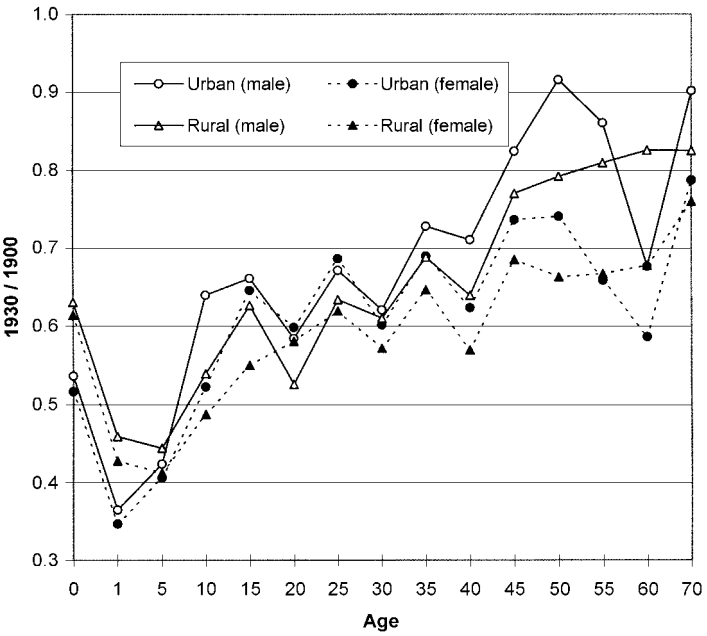

Figure 3. Reduction in mortality (q_x) by age and sex, 1900–1930 (q_x 1930/q_x 1900).

among men was far lower than among women in towns, while differences in the countryside were much slighter. As the demographic transition gathered strength, sex differentials in mortality increased everywhere, although urban–rural disparities persisted. This appears to have been a universal characteristic of the demographic transition (Vallin, 1991: 63–65).

This pattern can be seen more clearly in Fig. 2, where rural and urban male/female mortality differentials by age are plotted. These results are striking and deserve careful consideration. During the first 15 or 20 years of life, the differences are relatively small, and in some contexts there is even a slight excess female mortality. This is a shared pattern between the urban and rural world at both dates. After 25–29 years in towns and 35–39 years in the countryside, excess male mortality increases sharply. The greatest differences by sex occur between 40 and 60 years of age in both town and country. The age profile of this pattern does not change substantially over time, although sex differences do increase substantially.

If we concentrate on the rural world, age and sex patterns of mortality are the traditional ones: slight excess male mortality during the first year of life, turning into slightly higher female mortality during adolescence. Between 15 and 25 years male mortality was higher, becoming similar or lower between 25 and 40 years of age due to maternal mortality and to the often unfavourable living conditions of women during their adolescence and adulthood.[10] Excess male mortality, by as much as 20% in 1900 and 40% in 1930, became the norm after age 40. The patterns holding in the urban world were markedly different. In towns, excess female mortality was almost never present. During the first 20 years of life, mortality among males was between 1 and 18% higher than among females, holding at about 25% between 20 and 34 years of age, increasing dramatically after age 35. Between 1900 and 1930 for these age groups, excess male mortality increased substantially in both the urban and rural worlds. Increases in towns, however, were much greater than in the countryside, leading to around 80% higher male mortality between 45 and 60 years of age in 1930.

The overall increase in excess male mortality for all age groups over the demographic transition is, perhaps, one of the most salient aspects of the results presented here. The

mechanics of this increase can be found in the differential rates of mortality reduction among men and women in different areas. Figure 3 reflects this process for urban and rural areas, for both men and women. The rate of decline of female mortality was invariably greater than for men, especially for the 40–59 year age group. The fall of urban mortality was greater for both sexes among young children, but the opposite was true for higher age groups. After 10 years of age, the group with smallest gains corresponded to men living in urban areas. In the light of these data, urban/rural mortality differentials appear to have been mainly the consequence of adult male mortality. Among women, urban mortality was also higher, but the differences were relatively modest. For men, on the other hand, the differences were very large and had a decisive influence on the disparities observed. Urban–rural disparities in life expectancy at birth between the city and the countryside in 1930, for example, were 1.93 years for women and 4.81 years for men.

By the 1930s, these differences were beginning to decline for young children, as towns improved their public health structures quickly and effectively. For adult ages, however, there was still no change in the traditional urban disadvantage with respect to the rural world. Despite the fact that mortality was decreasing everywhere, for these age groups it was falling much faster in the countryside and among women than it was in towns or among men. Until this excess urban mortality at all ages declined, the mortality transition in Spain would be incomplete. When this was finally achieved in the decade after the Civil War, however, it would be due to improvements in towns with respect to rural areas, rather than because men had improved their position with respect to women. These sex differences have continued to increase to this day, and constitute a common characteristic of modern demographic regimes.

URBAN REALITIES, LIFESTYLES AND ILLNESS: FURTHER DIMENSIONS OF THE 'URBAN PENALTY'

Thus far, the use of straightforward demographic material has identified some of the key aspects distinguishing urban mortality patterns from rural ones, and informing the speed with which mortality levels were brought into line with those in other areas of Europe. It is unquestionable that overall mortality levels were strongly influenced by childhood mortality, and by 1930 there was no longer an urban disadvantage. It was with mortality during adulthood, especially during the second half of what could be termed 'mature life' (35–60), where urban patterns of death were most clearly distinguishable from those holding in the countryside. There are few indications that these differences decreased over the course of the demographic transition. Despite the approximation in overall indicators of mortality such as life expectancy at birth, in many other ways the urban world continued to be every bit as different from the rural world in 1930 as it was in 1900.

If cause-of-death data are used, a number of the special characteristics of urban and rural mortality patterns can be brought into much sharper focus. These data by sex and age in 1906 and 1932 have been related to underlying age-specific death rates derived from projections of rates taken from the existing life tables, as was described earlier. In this way, we are in a position to use age- and cause-specific central death rates in our analysis. The results from this study suggest that the differences between the urban and the rural worlds were more related to the realities of urban living and to urban lifestyles, than to urban institutions which play only a modest role for most age groups. The strong as well as the weak points of urban living for the well-being of their inhabitants will become apparent in the following pages.

The point of departure for our discussion will be diseases of the respiratory and of the digestive tracts. These are fairly easy to identify for both 1906 and 1932, and they represent a significant fraction of all causes of death (between 40% and 44% for both dates). For the most part, they include the infectious diseases most often mentioned when the dynamics of the reduction of mortality are discussed.[11] In short, they basically define the context of the initial stages of the epidemiological transition, and the causes of their reduction can be fairly clearly pinpointed.[12] Many of the basic urban–rural differences in

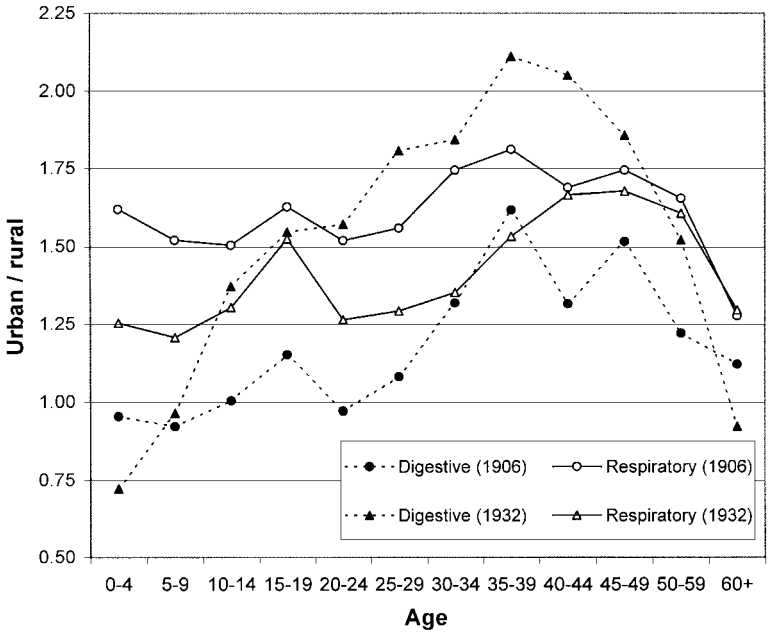

Figure 4. Urban–rural differences in death rates for digestive and respiratory diseases, Spain, 1906 and 1932.

respiratory and digestive tract diseases are summed up in Fig. 4. An initial conclusion to be drawn from these results is that for almost all age groups, the incidence of respiratory and digestive tract diseases was considerably higher in towns than in the countryside.

Excess urban mortality due to respiratory illness was present in all age groups, but was highest for mature adults (35–60). Over time, these differentials diminished slightly, although urban rates were often 50% higher than rural ones, with excess urban mortality for mature adult ages approaching 75% in 1906. Between a third and a quarter of all respiratory illness was due to respiratory tuberculosis (TB), and the rest corresponded mostly to bronchitis and pneumonia. The urban–rural differences for respiratory TB were higher in all age groups than those for other respiratory illness, although excess urban mortality was present in all cases. Population densities in towns explain many of the observed differences, especially since respiratory infections of all kinds are much more prevalent when population densities are high. There may also have been an institutional effect because hospitals and asylums tended to be located in towns, and they facilitated the spread of disease. In the final analysis, however, the incidence of institutions was itself another manifestation of higher population densities in towns. Increases in living standards and higher nutritional levels in towns tended to offset some of these disadvantages, as is suggested by lower levels of excess urban mortality due to respiratory infections in 1932.

Patterns of digestive tract disease were more divergent and showed more complex patterns of change. It is important to bear in mind, however, that whereas the weight of respiratory infections was considerable at all ages (ranging between 20% and 40% of all deaths in all age groups in 1932), digestive tract diseases were spread very unequally over the life cycle, with as many as a third of all deaths of infants being attributable to these sorts of infections, but seldom representing more than 10% of all deaths in ages beyond infancy.[13] This qualifies the significance of some of the changes in excess urban mortality due to digestive tract disease over the life cycle. In 1906 there were no differences between urban and rural digestive tract mortality over the first 30 years of life, although in higher age groups urban mortality was as much as 50% higher. In 1932, however, during the key years of childhood, towns

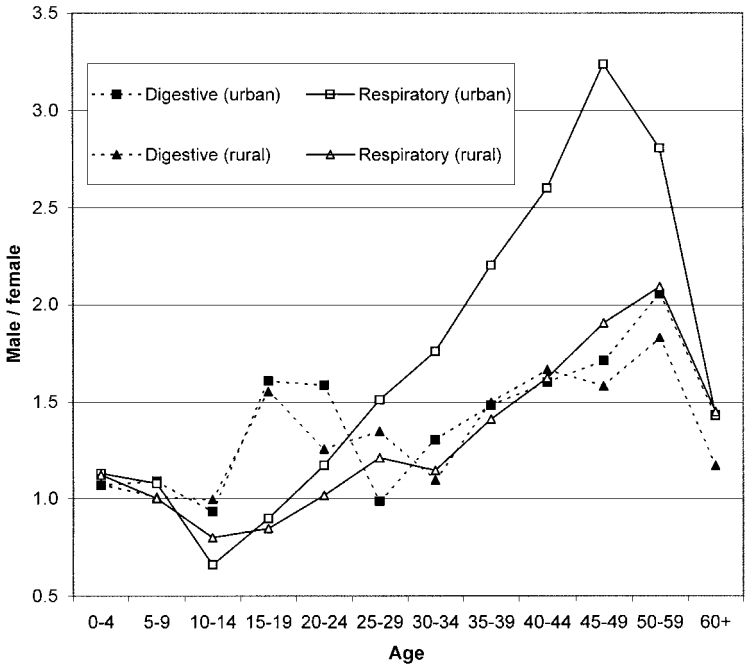

Figure 5. Male–female differences in death rates for digestive and respiratory diseases, urban and rural Spain, 1932.

showed a marked advantage over the countryside. This advantage became sharply negative during the adult years, turning positive once again among the elderly. Lower urban digestive tract mortality in childhood held, despite the presence in towns of foundling homes and of higher levels of illegitimacy, which would have tended to increase urban mortality levels. At higher age groups, excess urban mortality was not due to diarrhoea and enteritis. For this more specific cause of death, by 1932 at all ages after infancy, towns had either lower or equal mortality to the countryside, in contrast to 1906 when the opposite was true.

Further insights as to the specificity of urban mortality patterns can be seen when we look at the sex differentials of death rates for these two general groups of cause of death (Fig. 5). The results here are extremely eloquent and give ample testimony to the health disadvantages of adult men in urban contexts. During the first 20 or 30 years of life, there were no large sex differentials in mortality either from digestive or from respiratory diseases. It was only after 25 years of age for respiratory illness and after 35 years for digestive illness that these causes of death became selective for men. The basic patterns for digestive tract diseases in both the urban and the rural worlds and for respiratory diseases in the countryside were about the same, with death rates from 50 to 100% higher for men between 35 and 59 years of age. Respiratory illness in urban areas, however, was an entirely different matter, because here male mortality was as much as twice or even three times higher than it was for women. Only data from 1932 have been used in this figure because of their greater reliability. Had 1906 data been used, however, while the basic patterns would have been largely the same, it would have been clear that the sex differentials had sharply increased everywhere.[14] Clearly the situation of men relative to women during the demographic transition was not improving, especially with respect to respiratory illness in urban areas. Within the category of respiratory diseases, TB showed far greater levels of excess male mortality, although all types of respiratory illness preferentially targeted males, especially adult males. Much the same can be said of digestive tract infections, where all types of disease showed preference

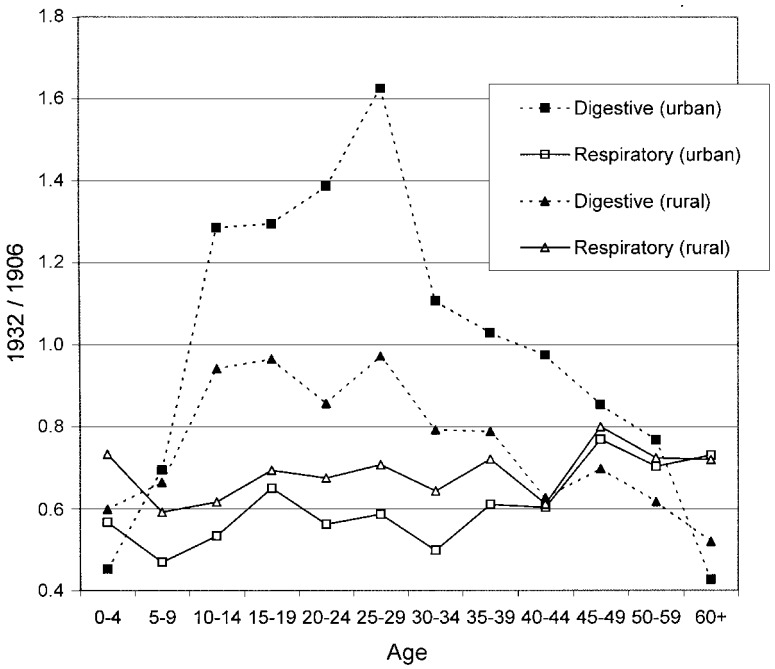

Figure 6. Rate of reduction in digestive tract and respiratory diseases, urban and rural (1932/1906).

for adult males, although this last point is qualified by the fact that death rates due to digestive diseases were very low in those age groups.

Biological, nutritional, behavioural and environmental factors underlie these striking patterns, although they are probably not equally important. The first two affect the resistance to disease, and the other two affect exposure to illness. It is unquestionable that overall resistance to infection has always been lower among males than among females, and this certainly explains a part of the excess male mortality which emerges from our data. This lower resistance was probably more a question of biology than of nutrition, because the nutritional levels of adults probably did not vary appreciably by sex, although there certainly would have between strong differences between the urban and the rural worlds. Even so, biology and nutrition are unlikely to explain all or even most of the observed differences, especially the tremendous divergences in the urban world for respiratory diseases.

With regard to digestive diseases, however, it is interesting to note that there was no perceptible *urban penalty*: everywhere the disadvantage of men seemed similar. Quite the contrary appears to have been the case for respiratory problems, where the towns took a terrible toll on men during the first decades of the twentieth century. It is impossible not to point to the behaviour of adult males, both in their work place and in their social and leisure lives, as a key factor taking a toll on their health. The observed differences can be explained to a large degree by the different population densities of men in towns as opposed to urban women or to men in the countryside. Specifically, male environments centred on the work place – often crowded in towns and never crowded in the countryside– and the local tavern–ubiquitous in towns and much less so in rural areas. Smoking, generally more frequent in towns and among men, also helps explain the higher urban mortality from respiratory disease for both sexes which appeared in Fig. 4.[15] Environmental factors, in particular air quality, must also have been very important for urban respiratory ailments among men, especially if they worked in factories.

Up until now, much of what has been said

here has concerned the disadvantages of urban life at least for people's health; why towns, despite the opportunities they afforded, were dangerous places to live. While this is true, it is only part of the story. The forces that were to inform the dramatic decline of mortality during the early stages of the epidemiological transition were also factors that originated in towns and spread to the countryside. Education, public health, sanitation, wealth and increasing living standards were all standard fare in urban areas well before they affected the countryside. These too were at work during the first third of the twentieth century, and by 1932 were in the process of turning the '*urban penalty*' into an urban advantage. Evidence of this process can be seen in Fig. 6 with the reduction of digestive and respiratory ailments during the first decades of the twentieth century.

Digestive tract diseases declined dramatically for children under 10 and for adults and the elderly over 45 years of age, although in between there was little if any indication of reduction. It was at young ages, however, where most digestive tract diseases were concentrated and it was there that they declined most.[16] At these age groups, the story is mainly about diarrhoea and enteritis, where decline was dramatic at young ages and much more rapid among urban children (0–4) than for those living in rural areas. This age group and their comparative urban advantage was to change the face of survival in Spain during the period, as life expectancies rose dramatically and urban areas, at least for children, ceased being the 'graveyards' they had traditionally been in the past. The process whereby an urban advantage in this age group was reached, however, was already underway by the beginning of the century, much as can be seen by the data in Fig. 4, although the process accelerated afterwards. The elements involved are the classic ones of the mortality transition: maternal education and public health, with a smattering of improved living standards. By the 1930s, despite higher illegitimacy rates and the presence of foundling homes in urban areas, cities had clearly surpassed rural areas in matters of child health.

At other ages, digestive tract diseases were much less important and patterns of change were less clear-cut. In both rural and urban areas, there was no decline between 10 and 30–40 years of age, although this may be due to the inclusion of appendicitis in the classification of the causes of death. This illness, possibly not present in earlier classifications, was particularly important precisely in those age groups and more so in towns than in the countryside. We are unable to explain urban–rural differences on this count. However, diarrhoea and enteritis continued to decline at an even faster pace than among young children, and more so in towns than in rural areas.[17] Clearly the battle against intestinal tract infection was well on its way to being won by the 1930s both in rural and in urban Spain.

The situation for respiratory illness is no less optimistic and was also favourable to towns, although the pattern of decline was somewhat different. Throughout the life span there were important reductions is respiratory illnesses, and for the most part urban areas took the lead. While the differences are not large, only about 10–15%, they affected all age groups below 40 years. After that age there were no urban/rural distinctions. The battle against respiratory illness was one of nutrition, of housing and of public health more than anything else. While the population densities in towns had originally left urban inhabitants at greater risk, declines there were also greater, due mainly to a number of economic, political and social factors suggested above. While these gains lagged behind those for digestive tract illness in the all-important 0–4 age group, throughout most of the rest of the life span respiratory ailments bore the brunt of mortality reduction, and especially of urban mortality reduction. Levels of TB benefited most from this pattern of decline, although other lung diseases also diminished rapidly. Both with TB and with bronchitis and pneumonia, the pace of urban decline was greater than in rural areas, and in both cases the declines were least visible among the elderly.

One further note on these causes of death deserves mention. With both respiratory and with digestive tract illnesses, reductions in death rates among women appear to have been significantly greater than among men. It is interesting to note that in both urban and rural areas for both categories of cause of death, the

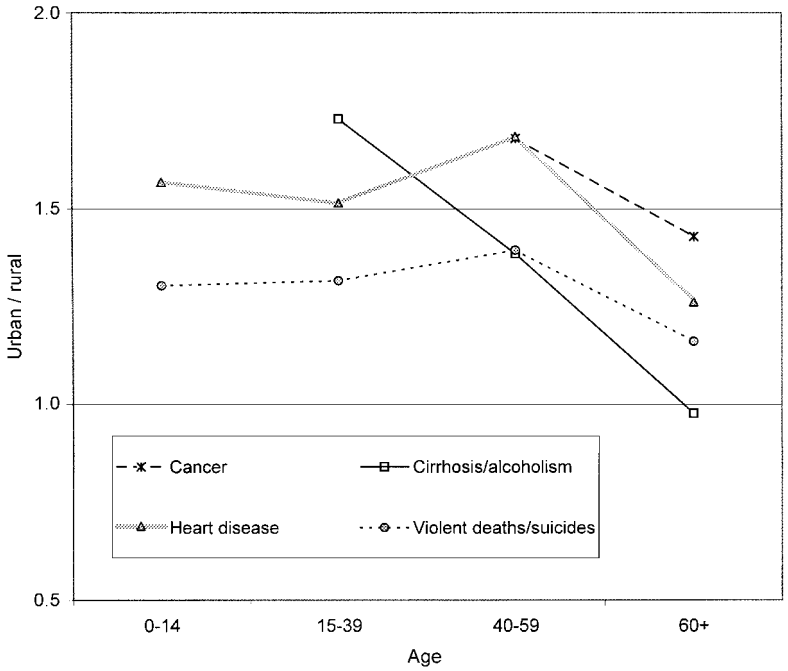

Figure 7. Urban–rural differences in death rates by age and specific causes, Spain, 1932.

advantage for women was most evident in the 40–59 year age group and, although less so, among the elderly. These changes were in the process of configuring modern mortality patterns in Spain, with greater differences by sex and greater emphasis on adults and the elderly in determining overall mortality disparities.

It would be inaccurate to assume that the major distinction between urban and rural mortality was concentrated solely in respiratory and digestive tract illnesses. Due to the great weight of these types of cause of death, the patterns they marked were certainly central to overall urban/rural differences. Other illnesses, however, also showed strong preferences for urban residents, and these tended to be related directly and indirectly to people's lifestyles. Even though the death rates for these causes were much lower than for digestive and respiratory ailments, they shed light on what urban life was really like. It is unquestionable that certain digestive and especially respiratory ailments were related to lifestyles as well. Yet there were other causes of death where the effects of urban life may have been even more visible. In order to test just how much a certain lifestyle made a difference, we have chosen four causes of death where links to lifestyles and risk factors are evident. These are cancer, heart disease, chronic alcoholism, and violent deaths and suicides. None of these are infectious diseases, but modern medical knowledge has shown that all of them are related to the type of life we lead, to the amount of stress our lives involve, and to where and how we work. Cancer, whose diagnosis during the early decades of this century was still very problematic, may be related to certain aspects of people's lifestyles. Lung cancer, which is not distinguished in the data, appears to be related to smoking, which, in turn, can be linked to a number of respiratory ailments. Heart disease can be brought on by diet and especially by stress. Alcoholism (often manifested in liver ailments) is also the consequence, to a certain degree, of stress and lifestyle. Finally, violent deaths and suicides are once again related to stress, social and political life, or to work-related accidents. These causes of death will provide a useful testing ground for what urban life was all about.[18]

Figure 7 provides abundant testimony that here too the urban *penalty* was a fact of life for

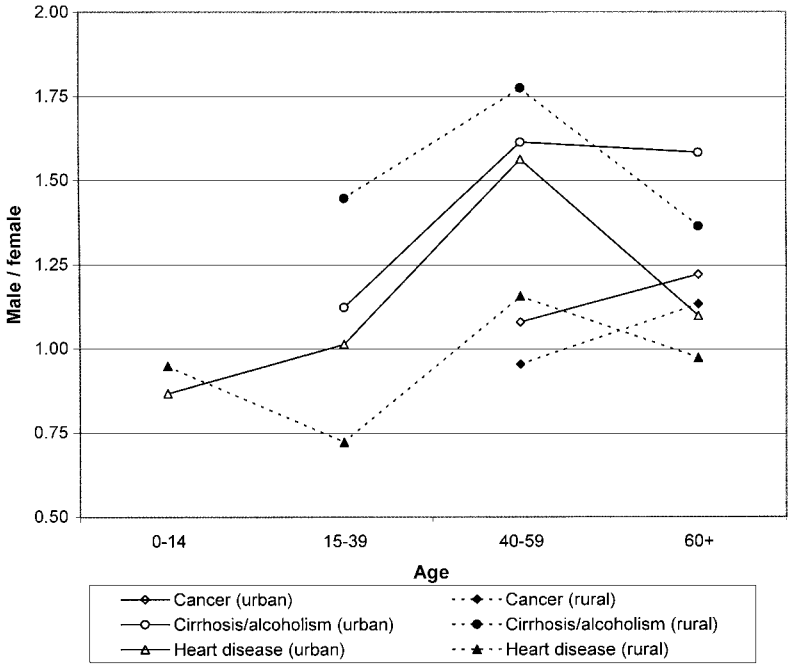

Figure 8. Male–female differences in mortality by specific causes and broad age groups, urban and rural Spain, 1932.

urban residents. The importance of cancer was minimal among young people, but increased sharply at 40 years of age when its incidence was between 45% and 70% higher in towns than in the countryside.[19] A part of this may be because of the urban setting of most hospitals, although we suspect that this represented only a small part of the observed differences. Death rates from heart disease were between 25% and 60% higher at all ages in towns, although it was only really important as a cause of death for people above 40 years of age.[20] After 60, when heart disease represented over 22% of all deaths in towns, urban rates were 26% higher than in the countryside. Alcoholism was never a major cause of death, except for adults aged 40–59 where it represented 3% of all deaths in towns in 1932. For this age group, urban rates were over 40% above rural ones. Finally, violent deaths and suicide were always between 20% and 40% higher in urban areas. Even though this was not a major cause of death, it is difficult to find one more closely related to what urban life was all about at work, in political activity and in society.

Differentials by sex for three of these causes are portrayed in Fig. 8 and provide further details as to the nature of urban life. Alcoholism is shown to be an ailment strongly selective of men, but there are few differences between urban and rural areas. Everywhere, alcoholism was worst after 40 years of age when it represented between 1.5% and 3.0% of all deaths, and it is in these age groups where it was selective of males. These are not surprising results, except perhaps for the evident lack of specificity of the urban experience. Cancer is a disease that shows very little sex selectiveness as well as few differences on this count between towns and the countryside. It is an illness that appears to have very little to do with behaviour patterns of men or women, although it should be kept in mind that overall levels were far higher in towns than in rural areas. Heart disease is where urban/rural differences are greatest, especially among mature adult males. It is a fitting monument to the stress of urban life and to different modes of behaviour among men and women, and shows a profile not unlike that of contemporary societies. Finally, deaths by violence and suicide, not included in Fig. 8 so as to preserve a reasonable scale, is

Table 3. Evaluating the urban penalty[a] at 20 years of age, Spain, 1932.

Category	*Males*	*Females*	*Total*
Respiratory disease	−1.91	−0.83	−1.35
Disgestive tract diseases	−0.50	−0.28	−0.39
'Other diseases'[b]	−1.91	−1.55	−1.75
Total urban penalty	−5.99	−2.38	−4.14

[a] Estimated as years of life expectancy lost by living in urban areas.
[b] 'Other diseases' include violent deaths, heart disease, cancer and alcoholism.

where sex differences are greatest. Among young adults, death rates were more than five times higher among men than among women, and in higher age groups this disparity persisted, although at a reduced level. Here, however, there are no differences at all between the urban and the rural worlds. Violent death was everywhere an affair of men.

In contrast to respiratory infections and digestive tract disease, all of these causes of death showed substantial increases over the period under study, and few urban–rural differences in rates of change appear.[21] The incidence of heart disease increased by between 10 and 28% at ages above 40. With cancer, increases for the same age groups ranged from 10% to 68%. In both cases, increases in the countryside were slightly greater than those in towns, although the differences were relatively small. Finally, violent deaths increased slightly in towns (2–14%) and were stable or declined slightly in rural areas (0.83–0.98%). Despite diagnostic problems in some cases, it is clear that while these problems were essential to any definition of urban life, they had nothing to do with the forces that were so instrumental in the overall decline in mortality. Gains were made against infectious disease, but left degenerative and many behaviourally-based illnesses largely untouched. Since people were living longer, the likelihood that they would get heart disease or cancer increased significantly. In this way, by the early 1930s both rural and urban Spain were entering the second phase of the epidemiological transition.

Summing up, the overall magnitude of the urban penalty can be assessed in terms of the reduction in life expectancy experienced by urban dwellers. In Table 3 this has been done for persons aged 20. The results show that living in a town meant a decrease in life expectancy of 6 years for men and of just under 2.5 years for women.[22] Among males, a third of this penalty was due to respiratory disease, another third to 'other causes', especially heart problems, and only a small part to digestive tract diseases. For women, much smaller urban–rural differences were explained mostly by non-infectious diseases.[23] In other words, living in town shortened the average life span of adult men by nearly 14% and of adult women by 5%. It was indeed a high price to pay.

TOWNS, THE 'URBAN PENALTY' AND DEMOGRAPHIC MODERNISATION: SOME PRELIMINARY CONCLUSIONS

In this paper we have made use of a large and previously untapped source of data in order to deepen our understanding of the '*urban penalty*' in Spain during a key phase of its demographic transition. Our database spans a good part of this transition, starting at a period in which mortality was still quite high and ending in one in which mortality was well on its way towards the survival rates typical of other regions of Europe. This does not mean that demographic modernisation in Spain started in 1900 or finished by 1930–32, but these dates mark significant points along that process. On the eve of the Spanish Civil War, extremely important structural changes in mortality were under way, although many of them would not be completed until a number of years later. Despite deficiencies in the data, the results presented in this paper are solid and significant ones, and promise to alter the way in which the process of modernisation of mortality is understood in Spain.

This paper has addressed two central and related issues: the meaning of the *urban penalty* and the role that towns played in the process of demographic modernisation. Dramatic differences between the urban and the rural worlds have appeared, particularly affecting mortality among mature urban populations where decline was hesitant and where men were at a singular disadvantage. These differentials can

be linked to urban lifestyles and other realities of urban life. While certain continuities have come to light, especially those underlying many of the traditional disadvantages of urban life, elements of change have also appeared. These were changes that were making towns pioneers in the process of demographic modernisation. The evidence brought to bear on these two issues has been very persuasive, and deserves serious consideration.

Even though death rates had declined everywhere and were declining faster in towns than in the countryside, by 1932 the *urban penalty* was still very clearly visible in Spain. The excellent quality of the data enables us to assess what this penalty actually entailed and what it had probably entailed for centuries. While by 1930 overall death rates were only slightly higher in urban areas, for many key age groups of the population, especially for adults of working age (approximately 30–60), death rates in urban societies were often twice what they were in the rural world. By and large, these disadvantages were the product of environments, of population densities and of certain lifestyles which were typical of towns and which had deleterious consequences for the health of urban residents.

Towns had higher population densities than rural areas. This was a general fact of urban life and it helps explain why certain types of contagious diseases were invariably more prevalent in urban areas. Density, here, is a many-layered reality. Overall population density in urban areas contributed to the circulation of infectious diseases, especially those of the respiratory tract, and tended to make morbidity higher for every sector of urban society. This is a basic, almost ecological reality and it informs everything else. Nevertheless, population density also affected the workplace and housing, and here clear social distinctions must have been an everyday reality. Among lower social classes the incidence of infection was probably higher than among the rich because they lived in more crowded housing, tended to visit crowded taverns and toiled in crowded workplaces. This too was a fact of urban life. Even so, however, it is very likely that the prevalence of disease was higher among all urban groups than it was for equivalent social groups in rural areas. By the same token, morbidity in larger cities was probably higher than in smaller towns, although this may not necessarily have been translated into higher death rates because resistance to infection may well have also been greater in the larger and richer towns.

Density only explains part of the observed differences. Behaviour that was potentially detrimental to people's health abounded in towns, and these risks also translated into higher death rates. Workplaces were effective centres of contagion, tended to have unhealthy environments, and were where on-the-job accidents took place (Haines 1991). Taverns, a favorite place for workers to meet, were crowded and smoke-filled dispensaries of alcoholic beverages. People smoked more in towns than in the countryside, and men did so much more than women. Life in towns was more stressful than in rural areas and violence was an integral component of urban life. Political life, labour conflict, and life on the streets were all potentially violent forms of social activity.[24] It is also possible to argue that food consumption was never as balanced in towns nor was food as fresh as it was in the countryside. Urban water supplies were also notoriously deficient before potable water supplies were installed. All of these elements of urban risk inform many of the results presented in this paper.

Respiratory infection was related to population densities more clearly than any other illness, and death rates from respiratory ailments were much higher in towns over the period under study (between 25% and 50% higher than in the countryside). Higher urban death rates, then, point more to the prevalence of disease (morbidity) than to supposedly lower resistance to infection, which may well have increased over the period thanks to higher urban living standards. In one sense, urban population density was in part the result of certain behavioural and environmental patterns typical of urban life. This helps explain why excess mortality among men was so extraordinarily high. Men's life outside the home was spent mostly at work and in the local taverns. These proved to be effective breeding grounds for respiratory infections which men may have subsequently transmitted to their own families. These places were not just dangerous because

of the density of the populations they attracted, but also because their atmospheres, often vitiated by machines and by smoke, were detrimental to the health of adult men.

Other causes of death were unrelated to infectious disease. While their importance for overall death rates was much lower than that of the classic infectious diseases, they also point to many of these surprisingly modern components of the urban penalty and of urban life. Cancer, alcoholism, heart disease and violent deaths were all much more important in towns, and all of these were related in one way or another to urban lifestyles, often especially for urban adult males. Heart disease is perhaps the most eloquent of these ailments. Urban death rates from heart disease were always at least 50% higher than rural rates, except among the elderly where the urban disadvantage was about 25%. Moreover, among mature males (40–59) in towns, death rates due to heart diseases were more than 50% higher than among mature females, as opposed to the countryside where they were almost equal by sex. It is impossible to explain these differences if we do not keep in mind the stressful effects of urban life on urban residents, and especially on the mature working male. While it is true that not all of the ailments used in this study have shown the same age and sex structure as did heart disease, all of them were markedly urban phenomena. The results of this paper are striking and attest to the surprising modernity of the risks of urban living during the demographic transition in Spain.[25]

Along with these structural and behavioural continuities, there were also profound elements of change taking hold in urban and rural mortality patterns which, in the 1930s, were on the verge of turning towns into the pioneers of demographic modernisation and soon were to make excess urban mortality a thing of the past, despite the persistence of many risks involved in urban living. Two telltale signs of the changes underway were the disappearance of excess urban mortality for digestive diseases at young ages, and the faster pace of reduction in death rates due both to digestive and respiratory diseases. There were deep-seated factors at work in the reduction in importance of infectious disease, and these factors invariably originated and were stronger in the urban world. They turned what had been an '*urban penalty*' into a distinct urban advantage and, in so doing, enhanced still more the influence of towns over their rural hinterlands. These factors affected infectious disease preferentially, and left most other forms of mortality basically untouched. The urban advantage in this process was related to higher living standards in towns, greater levels of investment in public health and sanitation, with its corollary of more effective urban government, important in-roads in the education of women, and finally, increasingly effective urban health institutions. All of these factors were present in the rural world, and indeed death rates from infectious disease declined everywhere, but this began first and was most effective in towns.

While urban living conditions may have been deficient, even dangerous, it is unquestionable that urban incomes were considerably higher than in the countryside. Urban work was less seasonal and better paid than most rural occupations, and this is one of the reasons that people flocked to towns. It is quite likely that urban nutritional levels were substantially higher than rural ones, as suggested by the fact that urban military conscripts during the 1920s and 1930s were between 10 and 17 cm taller than those from rural residences (Coll and Quiroga, 2000). Higher living standards and better nutrition were instrumental in increasing resistance to infection. At young ages both digestive and respiratory infections prevailed, although as people grew older it was mainly deaths due to respiratory infections that declined most. It is extremely interesting to note that despite the disadvantages caused by urban environments and lifestyles for respiratory disease, by 1932 rates of decline for most age groups were invariably higher in towns than in the countryside.

Investment in public health and public hygiene was instrumental in a wide number of aspects related to both the incidence and the gravity of infectious disease. Perhaps the most important of these reforms was the establishment of potable water systems, with the separation of residual and fecal waste from the sources of drinking water. Advances on this front came slowly over Europe, but the first third of the twentieth century was one of

intense activity. These sorts of initiatives were not restricted to water supplies. There were also efforts to establish pre- and post-natal care facilities which, in Spain, were often called 'gotas de leche' (after the French *gouttes de lait*). Attempts to clean up towns and to preserve the freshness of the produce and food coming into town were other related activities. These initiatives, all of which were related to good government, invariably started in urban areas, were first effective in towns, and only later spread to rural areas. Towns were richer than the countryside, governmental institutions were located in towns, urban institutions were stronger and better organised, and towns had greater power than the villages to get the support they needed from the central government. Digestive tract infections were especially sensitive to these reforms, which tended to affect the incidence of disease more than they did resistance to illness.

It is impossible to explain the dramatic decline in childhood infectious disease without taking into account changes in the ways in which mothers took care of their children. It is well-known that in the developing world, bringing childhood mortality from very high levels to only moderate ones is a fairly inexpensive process based on the role of mothers, both in the prevention of infections and in the care of sick infants. In other words, it is a matter of education. Declines in digestive and respiratory diseases among children (0–4) of as much as 50% suggest that Spain was going from a regime of extremely high childhood mortality to one in which it was only moderate, and towns were leading the way.[26] It is difficult not to place maternal education at square one in the process of improvement of child health, just as it was for the developing world. No matter how great the advantages derived from other reforms mentioned earlier, it is unlikely that they were responsible for more than a small improvement for this age group of the population. Cleanliness, hygienic infant feeding practices, and preventing dehydration among sick youngsters were all part of a different attitude of mothers towards their children. Even though fertility decline may have helped in this process, education appears to have been the key variable.[27]

It is well-known that educational levels were always higher among urban residents than among those in the countryside, and progress against illiteracy was much stronger in towns. Recent work on literacy in Spain has shown that in 1930 among adult women, urban literacy rates were more than 20% higher than in rural areas, and that in towns female illiteracy had decline by 57% as opposed to 43% in rural areas between 1900 and 1930. Nevertheless, it appears that levels of literacy had only a modest, although positive, effect on child survival. Gains in education were also achieved through more informal means which affected the way in which mothers cared for their children. The health establishment, especially doctors and midwives, must have played an extremely important role in changing the way mothers cared for their children, through advice, publications and other sorts of public activity. Doctors lived preferentially in towns, and those who lived there were probably better informed as to the progress of medicine in other countries and areas than their rural counterparts. In the final analysis, the dramatic reduction of childhood mortality found everywhere suggests that education, be it formal or informal, was a key factor for improved child health, and that towns were in a privileged position to reap the positive effects of that education.

For most of history, urban institutions had been an important factor in urban excess mortality. This unquestionably continued to be the case in 1932, although the negative effect was by then probably relatively small.[28] Nevertheless, these institutions were beginning to play a positive role as well, a role whose importance would be dramatically enhanced after the period under study. The main positive role of these mostly urban institutions for certain infectious diseases was that, by bringing together ill people, they may have spread infection within their walls, but limited its spread in society at large. Institutions were also instrumental in giving some sort of economic, nutritional and – to a lesser degree – medical support to otherwise marginalised elements of society. By the 1930s, these functions offset, at least in part, the role that institutions played in stimulating urban death rates. With the discovery of more therapeutic medical practices after the 1940s, the presence

of medical and charitable institutions in the urban world was to become a central part of the lead that towns took over rural areas in the health and well-being of their populations.

With the exception, perhaps, of urban living standards, all of the forces of change at work were ultimately related, directly or indirectly, to good and effective government practices that were gradually making themselves felt during the period. Governments organised and promoted pre- and post-natal care, maternal education, improvements in public health and hygiene, and educational reforms. It was governments that invested in health and in education, and these levels of investment increased dramatically during the period. Government actions invariably were centred in towns first, and only later in the countryside. For example, in 1920, per capita investment in health was nearly three times higher in towns than in the countryside, and investment in education was nearly twice as high. The role of governments in this entire process should not be under-emphasised, nor should the preferential attention they paid to towns and cities. Governments were located in towns and most of their members were of urban origin. Towns were more permeable to new ideas and more receptive to government initiatives. This is a major reason why they ended up playing such a central role in the dramatic reduction of mortality. Rural areas benefited from government initiatives, but only after towns and often through towns.

The health of mothers is a clear example of some of the advantages of urban life stressed in the preceding paragraphs. Women of reproductive age have always faced greater risks to their health during and near the moment of childbirth, especially during the early decades of the twentieth century when antibiotics had not yet been invented and sophisticated obstetrics was still but a promise for the future. Even so, here too there were great urban–rural differences, although in the opposite direction from those seen with other causes of death. Maternal mortality for women (15–39) was more than 15% lower in towns than it was in the rural world.[29] Evidently the conditions surrounding childbirth must have been more favourable to a woman's health in town than they were in the countryside. Even though overall death rates among women of reproductive age were 20% higher in towns, this was mostly due to respiratory illness rather than childbirth. Higher levels of nutrition, greater proportions of births assisted by midwives, easier access to medical advice, the ready presence of institutions, and probably greater hygiene surrounding childbirth itself must have all had a positive influence on the health of mothers. All of these were integral parts of urban life and they suggest that there were also certain health advantages in towns, especially for mothers.

The dramatic gains against infectious disease both in urban and in rural Spain between the early part of the twentieth century and the 1950s confirm the importance of towns as spearheads of health change. Thanks to this, Spain abandoned the dubious honour of having one of the highest levels of mortality in Western Europe, and initiated its climb towards the position of extremely high life expectancy that it enjoys today. The control of infectious disease was a major part of that process, and towns played a key role in the struggle against infection. This struggle, however, was only part of the story, as other types of illness increased in importance during the first third of the century and continued to do so until well into the second half of the century. Many of these ailments were also the product of the *urban penalty* because they were an undesirable side-effect of urban life and of urban lifestyles. In fact, the *urban penalty* has never really disappeared because urban areas were, and continue to be, areas fraught with peril and risk. What changed was that most of these factors no longer resulted in death, or if they did so it was at a much greater age. The incidence of infectious disease, especially respiratory infections, continues to be far higher in urban areas, stress-induced ailments are much more frequent, violence is ever-present, and smoking and automobile accidents continue to take a heavy toll on people's health. In this way, the elimination of the *urban penalty* was in reality the partial elimination of the consequences of the *urban penalty*. It was also a monument to the triumph of human organisation, scientific progress, education and economic growth, and an integral part of the process of social and economic modernisation.

Table A1. Age-specific death rates for digestive and respiratory diseases in urban and rural Spain, 1906 and 1932 (per thousand).

	Digestive tract diseases				*Respiratory tract diseases*			
	1906		1932		1906		1932	
Age	*Urban*	*Rural*	*Urban*	*Rural*	*Urban*	*Rural*	*Urban*	*Rural*
0–4	25.63	26.87	11.60	16.07	24.59	15.18	13.92	11.11
5–9	0.67	0.73	0.46	0.48	2.02	1.33	0.95	0.79
10–14	0.25	0.25	0.32	0.23	1.18	0.79	0.63	0.48
15–19	0.34	0.29	0.44	0.28	3.32	2.04	2.16	1.41
20–24	0.36	0.37	0.50	0.32	4.79	3.15	2.69	2.13
25–29	0.40	0.37	0.65	0.36	4.53	2.90	2.66	2.05
30–34	0.72	0.55	0.80	0.43	5.18	2.97	2.58	1.91
35–39	1.00	0.62	1.03	0.49	4.88	2.69	2.97	1.94
40–44	1.32	1.00	1.29	0.63	5.63	3.33	3.39	2.04
45–49	1.91	1.26	1.63	0.88	5.27	3.02	4.05	2.42
50–59	2.85	2.33	2.19	1.44	7.58	4.58	5.32	3.31
>60	10.15	9.05	4.34	4.70	18.07	14.15	13.20	10.18
Broad age groups								
0–14	9.73	10.17	4.31	5.82	10.15	6.20	5.38	4.28
15–39	0.53	0.43	0.66	0.37	4.54	2.75	2.63	1.90
40–59	2.16	1.68	1.79	1.07	6.44	3.86	4.47	2.75
>60	10.15	9.05	4.34	4.70	18.07	14.15	13.20	10.18
All age groups	4.47	4.99	3.56	3.88	7.99	5.27	5.48	4.28

Table A2. Age-specific death rates by certain causes in urban and rural Spain, 1906 and 1932 (broad age groups, per thousand).

	1906		1932		1906		1932	
Age	*Urban*	*Rural*	*Urban*	*Rural*	*Urban*	*Rural*	*Urban*	*Rural*
	Diarrhoea and enteritis				*Bronchitis and pneumonia*			
0–14	9.44	9.76	4.00	5.49	9.13	5.82	5.05	4.09
15–39	0.30	0.22	0.10	0.10	1.02	0.79	0.73	0.59
40–59	1.00	0.71	0.27	0.23	3.51	2.45	2.45	1.66
>60	7.37	6.10	1.47	2.11	16.69	13.24	11.90	9.38
All age groups	3.80	4.31	1.59	2.48	5.35	4.06	3.82	3.31
	Respiratory TB				*Cancer*			
0–14	1.02	0.38	0.33	0.19	0.02	0.02	0.04	0.02
15–39	3.52	1.96	1.90	1.31	0.17	0.08	0.19	0.09
40–59	2.93	1.41	2.03	1.09	1.73	0.89	1.91	1.14
>60	1.38	0.91	1.30	0.80	3.80	2.40	5.77	4.04
All age groups	2.64	1.21	1.66	0.97	0.77	0.42	1.13	0.77
	Cirrhosis/alcoholism				*Heart disease*			
0–14	0.03	0.03	0.03	0.04	0.30	0.23	0.59	0.38
15–39	0.08	0.06	0.09	0.05	0.58	0.39	0.77	0.51
40–59	0.53	0.37	0.51	0.37	2.82	1.57	3.10	1.84
>60	1.05	1.00	0.97	0.99	13.10	10.05	16.19	12.84
All age groups	0.25	0.19	0.27	0.23	2.07	1.43	2.95	2.27
	Violent deaths/suicide							
0–14	0.37	0.40	0.28	0.21				
15–39	0.38	0.35	0.39	0.30				
40–59	0.47	0.39	0.54	0.39				
>60	0.78	0.86	0.82	0.71				
All age groups	0.46	0.43	0.51	0.38				

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NOTES

(1) For a brief look at some of this literature, see Wrigley (1967, 1985, 1990), de Vries (1987: 227–324) or van Poppel (1989). See also, for example, the articles in the volume edited by Lawton and Lee (1989).
(2) For more on this in England, see Kearns (1988, 1991, 1993) and Woods (1985). See also Sharlin (1978), Finlay (1981), van der Woude (1982), Woods and Shelton (1997, 2000) and Woods (1989, 2000).
(3) This seems to have been the case, for example, with infant mortality in England where national indicators suggest that, after a decline starting in the 1870s, levels increased once again between 1880 and 1895. Regarding this process, see Woods *et al.* (1988: 356–362; 1993: 41–42) and Williams and Mooney (1994). There are also indications that something similar occurred in mortality at young ages during the final decades of the nineteenth century in the United States (Preston and Haines, 1991: 97–102, 208–210).
(4) There is ample literature on this point. See, for example, Woods (1991) and Kearns (1989).
(5) There are also other levels of data aggregation present in published records. See Reher and Valero Lobo (1995).
(6) These tables have been published in Dopico and Reher (1998). The complete set of tables is available free of cost at the following web site: http//www.ucm.es/info/geps (in '*Otras bases de datos*'). For the methodology used in generating these tables, see Dopico and Reher (1998: 25–58).
(7) For additional work on the same database, see Pérez Moreda *et al.* (in press).
(8) If instead of using only provincial capitals, we include all towns above 20,000 inhabitants, for the same date more than half of them (41 of 80) had negative natural growth rates. These data are taken from Reher *et al.* (1993: 229, 244–245). See also Reher (1989, 1990).
(9) See also Gómez Redondo (1992: 70–74). For recent analyses of different aspects of childhood mortality in Spain during the period, see Ramiro-Fariñas and Sanz-Gimeno (2000a, 2000b), Reher, Pérez-Moreda and Bernabeu-Mestre (1997), and Reher and Sanz-Gimeno (2000).
(10) Tabutin (1978) studied excess female mortality in the past, especially visible between 5 and 45 years of age, and attributed it to these factors.
(11) Most, although not all, of the causes of death included in these two classifications refer to infectious disease. With digestive tract diseases, for example, after infancy a number of the diseases involved are not infectious.
(12) In this paper we will only use a limited number of indicators, including urban/rural and male/female differentials and intensity of decline. The appendix tables contain the age-specific death rates for these groupings as well as other causes of death used in this analysis.
(13) For example, in rural areas in 1932, respiratory diseases represented nearly 40% of all deaths for persons aged 20–29, and digestive tract diseases claimed only 7.5% of all deaths. For 50–59 year olds, these proportions in rural areas were 23% and 10% respectively.
(14) For respiratory illnesses in rural areas, sex differentials ranged from 1.06 to 1.10 for the 15–39 age group between 1906 and 1932, and from 2.51 to 1.93 for the 40–59 year age group. In urban areas, the same age groups showed the following pattern: 1.36 to 1.43 (15–39) and 2.14 to 2.82 (40–59). This pattern was similar for digestive tract diseases, although sex differentials tended to be lower. In rural areas they ranged from 1.20 to 1.33 (15–39) and from 1.28 to 1.74 (40–59), and in towns from 1.28 to 1.38 and from 1.59 to 1.84.
(15) According to the *Anuario Estadístico de España* in 1920, the provinces with the six largest Spanish towns were among the nine provinces with the highest per capita tobacco consumption in Spain. Among them, consumption was between two and three times the national average.

(16) In 1932, for example, 58% of all digestive tract deaths in the rural world were concentrated in the 0–14 year age group, while in towns the concentration was about 40%.

(17) In towns, diarrhoea and enteritis declined to 0.42 (0–14), 0.33 (15–39), 0.27 (40–59) and 0.20 (>60 years). In rural areas the decline was somewhat slower at 0.56, 0.44, 0.33 and 0.35 respectively.

(18) See Appendix, Table A2, for age-and cause-specific death rates for these causes.

(19) For the figures used here, data have been eliminated from age groups where the incidence of any given cause is considered negligible.

(20) For this age group, deaths from heart disease represented 15–17% of all deaths in both urban and rural areas.

(21) Alcoholism is not included here because it does not appear in the classifications of cause of death in 1906.

(22) Differences in life expectancy for different groups of causes of death were derived by inserting age-specific cause and death rates ($_nm_x$) corresponding to rural areas into urban life tables. The overall urban penalty is simply the difference in life expectancy at age 20 (e_{20}) between urban and rural areas.

(23) The remaining male urban penalty of 1.5 years was split between urinary and nervous tract causes and, somewhat surprisingly, poorly defined diagnostics. For women, urinary tract diagnostics explained most of the remaining observed differences.

(24) It is interesting to note that in the category of 'violent deaths' used in this study, the importance of suicide was roughly the same in town and countryside, as opposed to other sorts of violence which show a very clear urban profile.

(25) In a recent study based on 1990–92 Spanish data, Camarero-Rioja *et al.* (1999: 113–123) found that mature adult males (50–75) were also at a distinct disadvantage both with respect to females and to rural populations, with lung cancer, heart disease, cirrhosis of the liver, and other respiratory diseases playing a key role. The urban penalty continues to be an integral part of urban existence.

(26) Between 1906 and 1932, digestive diseases for children aged 0–4 declined by 55% in towns and 40% in the countryside. Respiratory diseases decline by 43% and 27% respectively.

(27) For the contribution of fertility decline to the reduction in childhood mortality, see Reher (1999).

(28) This can be seen, at least indirectly, by means of a straightforward counterfactual exercise. The 1930 census enables us to identify the institutional populations in the urban world by broad age groups. If rural mortality levels are applied to non-institutional urban populations and levels twice and three times that of the rural world are applied to the institutional populations, it is possible to derive a 'hypothetical' urban mortality and compare it with the actual levels appearing in our data-set. In this exercise based on rather extreme mortality suppositions, for the 15–39 year age group, institutions explain between 3 and 6% of the excess urban mortality, and for the all-important 40–59 year age group where mortality differences are highest, they explain only between 2.1 and 4.2%. Only for the elderly can institutions explain a considerable amount of excess urban mortality (49.3 and 98.5%), although it is useful to bear in mind that among the elderly, mortality differences between town and countryside are quite small.

(29) In 1932, maternal mortality included 'septicemia and puerperal infections' (rubric 35) and 'other diseases of pregnancy, childbirth or puerperium' (rubric 36). The diagnostics of 1906 are much less clear and so results have not been included here. The age- and cause-specific death rates for this age group were 3.95 per 10,000 in towns and 4.68 per 10,000 in rural areas.

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