

## Mortality and the Epidemiological and Demographic Transition in Los Santos de Maimona (Badajoz-Spain)

D. PERAL PACHECO

L.F. PINEDA NÚÑEZ

*History of Medicine Dept.*

*Grupo de Investigación en Humanidades Médicas*

*Facultad de Medicina(UEx)*

J. McCUE

*English Language Dept.*

### ABSTRACT

*A study of mortality was made from the Registers of Deaths of the Parochial Archives of the Church of Nuestra Señora de los Angeles from 1800 to 1992 in Los Santos de Maimona (Badajoz, Spain). The number of deaths in the study period is 29,885, of which children represent 46% and the rest, 54%, are over 7 years old. The mortality rate from the 19<sup>th</sup> to the 20<sup>th</sup> centuries changes from children to elderly people. The commencement of the demographic transition can be situated in 1894, and finalizes in 1965 when the birth rate is lower than 20 per thousand.*

### RESUMEN

*Se realizó un estudio de mortalidad a través de los Libros de Difuntos del Archivo Parroquial de Nuestra Señora de los Angeles de los Santos de Maimona (Badajoz) desde 1800 hasta 1992. El número de fallecidos en este período estudiado es 29.885, de los cuales el 46% corresponde a párvulos y el 54% son difuntos mayores de 7 años. La tasa mortalidad en los siglos XIX y XX evoluciona desde una mortalidad infantil hacia una mortalidad adulta, de edades cada vez mayores. El comienzo de la Transición Demográfica la podemos situar en 1894 y finalizar en 1965, cuando la tasa de nacimientos se sitúa por debajo del 20 por mil.*

## INTRODUCTION

The last two centuries have produced, without question, the most notable advances in medicine. In the 19<sup>th</sup> century, when great discoveries in biology were made, modern medicine began its spectacular rise. By the beginning of the 20<sup>th</sup> century, practically the whole structure of the human body was known in minute detail. Rapid progress was also being made in the understanding of physiological processes. The biological discoveries of the 19<sup>th</sup> century gave rise to the development of medical technology. New instruments for diagnosis such as the stethoscope were invented, and devices for taking blood pressure and for surgical use became more sophisticated (Capra 1985: 140-143). This, together with improved nourishment, the use of hygiene measures and a general improvement in living conditions, has resulted in greater life expectancy for the population. This increase in life expectancy came about firstly as a result of a decrease in child mortality, which was also related to the poverty level, to the availability of proper nourishment, and to a number of other social, economic and cultural factors (Bernabeu Mestre 1991). Dr. González Gallego says, echoing the words of Richard Shyrock, that “the history of medicine is linked as much to social and economic phenomena as it is to biological problems, and constitutes one of the central issues of human experience” (Gonzalez Gallego 1994).

With regards to hygiene advances in Spain, an outstanding figure from the 19<sup>th</sup> century was Monlau, who laid down a series of important hygiene measures aimed at reducing illness: ventilation of rooms, washing of the body and clothes, hygiene in the handling of food, drainage systems, paving, the setting-up of cemeteries, regulations regarding prostitution, customs, professions, etc. (Granjel 1983: 101-115).

Public Health’s most spectacular triumph has been the achievement of an important decrease in infectious diseases during the 19<sup>th</sup> and 20<sup>th</sup> centuries. A hundred years ago, diseases such as cholera, measles, smallpox, tuberculosis, typhoid, etc. were a constant threat to the population. People were aware that they could be infected by these diseases at any time and every family knew that one or other of their offspring was likely to perish. Control and prevention of these diseases came about thanks to the introduction and development of vaccines and antibiotics in the 19<sup>th</sup> century.

The decrease in the mortality rate is a phenomenon of capital importance in the history of mankind and to which the growth of the population in modern times can be initially attributed. This drop in the death rate first began to take

place in Europe in the 18<sup>th</sup> century, although the younger population, especially children of less than a year old, were not favourably affected by it until the end of the 19<sup>th</sup> and beginning of the 20<sup>th</sup> centuries. (Gómez Redondo 1992: 13-14).

This study focuses on Los Santos de Maimona, a town located 74 km south of the capital of the province of Badajoz (Spain). It has an extension of 109.02 km<sup>2</sup>. The urban nucleus is situated at an altitude of 529 m, and within its municipal boundaries the lands are mostly flat or slightly undulating, with the exception of the heights of Los Santos (657 m) and Los Olivos (653 m), and the Cabrera, Castillo and Resbala hills. (Madoz 1849: vol.13).

#### **OBJECTIVES**

To analyze the overall mortality within the population of this town from 1800 to 1992.

To determine the time of occurrence of both the Demographic Transition and the Epidemiological Transition.

#### **MATERIAL AND METHOD**

Data were collected from the Books of Registers of Deaths of the Parochial Archives of the Church of Nuestra Señora de los Angeles. The first Book of Register of Deaths dates from the year 1660. In these Archives, we found all the Registers corresponding to our study period, except the Register of Deaths of Children for the years 1839-1843 inclusive. The information gathered from the Archives was recorded on files.

All the data were recorded faithfully as they were written in the Registers of Deaths.

Once the files were completed with the greatest number of data possible, we proceeded to analyze the variables defined for the study on mortality.

#### **RESULTS AND DISCUSSION**

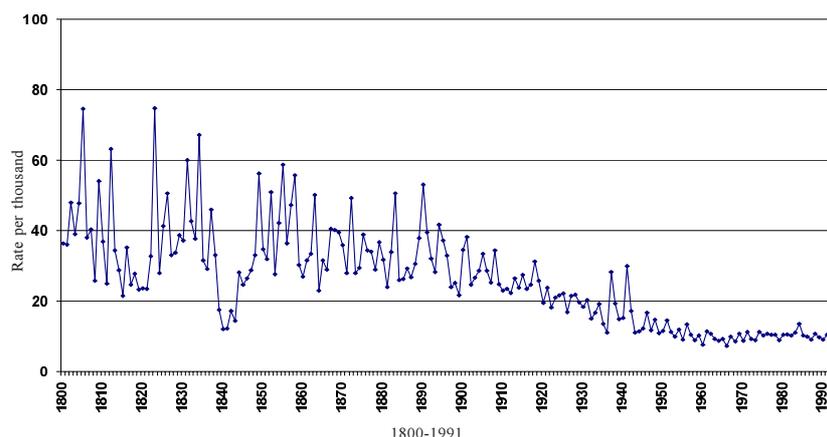
In order to deal with the question of Epidemiological and Demographic Transition we carried out an analysis of overall mortality from 1800 to 1992.

### Overall Mortality

For the study period established from 1800 to 1992 we found that in Los Santos de Maimona there are a total of 29,885 deaths registered.

The distribution of this mortality, expressed as Gross Mortality Rate (the number of deaths registered in a given year divided by the number of town inhabitants for that year and multiplied by a thousand, that is, the number of deaths occurring per year per thousand inhabitants), for each of the 192 years is shown in Figure 1.

**FIGURA 1**  
**GROSS MORTALITY RATES IN LOS SANTOS DE MAIMONA: 1800-1992**

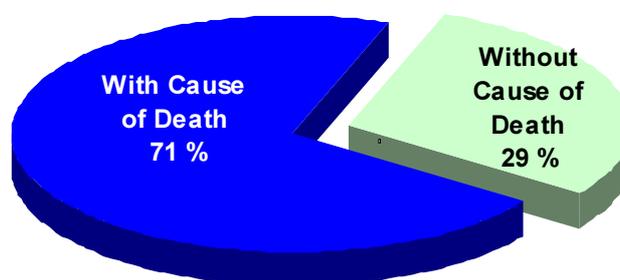


Of the total number of deaths registered, 8,706 have no recorded diagnosis of cause of death whereas 21,179 do have such a diagnosis, meaning that for 71% the cause of death is known and for 29% it is not (Fig. 2).

From 1800 to 1838, 5,424 records exist, of which 5,330 have no cause of death; that is, over a period of 38 years only 114 causes of death were registered. From 1838 onwards we begin to find causes of death being recorded. The reason for this is that in this year a Royal Order was introduced obliging the Church to record causes of death prior to burial. Of the 133 cases registered in this year, 83, i.e. more than half, have cause of death, whereas 50 do not. This

situation does not last long, however, reverting, in the years up to 1846, to that found previously, with very few death cause diagnoses found for each of these years. In 1846, around half the deaths were registered with cause diagnosis, 61 out of a total of 120, whereas the other 59 were not. From 1846 to 1864 we find that approximately half of the records for each of these years have a written cause of death, although the graph shows that the deaths without cause are always more than those with cause. In 1865 the situation is reversed, the majority now having recorded causes of death.

**FIGURE 2**  
**OVERALL MORTALITY IN LOS SANTOS DE MAIMONA:**  
**1800-1992**

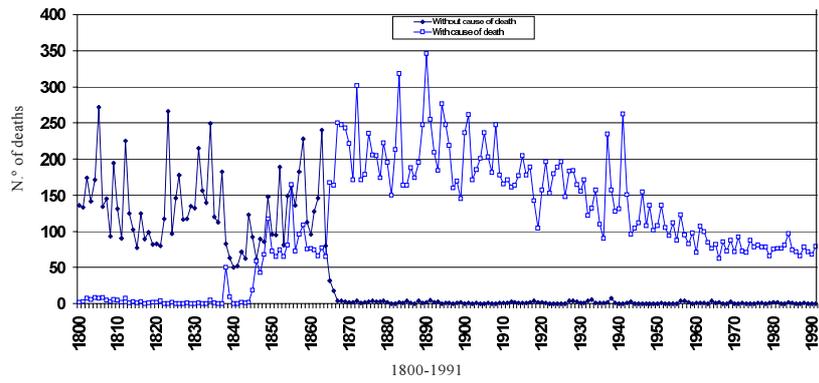


Only in the year 1850 do we find that all the deaths have their corresponding causes recorded. There are 150 death records for this year (Fig. 3).

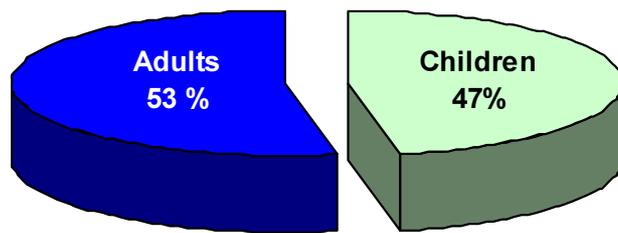
Of the total number of 29,885 deaths, 14,038 (46%) were children, 15,813 (53%) were adults, and 34 (1%) are not specified (Fig. 4).

Of the 29,885 deaths registered, those without specified age include 2,766 children, 134 married males, 104 married females, 48 widowers, 96 widows, 11 single males, and 21 single females of which 18 are registered without record of age, marital status or whether they are minors. There are also 51 males registered without this information.

**FIGURE 3**  
**OVERALL MORTALITY IN LOS SANTOS DE MAIMONA: 1800-1992**



**FIGURE 4**  
**OVERALL MORTALITY IN LOS SANTOS DE MAIMONA: 1800-1992**  
**ADULTS/CHILDREN**



The records contain 19 adults and 65 children who are registered with no indication of their sex.

There are 917 cases of adults registered with no indication of their marital status. We have assumed that the 466 records of subjects whose ages range from 7 to 14 are single, since no cases of married individuals appear at these ages, and we would not expect to find any. A unique case is that of a 15 year-old married woman whose death was registered in 1825.

Furthermore, there are 2,841 records which give no indication of either marital status or age.

Profession is indicated only in 267 of the total number of deaths recorded. The doctor who certified cause of death is identifiable in 4,944 cases. The first time the name of a doctor appears on a death certificate is on November 12, 1884, though this is a chance occurrence since a doctor's name does not appear again until 1926. It is not until May 1936 and onwards that we find this information regularly appearing on the death certificate.

A total of 890 records of individuals of unknown parentage were found, of which 796 are children and the remainder adults.

The graph shows a depression in the years 1839-1843 which corresponds to the absence of records of children's deaths due to the disappearance in this period of the Register of Children's Deaths.

We shall now analyze overall mortality and how it is distributed in relation to age by looking separately at the two centuries studied. The graph in Figure 5 corresponds to the 19<sup>th</sup> century and that in Figure 6 to the 20<sup>th</sup>. Each graph is divided into 4 columns of 25 years, except the last column of the graph corresponding to the 20<sup>th</sup> century, which is only 16 years, as the study period ends in 1991. It is thus possible to observe how mortality varies within each quarter century in terms of age.

The values from these groups are also presented in Tables 1 and 2, so that the low percentages in some age groups can be appreciated more easily in comparison to other groups.

Both graphs reveal how mortality has evolved globally from very early ages; in the 19<sup>th</sup> century the highest percentages of deaths occurred in children, whereas in the 20<sup>th</sup> century the most advanced age groups have proportionally the highest number of deaths.

TABLE 1. A.

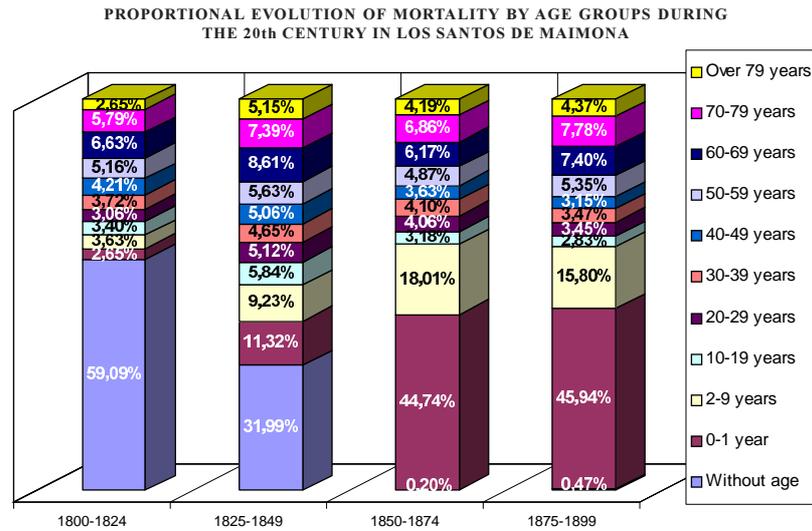
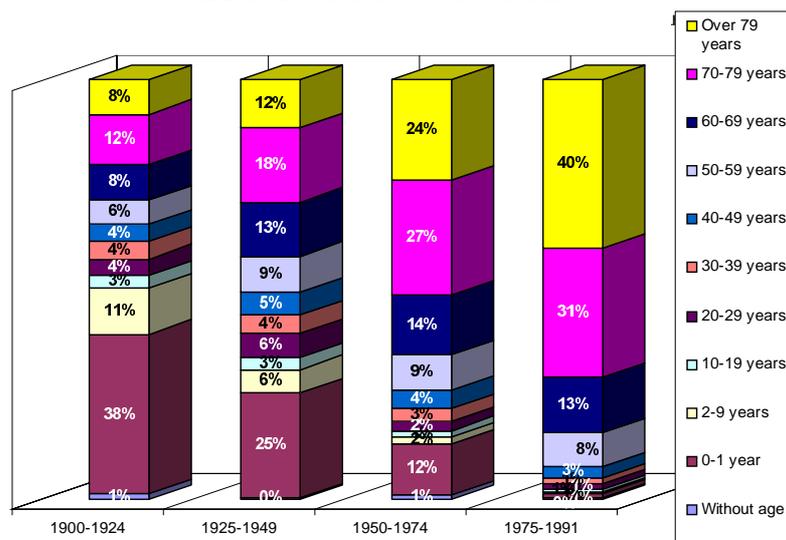


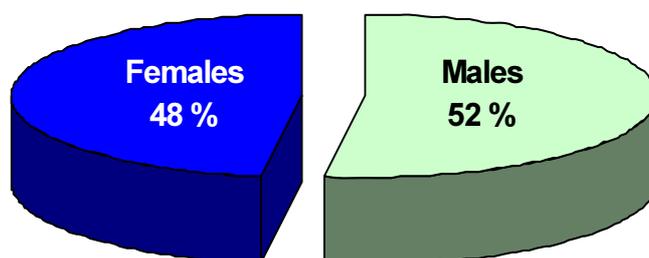
TABLE 1. B.

Age	Period			
	1800 – 1824	1825 – 1849	1850 – 1874	1875 – 1899
> 79 years	2.65%	5.15%	4.19%	4.37%
70 – 79 years	5.79%	7.39%	6.86%	7.78%
60 – 69 years	6.63%	8.61%	6.17%	7.40%
50 – 59 years	5.16%	5.63%	4.87%	5.35%
40 – 49 years	4.21%	5.06%	3.63%	3.15%
30 – 39 years	3.72%	4.65%	4.10%	3.47%
20 – 29 years	3.06%	5.12%	4.06%	3.45%
10 – 19 years	3.40%	5.84%	3.18%	2.83%
2 – 9 years	3.63%	9.23%	18.01%	15.80%
0 – 1 year	2.65%	11.32%	44.74%	45.94%
Without age	59.09%	31.99%	0.20%	0.47%

PROPORTIONAL EVOLUTION OF MORTALITY BY AGE GROUPS DURING  
THE 20th CENTURY IN LOS SANTOS DE MAIMONA



Age	Period			
	1900 – 1924	1925 – 1949	1950 – 1974	1975 - 1991
> 79 years	8%	12%	24%	40%
70 – 79 years	12%	18%	27%	31%
60 – 69 years	8%	13%	14%	13%
50 – 59 years	6%	9%	9%	8%
40 – 49 years	4%	5%	4%	3%
30 – 39 years	4%	4%	3%	1%
20 – 29 years	4%	6%	2%	1%
10 – 19 years	3%	3%	1%	1%
2 – 9 years	11%	6%	2%	1%
0 – 1 year	38%	25%	12%	1%
Without age	1%	0%	1%	0%

**OVERALL MORTALITY IN LOS SANTOS DE MAIMONA:  
1800-1992. SEX**

From a break-down of the figures on overall mortality, we can see (Fig. 7) that 15,524 (51.94%) are males, 14,276 (47.76%) are females, and in 84 records (0.28%) sex is not specified.

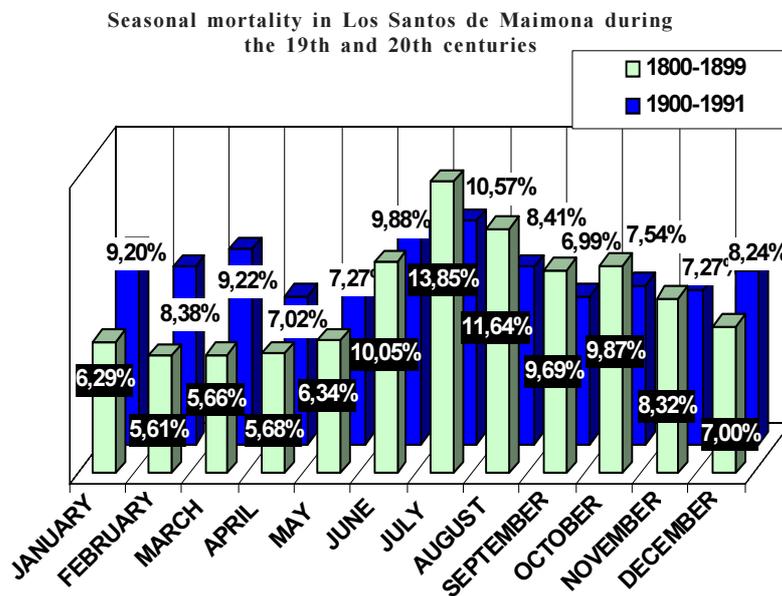
The seasonal mortality study by months has been divided into two series, one corresponding to the 19<sup>th</sup> century and the other to the 20<sup>th</sup>. Figure 8 shows that the month which produced most deaths is July in both centuries, with 13.85% of the records corresponding to the 19<sup>th</sup> century and 10.57% to the 20<sup>th</sup>. The summer months in general produced the greatest mortality in both centuries.

**Demographic and Epidemiological Transitions**

During the chosen study period, Los Santos de Maimona is witness to the so-called Demographic and Epidemiological Transitions. The first of these focuses on the decrease in the birth rate, and the second aims to explain the drop in mortality. The two seem to go hand in hand. Los Santos de Maimona is an example of what has already been described by other authors for other European and Spanish towns (Vallin 1999: 70).

On the one hand, the town under study was affected by the devastating epidemics which ravaged throughout the 19<sup>th</sup> century, and which ceased to exist, at least as far as mortality is concerned, in the 20<sup>th</sup> century.

The 19<sup>th</sup> century was witness to epidemics of cholera, smallpox, measles and other diseases. The las of these great epidemics in terms of mortality was the influenza epidemic which took place in the 20<sup>th</sup> century, in 1918.

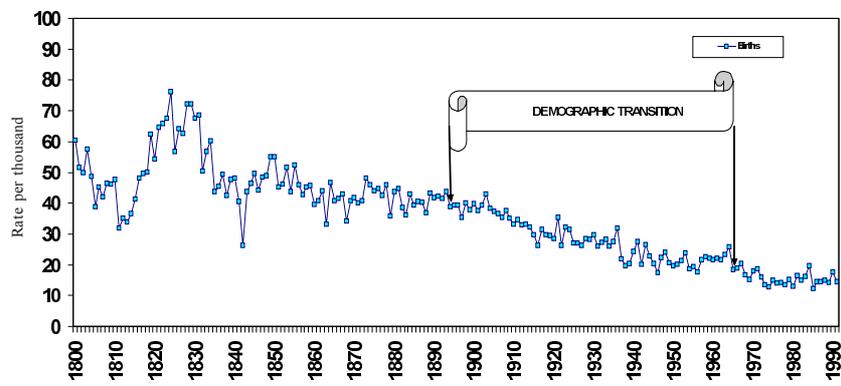


The “classic or western” model of demographic and epidemiological transition described by Omran (Bernabeu Mestre 1981: 83), representing western European societies, shows a gradual and progressive transition from high rates of birth and mortality, i.e. around 40 per thousand and 30 per thousand, respectively, to low birth and mortality rates of 20 and 10 per thousand, respectively.

### Demographic transition

This is exactly what occurs in the case of Los Santos de Maimona, where from 1894 onwards the birth rate becomes stable at less than 40 per thousand, except for the year 1903 when it is higher. We can therefore situate the beginning of the demographic transition in the year 1894, and its finalization in 1965 when

the birth rate drops to below 20 per thousand. During this period an important and progressive drop in the birth rate takes place and does not end in the year 1965 but continues decreasing until 1974, when it finally becomes more or less stable (Fig. 9).

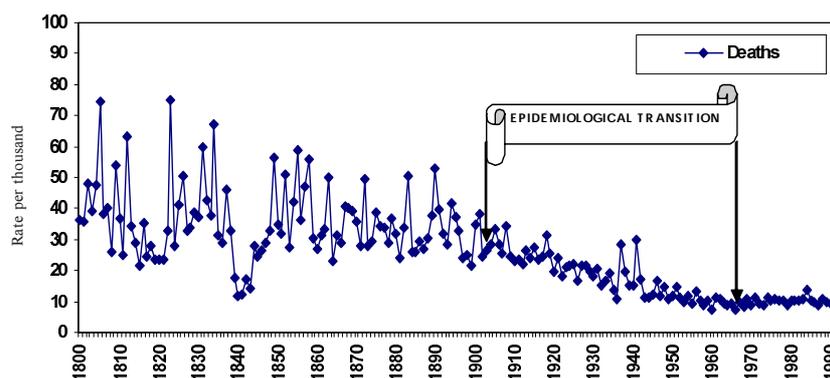


Gross birth rate in Los Santos de Maimona: 1800-1992

In the first decade of the 20<sup>th</sup> century, as Dopico notes, birth control comes into use, and the consequent reduction in the birth rate results in a decrease in mortality of fertile women, that is, in puerperal mortality, and at the same time child and youth mortality rates also become lower (Dopico 1998: 57-58). The most marked drop in the birth rate in Los Santos de Maimona occurred in the 1970's, when in a period of a few years births decreased by more than 50%.

### Epidemiological transition

It may be said that the beginning of the epidemiological transition occurred in the last years of the 19<sup>th</sup> century and the first years of the 20<sup>th</sup>; with regards to mortality it is more difficult to pinpoint because in some years there are fluctuations in which rates of more than 30 per thousand appear. The period in which the decrease in mortality starts to appear and is then consolidated is from the end of the decade of the 1880's until the decade of the 1910's, when the birth rate also begins to drop (Dopico 1998: 28). Dopico situates the beginning of the epidemiological transition in the year 1885; this year saw in Spain the last



Gross mortality rate in Los Santos de Maimona: 1800-1992

cholera epidemic, though no deaths resulted from it in Los Santos de Maimona. The beginning of the descent in mortality then comes about gradually, only to be interrupted by the rise in mortality in the decade of the 1910's which reaches its peak with the widespread influenza epidemic of 1918-1920, and by a further increase in mortality as a result of the Spanish Civil War in the years 1937 and 1941 (Dopico 1998: 27). This drop in mortality reaches its lowest point in the 1960's, when it becomes lower than 10 per thousand, and although it rises a little in the following years, it finally remains at around 10 per thousand. The demographic transition ends in the 1970's when, according to Dopico(1998: 30), "mortality reaches the point where it is on a par with the most advanced Western countries".

This drop in the mortality rate most benefits child and youth mortality (Ramiro and Sanz 1990:61; Robles and Pozzi 1997: 172). Many factors can account for this, such as improved nourishment, and the fact that society began to change its attitude with regard to the child population, especially where mothers' preoccupation for children's upbringing is concerned (Dopico 1998: 56). The parish priest Ezquequiel Fernández Santana contributed to this fact in Los Santos de Maimona in many respects, the creation of his School for Adults being worthy of special note.

We can see how the high mortality rate in children and young people which existed in the 19<sup>th</sup> century reaches a point at the end of the 20<sup>th</sup> century where it is practically non-existent (Fig. 10). Mortality has gone in an upward

direction age-wise, affecting the most advanced age groups. Children, therefore, have benefitted most from the decrease in mortality (Schofield and Reher 1994: 17).

Disease in the 19<sup>th</sup> century and the beginning of the 20<sup>th</sup> was to a very great extent an acute process, frequently synonymous with death; nowadays, however, it is a temporary everyday occurrence in acute cases, or a chronic state suffered by many people over long periods of their lives up to an advanced age. This fact is corroborated by other authors such as Bernabeu (1991:99-100, 1998:18) and Vallin (1995: 96-100).

We are able to verify that the mortality and birth descent pattern for our study of Los Santos de Maimona bears out similar studies made by Vallin (1995: 69) for England – Wales over the same period, McKeown (1990: 98-104) for Sweden, England and Wales, France and Ireland, and Arnaut (1998:215) for Pamplona in Spain.

## CONCLUSIONS

We found for the study period, 1800-1992, a total of 29,885 deaths registered in the Parochial Archives of the town of Los Santos de Maimona. Of this number, 8,706 (29.13%) do not contain cause of death diagnoses, whereas the remaining 21,179 (70.87%) do.

Of the total number of records (29,885), those corresponding to males are 15,525 (52%), females 14,227 (47.7%) and 83 (0.3%) do not specify sex. Without looking at specific ages, 14,049 (47%) are children, 15,729 (52.6%) are adults, and in 107 cases (0.4%) there is no specification of age or whether the subjects refer to children or adults. When we consider that 47% of the total number of deaths are children, and the fact that we have no records of children's deaths for a period of five years, we can see that the child and youth mortality rate corresponds to that of the 19<sup>th</sup> and 20<sup>th</sup> centuries.

The epidemiological transition in Los Santos de Maimona commences in the year 1890. Then mortality starts to decrease gradually, and is only interrupted by a rise in mortality in the decade 1910-1920, reaching its peak with the worldwide influenza epidemic of 1918-1920 and as a result of the Spanish Civil War in the years 1937 and 1941. The period when the drop in mortality begins and becomes consolidated is the end of the 1880's and the decade 1910-1920, and in this period births also start to drop. The epidemiological transition ends in the 1960's, and the demographic transition finalizes in the 1970's.

## REFERENCES

### Sources

Municipal Historic Archives of Los Santos de Maimona. Town Hall Minutes Books.

Parochial Archives of the Nuestra Señora de los Angeles Church. Books of Registers of Baptisms for the years 1800 to 1991.

Parochial Archives of the Nuestra Señora de los Angeles Church. Books of Registers of Deaths for the years 1800 to 1991.

## BIBLIOGRAPHY

ALBARRACÍN TEULÓN, A. (1986): "Revolución y medicina: una interpretación de la tardía ordenación de la asistencia médica en la España del siglo XIX". *Dynamis*. Vol. 5-6. Edita el Servicio de Publicaciones de la Universidad de Granada.

ALBARRACÍN TEULÓN, A.; LÓPEZ PIÑERO, J. M. y GRANJELL, S. (1980): *Medicina e Historia*. Madrid.

ARNAUT BRAVO, S. (1998): *Cambio Demográfico y Mortalidad en Pamplona (1880-1935)*. Universidad pública de Navarra y Ayuntamiento de Pamplona. Pamplona.

BALAGUER, E.; BALLESTER, R.; BERNABEU, J.; NOLASCO, A.; PERDIGUERO, E. y PÉREZ, S.: Forthcoming: "La Transición Sanitaria Española en el Período 1879/1919". Paper presented at the Congreso de Demografía Histórica. Alicante. 1990.

BERNABEU MESTRE, J. (1995): "Enfermedad y población: Introducción a los problemas y métodos de la epidemiología histórica". *Seminari d'Estudis sobre la Ciència*. Valencia.

BERNABEU MESTRE, J. (1991): "Enfermedad y población: Una aproximación crítica a la epidemiología histórica española". *Revisiones en Salud Pública*. Madrid.

BERNABEU MESTRE, J. (1998): "Transición sanitaria y evolución de la medicina (Diagnóstico, Profilaxis y Terapéutica), 1885-1942". *Boletín de la ADEH*. 16 (2). Bilbao.

- BERNABEU MESTRE, J. y LÓPEZ PIÑERO, J. M. (1987): "Condicionantes de la mortalidad entre 1800 y 1930: higiene, salud y medio ambiente". *Boletín de la Asociación de Demografía Histórica* n 2, Madrid.
- BREL CACHÓN, M. P. (1999): "Comparación de los Libros Parroquiales y de los Registros Civiles. Una aportación a la validez de las fuentes demográficas a finales del siglo XIX". *Boletín de la ADEH*. 17 (2). Bilbao.
- CAPRA, F. (1985): *El punto crucial. Ciencia, Sociedad y cultura naciente*. Integral Ed. Barcelona.
- CARRILLO, J. C. y ROMERO DE SOLÍS, P. (1973): "La población española en los siglos XVIII y XIX". *Estudios de sociodemografía histórica*. Madrid.
- DOPICO, F. (1986): "Desarrollo económico y social y mortalidad infantil. Diferencias regionales (1860-1950)" *Dynamis*. Vol. 5-6. Servicio de Publicaciones de la Universidad de Granada.
- DOPICO, F. (1998): "El declive de la mortalidad en España, 1860-1930". *Mono-grafía de la ADEH* 1. Bilbao.
- GÓMEZ REDONDO, R. (1992): *La mortalidad infantil española en el siglo XX*. Centro de investigaciones sociológicas. Siglo XXI de España editores S. A. Madrid.
- GONZÁLEZ GALLEGO, M. A. (1994): *Historias y curiosidades de la medicina*. Ediciones Luzán - 5 S.A. Madrid.
- GRANJEL, L. S. (1961): "Legislación sanitaria española en la España del siglo XIX". *Asclepio*. Vol. 21. Arnao de Vilanova del Consejo Superior de Investigaciones Científicas de Madrid.
- GRANJEL, L. S. (1986): "Medicina Española Contemporánea". Ediciones de la Universidad de Salamanca. Salamanca.
- GRANJEL, L. S. y SÁNCHEZ-GRANJEL SANTANDER, L. (1980): *El cólera y la España ochocentista*. Universidad de Salamanca. Salamanca.
- GRANJEL, M. (1983): *Pedro Felipe Monlau y la higiene española del siglo XIX*. Cátedra de Historia de la Medicina. Universidad de Salamanca. Salamanca.
- JAMMAL, A.; ALLARD, R. et LOSLIER, G. (1988): *Dictionnaire d'Épidémiologie*. Edisem-Maloine. Louiseville.
- MADOZ, P. (1849): *Diccionario Geográfico-Estadístico-Histórico de España y sus posesiones de ultramar*. Vol. 13. Madrid.

- McKEOWN, T. (1990): *Los Orígenes de las Enfermedades Humanas*. Editorial Crítica. Barcelona.
- MONLAU, P. F. (1862): *Elemento de Higiene Pública o arte de conservar la salud de los pueblos*. 2<sup>nd</sup> Ed. Vols. 1-3. Imprenta y esterotipia de M. Rivadeneyra. Madrid.
- PERAL PACHECO, D. (1993): *La Salud Pública en Zafra en el siglo XIX*: Ediciones Bartolomé Gil Santacruz. Badajoz.
- PÉREZ MOREDA, V. (1980): *La crisis de mortalidad en la España interior siglos XVI-XIX*. Siglo XXI de España editores. Madrid.
- PÉREZ MOREDA, V. y REHER, D-V. (1988): *Demografía Histórica en España*. Ediciones El Arquero. Madrid.
- RAMIRO, D. y SANZ, A. (1999): "Cambios estructurales en la mortalidad infantil y juvenil española. 1860-1990". *Boletín de la ADEH*. 17 (1). Navarro & Navarro editores. Bilbao.
- ROBLES GONZÁLEZ, E. y POZZI, L. (1997): "La mortalidad infantil en los años de la transición: una reflexión desde las experiencias italiana y española". *Boletín de la ADEH*. 15 (1). Bilbao.
- ROBLES GONZÁLEZ, E.; GARCÍA BENAVIDES, F. y BERNABEU MESTRE, J. (1996): "La transición sanitaria en España desde 1900 a 1990". *Revista Española de Salud Pública*. Vol. 70 (2). Madrid.
- SCHOFIELD, R. REHER, D. (1994): "El Descenso de la Mortalidad en Europa". *Boletín de la ADEH*. 12 (1). Bilbao.
- VALLIN, J. (1995): *La Demografía*. Alianza Editorial S. A. Madrid.
- VALLIN, J. (1999): "La Población Mundial". 2<sup>nd</sup> Ed. Alianza Editorial S. A. Madrid.