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Natality and mortality seasonality in the Spanish Central Pyrenees

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RESUMO

A análise da distribuição mensal dos nascimentos e óbitos nos Pirinéus Centrais Espanhóis (em Huesca), mostra que as variações sazonais nesta área são elevadas, tanto a nivel da natalidade como da mortalidade, apesar de apresentarem diferentes padrões e evolução.

No que concerne à natalidade, os maiores coeficientes situam-se nos primeiros meses do ano, ao passo que a mortalidade, devido à sua relação com a distribuição da temperatura ao longo do ano, ocorre maximamente no Inverno.

A evolução da sazonalidade é também diferente nos dois fenómenos: na mortalidade, devido a decrescente influência do ambiente através da melhoria das condições sanitárias, as variações sazonais têm vindo a diminuir e, por isso, a sua distribuição tornou-se mais uniforme ao longo do ano. Na natalidade, o seu controle progressivo e a evolução sócio-económica das populações, determinaram o aumento das variações sazonais e a modificação do padrão da sazonalidade, passando os maiores coeficientes do princípio do ano para o Verão.

Palavras-chave: Distribuição mensal; Mortalidade; Natalidade; Sazonalidade.

ABSTRACT

The survey on births and deaths monthly distribution in the Spanish central Pyrenees (at Huesca) shows that seasonal variations are high in this area both in natality and mortality, though there are different patterns and evolution.

Considering natality, the highest coefficients are situated during the first months of the year, while in mortality because of its high relation with temperature distribution throughout the year, the maximum number of deaths is in winter.

Seasonality evolution is also different in both phenomenons, in mortality due to the decreasing influence of the environment through better sanitary conditions,

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seasonal variations have been diminishing, thus mortality becomes uniformally distributed throughout the year. In natality, its progressive control and socio-economic evolution have increased seasonal variations and have also changed the seasonality pattern, shifting the highest coefficients from the beginning of the year in first studied years to the summer in the latter ones.

Key-words: Monthly distribution; Seasonality; Natality; Mortality.

INTRODUCTION

This study is part of a biodemographic survey of the highest valleys population of the Oriental Aragonese Pyrenees (Huesca).

The studied area is limited in the east by Lérida, in the west by Jaca (Huesca), in the north by France, and in the south by the intrapyrenaic depression (see map). This area spreads over 2400 Km^2, including 100 parishes of which all information on births, deaths and marriages occured from 1918 to 1981 was collected through microfilms, from Barbastro's Bishopric archives. Of this period, due to the spoliation that church registers suffered during the Spanish civil war, it was impossible to obtain records of births occured between 1931 and 1935, and deaths between 1930 and 1937.

A seasonality analysis of a demographic phenomenon points out the absence of uniformity throughout the year, and tries to find out possible causes of these seasonal variations.

Natality and mortality seasonality, as several authors have shown (COWGILL 1966, MALINA *et al.* 1977) depend on climatical factors (temperature, moisture, pluviosity, moon phases) and on sociocultural factors (work periodicity, cultural customs, health levels). Furthermore a consequence of these two seasonal phenomenons is the lack of uniformity in vegetative growth throughout the year.

On the other hand the possible causes of seasonal variations can change in the course of time, therefore it is useful to analyse seasonality decreases again. All this can be observed through the standard desviation in the seasonality incidence evolution (Fig. 5).

RESULTS AND DISCUSSION

Natality

Considering all years as a whole (Table 1 and Fig. 1), it can be observed than the most favoured months are February, March, and April, while the minimum natality is in September. This pattern, with the highest natality in the first months of the year and the lowest in the latter part of it, has been found in the majority of the studied populations in the Northern Hemisphere. In Spain a similar pattern was observed in Maragata (BERNIS, 1974), Formentera (BERTRANPETIT, 1981), Las Hurdes (GARCIA-MORO, 1982), and La Alpujarra (LUNA, 1984).

The monthly distribution of births directly depends on conception rythm, and one of the sociocultural factors that could mostly influence on this rythm is marriage seasonality (PRIOUX, 1976).

The highest number of conceptions according to the observed natality seasonality (nine months before the months with the highest coefficients) corresponds to May, June, and July, while the maximum nupciality is in November (DIAZ, 1986). This scarce influence might be due to a reduced proportion that first births represent within the whole of births.

The seasonality pattern seen so far is the outcome of superposing two different distributions. Looking at Table 2 it can be observed how in the first studied years the highest coefficients are placed at the beginning of the year and afterwards the maximum of natality becomes situated in summer. This change of seasonality pattern involves a transition period (approximatly between 1936-1950), in which a uniformation of monthly births distribution takes place (Fig. 3). Thus when analizing seasonality incidence through the standard desviation, we hope to find the highest values in the earlier and latter studied years, while the minimum should be reached between them, and that is what can be observed in Fig. 5.

This seasonality evolution has also been observed in other surveys undertaken in countries with cold winters (CZIEZEL, 1974), and it's due to a diminution of labor factors incidence on natality and to an increasing control of month's birth by the parents. Both factors may also have conditioned the observed seasonality evolution in the studied region.

Mortality

Considering all years as a whole the seasonality pattern in the studied population shows (as the majority of the populations) a high relation between deaths distribution throughout the year and temperature. Thus the highest coefficients are situated in winter (January, February, March, and December), when the lowest temperatures are reached and cardiovascular and respiratory disorders increase. The lowest coefficients are reached in summer (Table 1 and Fig. 2). High values described for summer months in some mediterranean populations (BERTRANPETIT, 1981) are not found here because there are not very hot in mountain climates.

On the study of seasonality pattern evolution (Table 3 and Fig. 4), we can see that because the mortality crisis due to the flu epidemy in 1918 had it's highest incidence in October, high seasonal variations can be observed in viously occurred and the consequent selection that this implies, seasonality incidence decreased. Then deaths distribution became more irregular, and in the latter years owing to a lessening subordination to the environment, seasonality evolution in order to distinguish possible variations of environmental factors.

The present study deals with natality and mortality seasonality, trying to show their trends between 1918 and 1981.

TABLE 1. *Seasonality coefficients*

	Natality		Mortality	
Month	**Number**	**Coef.**	**Number**	**Coef.**
January	1161	101.53	1159	131.78
February	1174	112.66	977	121.90
March	1362	119.11	1022	116.20
April	1305	117.93	792	93.05
May	1186	103.72	760	86.42
June	1093	98.77	693	81.42
July	1083	94.71	715	81.30
August	1009	88.24	768	87.32
September	919	83.04	797	93.64
October	1109	97.00	849	100.40
November	973	87.92	849	99.75
December	1090	95.32	939	106.78
Total	13464	1199.95	10354	1199.96
T. D		11.66		16.31

TABLE 2. *Natality seasonality coefficients*

Month	1918-1929	1921-1930	1936-1950	1951-1960	1961-1970	1971-1981
Jan	98.29	108.41	95.47	103.18	98.90	86.11
Feb	138.78	117.24	100.90	106.70	98.16	108.02
Mar	127.71	129.41	108.22	116.09	121.28	77.33
Apr	112.57	128.84	100.92	124.58	115.54	107.14
May	110.19	106.05	97.23	95.25	119.54	95.88
Jun	100.93	96.02	103.19	90.74	112.88	94.44
Jul	83.26	88.20	100.30	102.20	86.00	138.86
Aug	78.88	81.11	94.58	94.26	93.76	103.71
Sep	75.04	74.86	85.92	91.25	85.33	116.25
Oct	92.02	92.66	114.39	90.28	97.20	93.14
Nov	80.86	88.42	94.55	88.68	86.21	79.89
Dec	101.41	88.73	104.27	96.74	85.14	100.17
Tot	1199.94	1199.95	1199.94	1199.95	1199.94	1199.94
T. D	19.81	17.99	7.32	11.17	13.86	16.83

TABLE 3. *Mortality seasonality coefficients*

Month	1918-1920	1921-1930	1938-1950	1951-1960	1961-1970	1971-1981
Jan	126.69	194.74	133.16	141.78	133.42	140.30
Feb	98.30	125.60	128.07	143.86	122.70	92.39
Mar	101.49	117.02	118.25	128.95	110.87	122.18
Apr	92.58	93.89	87.13	93.50	106.79	83.58
May	65.10	95.15	97.17	84.77	72.33	99.04
Jun	53.51	90.36	81.81	78.04	99.04	88.70
Jul	74.19	79.73	80.72	89.06	81.74	87.47
Aug	80.49	96.87	88.43	75.52	78.92	100.68
Sep	133.09	109.40	73.85	73.62	72.83	85.27
Oct	157.50	96.01	88.43	91.20	68.57	99.04
Nov	130.92	85.48	89.26	94.23	116.52	98.94
Dec	86.09	85.72	133.69	105.45	136.24	102.37
Tot	1199.98	1199.97	1199.97	1199.95	1199.97	1199.96
T. D	31.25	15.52	21.94	24.89	24.59	16.38

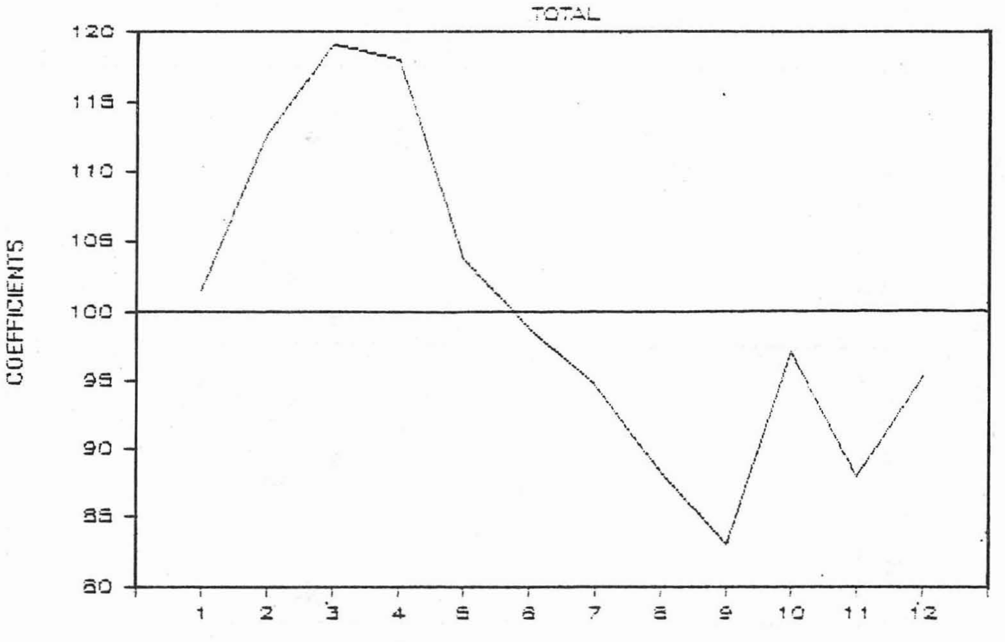

Fig. 1 — Natality Seasonality

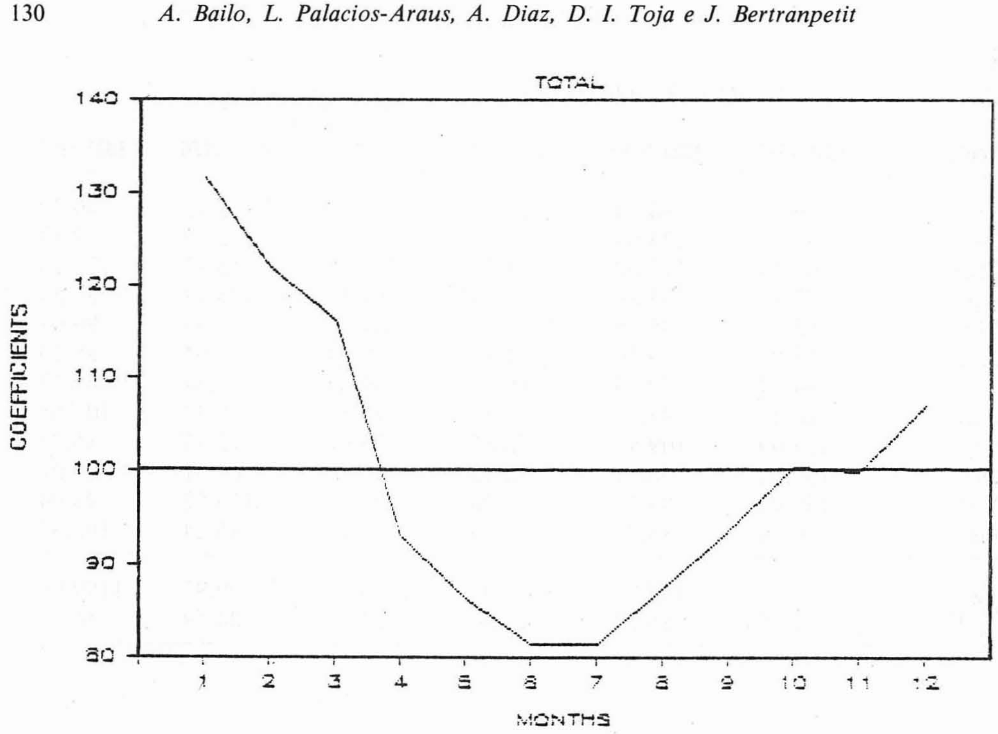

Fig. 2 — Mortality Seasonality

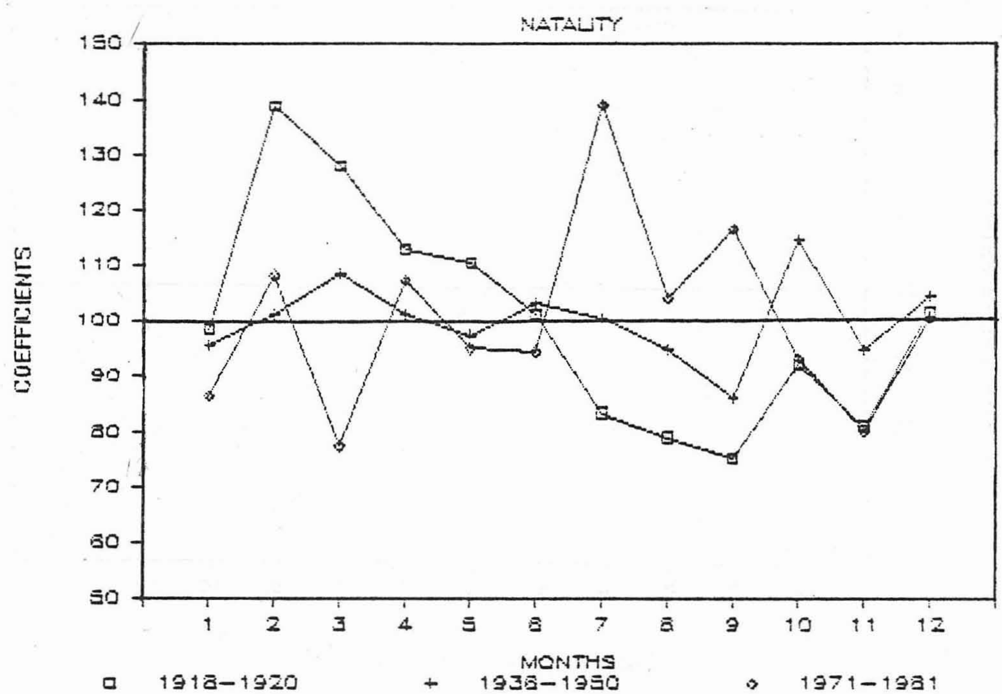

Fig. 3 — Seasonality evolution: natality

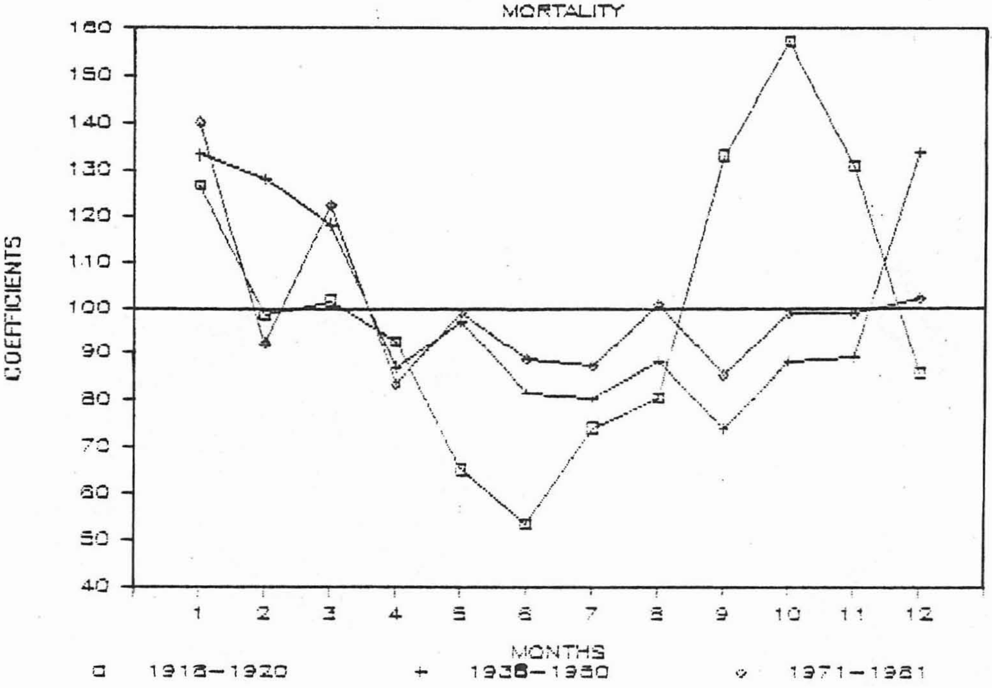

Fig. 4 — Seasonality evolution: mortality

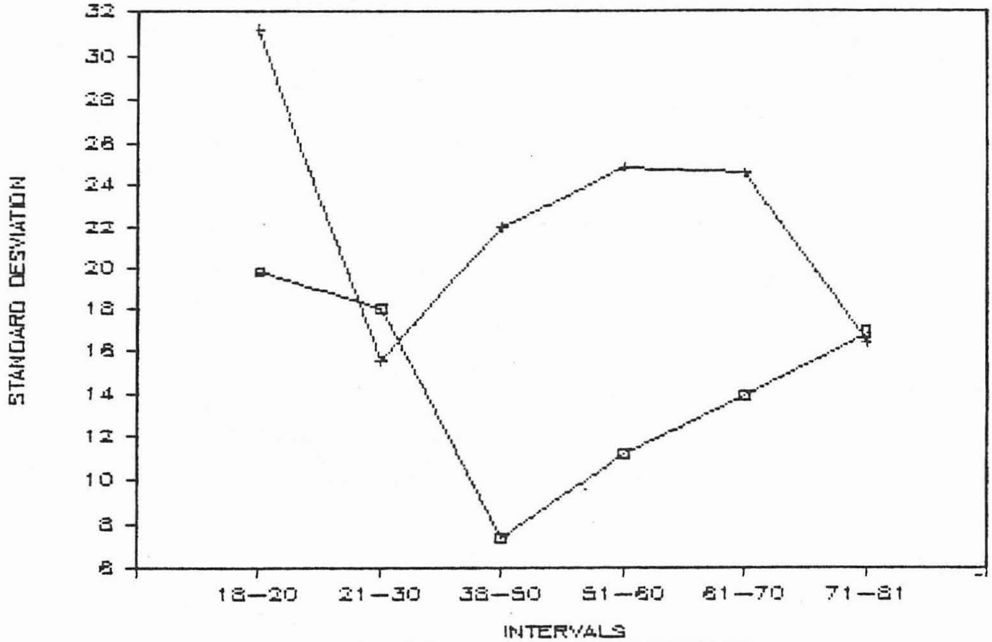

Fig. 5 — Standard desviation evolution

Fig. 6 — Province of Huesca

MATERIAL AND METHOD

The information concerning the whole births and deaths (13346 and 10354 respectively) on which this study is based on, was stored through D-base III program in a personal computer Olivetti M-24. Statistics were performed by SPSS-X package, and all graphics were done with Lotus 1-2-3 program.

The seasonality analysis was carried out calculating Henry's seasonality coefficients (1976), which consist in adding the number of events in each month, dividing them by their respective number of days (28.25 in February), then adding the twelve quotients and with this sum reducing each quotient to 1200. In this way if there was no seasonality there would be 100 events (births, deaths, or marriages) in each month.

Firstly we calculated these coefficients considering all years as a whole, and then we studied the seasonality pattern evolution computing seasonality coefficients in each of the six intervals that the studied period had been divided into. After that we obtained the standard desviation (T.D) of the coefficients, statistic that points out the differences between months and which will allow us to discover how seasonality incidence has evolved.

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