Extended abstract:

The Relationship between Adult Mortality Rates and Education Attainment in Argentina

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1. Introduction

The study of the relationship between socioeconomic characteristics and mortality patterns has been a traditional research area of demographic analysis, representing one of the seminal areas at the establishment of this discipline. The classical studies on differentials in mortality focused on how occupational status, income, wealth or educational attainment determines mortality levels and causes at death for specific groups in the population. The analysis of this relationship has gained an important scientific relevance in social sciences in general and in demography in particular because it is directly linked with the crucial matter about how social stratification shapes different life opportunities for the individuals. Furthermore, the study of this relationship has relevant interest for the designing of public policies oriented to struggle with social inequalities. As marked fifteen years ago by Link and Phelan, the socioeconomic status is a fundamental cause of mortality disparities Link and Phelan (1995).

Among the other socioeconomic variables -occupational status, income and wealth-, educational attainment was recognized as the key indicator of socioeconomic status for analyzing differentials in adult mortality (Hummer and Lariscy 2009; Molla et al. 2004; Elo and Preston 1995; Christenson 1995).

In Latin America, there is an important set of studies that focused on the social inequalities in mortality, in a context of mortality decline (Palloni 1991, Behm 1980; Stolnitz 1965; Arriaga 1968; Palloni and Wyrik 1982, Rofman 1994). However, mainly due to specific limitations in the available data, it is little that we know about the relation between educational attainment and adult mortality patterns in Latin America.

The aim of this article is to describe and analyze the effect of education on adult mortality patterns in the period 1991-2001 in Argentina. We will focus our analysis in the relation of the specific mortality levels with the evolution of the Specific Education Attainment during this period in Argentina.

2. Data, Measures and Methods

Data

The data used in this study comes from the Mortality Files for 1991 and 2001, and the 10% Public Microdata Sample (IPUMS) of the 1991 and 2001 Censuses for Argentina.

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Argentinean's Mortality Files include data on all deaths occurring within the Argentina for each year. Data are obtained from certificates filed for deaths taking place in each Province, including one record for each death occurring during the data year. Mortality Files are part of the National Vital Statistics System and there are one of the most used data sets for studying of mortality patterns, especially because of its universal coverage and its important standardization. Mortality Files include information on basic sociodemographic factors of the death person, generally reported by next relatives, and some characteristics of the situation of the death (such as, place of death, manner of death, cause of death). For this research article we will work with the Mortality Files for the year 1991 and 2001.

10% Public Use Micrdata Sample (IPUMS) of the 1991 and 2001 Censuses of Argentina were used for obtaining the information about total population and population by age, sex and educational groups.

Measures

Dependent variable:

Mortality in this study is measured by age, sex and education specific death rates. Argentinean's 1991 and 2001 death certificates for country residents who where age 25 to 64e year olds at the time of their death provide the numerators of these death rates. The denominators are estimated from the 10% Public Microdata

Explanatory variables:

Explanatory variables include age (at census time in the case of Censuses data and time of death ffor the Mortality File) and gender (male and female).

Education: The 1991 and 2001 Censuses of Argentina measured education at the highest completed year of schooling ranged from 0 to 18. The Argentinean Mortality Files measured education with the following categories: 1: Never assisted; 2: Incomplete Primary; 3: Complete Primary; 4: Incomplete Secondary; 5: Complete Secondary; 6: Incomplete Universitary or Tertiary studies and; 7: Complete Universitary or Tertiary studies or more. For this paper we unified the category system of the variable education in three main categories: 1) Up to 7 years of school (Complete Primary); 2) From 8 to 12 years of school (From Incomplete Secondary to Complete Secondary); 3) 13 or + (From Incomplete Universitary or Tertiary studies to Complete Universitary or Tertiary studies or more).

Methods

This study has an explanatory and descriptive nature. We used a descriptive statistics for estimating the population and number of deaths by age, sex and education

groups, and we complemented our analysis with ratios for comparing the death rates by age, sex, and education group.

3. Results

Descriptive

In 1991 about 14,446,185 adults aged 25 to 64 years and older resided in Argentina. Of the total population aged 25 to 64 years old, 58.1% belonged to the least educated group, 25.4% percent to the middle educated groups, and only 16.4 to the highest educated group. Data in the Mortality files compiled by each one of the 24 Argentinean provinces show that 71,850 of those who died in 1991 were aged 25 to 64 years old. Of the total number of adults aged 25 to 64 who died during this year, 85% percent were in the least educated group, almost 11% were in the middle educated group, and around 3 percent were in the highest group. (Table 1)

Table 1. Population and number of deaths by age, sex and education groups: Argentina Population 1991 aged 25-64.

		Population by education group (% of the total)				Deaths by education group (% of the total)		
Sex and Age groups	Population	0 to 7	8 to 12	13 +	Deaths	0 to 7	8 to 12	13 +
Males								
25-29	1,138,474	45.3	30.9	23.8	1,869	81.6	13.9	4.5
30-34	1,093,046	48.7	30.1	21.1	1,928	82.0	13.5	4.6
35-39	1,044,382	54.1	26.7	19.2	2,514	81.3	14.0	4.6
40-44	967,837	58.7	24.6	16.7	3,745	83.7	12.4	3.9
45-49	829,445	62.7	23.0	14.3	5,286	83.9	12.5	3.6
50-54	724,970	66.5	21.6	11.8	7,335	85.7	11.1	3.2
55-59	653,775	71.2	18.5	10.3	10,453	87.4	9.7	2.8
60-64	600,581	74.8	16.2	9.0	14,142	88.0	9.2	2.8
Females								
25-29	1,166,091	41.1	31.4	27.4	1,075	78.4	16.4	5.2
30-34	1,122,007	45.7	31.6	22.7	1,115	80.5	13.5	6.0
35-39	1,075,790	51.5	29.0	19.6	1,629	81.7	14.0	4.3
40-44	991,995	57.4	27.6	15.0	2,213	82.3	13.7	4.0
45-49	857,169	63.3	25.1	11.6	2,731	84.3	11.9	3.8
50-54	766,569	70.0	21.7	8.4	3,599	86.0	10.9	3.1
55-59	711,959	75.9	17.1	7.0	4,948	88.0	9.7	2.2
60-64	702,095	80.1	14.5	5.4	7,268	89.9	8.2	1.9
Total	14,446,185	58.1	25.4	16.4	71,850	86.0	10.8	3.2

Sources: IPUM and National Health Ministry from Argentina

Table 2. Population and number of deaths by age, sex and education groups: Argentina Population 2001 aged 25-64.

Sex and Age groups	Population	Population by education group (% of the total)			Deaths	Deaths by education group (% of the total)		
		0 to 7	8 to 12	13 +		0 to 7	8 to 12	13 +
Males								
25-29	1,323,440	34.9	42.9	22.3	2,421	71.1	23.5	5.4
30-34	1,160,740	38.7	39.7	21.6	2,337	72.3	22.6	5.2
35-39	1,084,370	43.7	35.9	20.3	2,631	72.3	21.9	5.8
40-44	1,043,820	47.6	34.6	17.9	3,443	74.2	20.2	5.5
45-49	964,950	52.7	30.0	17.3	5,263	75.8	18.3	5.9
50-54	898,720	57.8	26.9	15.3	7,681	77.9	16.6	5.5
55-59	712,840	61.4	25.3	13.4	10,176	79.3	15.9	4.8
60-64	595,020	65.2	23.5	11.3	12,923	81.3	14.0	4.6
Females								
25-29	1,367,780	29.0	38.8	32.2	970	46.4	47.0	6.6
30-34	1,206,610	34.1	35.3	30.7	1,096	45.0	48.9	6.1
35-39	1,140,840	39.8	33.2	27.1	1,446	45.1	49.8	5.1
40-44	1,091,840	43.9	33.4	22.6	2,061	45.9	48.3	5.9
45-49	1,014,600	48.7	30.8	20.6	3,063	47.2	47.8	4.9
50-54	957,920	54.9	28.6	16.5	4,200	51.2	44.1	4.7
55-59	782,640	61.6	25.4	13.0	5,175	53.2	43.3	3.4
60-64	686,050	68.2	22.2	9.5	6,740	56.3	40.9	2.8
Total	16,032,180	46.4	32.9	20.7	71,626	68.6	26.6	4.8

Sources: IPUM and National Health Ministry from Argentina

For the year 2001 about 16,032,180 adults aged 25 to 64 years and older resided in Argentina. Of the total population aged 25 to 64 years old, 46.4% belonged to the least educated group, 32.9% to the middle educated groups, and 20.7% to the highest educated group. Data in the Mortality Files for 2001 shows that 71,626 of those who died in 2001 were aged 25 to 64 years old. Of the total number of adults aged 25 to 64 who died during 2001, 68.6% percent were in the least educated group, almost 27% were in the middle educated group, and around 5 percent were in the highest group. (Table 2)

During the period 1991-2001 we can observe the relevant grow in educational attainment in this age group. There is an increasing the highest education level from 16.4% in 1991 to 20.7% in 2001; another increasing the middle educated group going from in 25.4% 1991 to 32.9% in 2001; and a declining in the percentages of the population with the lowest education level. This increasing in the educational attainment is most relevant for the population included in the younger age groups and particularly for the females. (Tables 1 and 2). The increment in the education attainment level is also reflected in the increment of the educational attainment for the people who died during this period of time.

Mortality by level of education

For both sexes, mortality was predominantly lowest for those with the most education and highest for those with least education. Table 3 and 4 present death rates by age, sex, and education group for the years 1991 and 2001 respectively. Following Molla et al. (2004), we computed ratios of death rates between the group with the lowest level of education and each of the other two education groups and between the middle educated groups at the highest educated group. A ratio in excess of 1.0 indicates that the death rate of the group with a lower level of education exceeds the deaths rate of the group with higher education.

For the year 1991, mortality was always lowest for those with the most education and highest for those with least education. All the ratios are larger than 1.0, supporting the already observed inverse relationship between mortality and education. For instance, for males aged 25-29, the ratio of death rates between the least educated and the most educated group is 9.5. This ratio decreases gradually at older ages, for males and females. But even at the older age groups shown the disadvantage of the lowest and middle education groups in comparison to the highest education group is substantial. For females, the ratio also decreases at older ages but the pace of this declining is faster at the first four age groups, and then it slows for the older age groups (Table 3).

Table 3. Death rates by age, sex and education groups: Argentina Population 1991 aged 25-64 years.

		Death rates by education group (per 1000)			Ratio		
Sex and Age groups	Death rates	0 to 7	8 to 12	13 +	0 to 7 vs. 13+	8 to 12 vs. 13+	0 to 7 vs. 8 to 12
Males							
25-29	1.6	3.0	0.7	0.3	9.5	2.4	4.0
30-34	1.8	3.0	0.8	0.4	7.8	2.1	3.8
35-39	2.4	3.6	1.3	0.6	6.3	2.2	2.9
40-44	3.9	5.5	1.9	0.9	6.1	2.1	2.8
45-49	6.4	8.5	3.5	1.6	5.4	2.2	2.5
50-54	10.1	13.0	5.2	2.8	4.7	1.9	2.5
55-59	16.0	19.6	8.4	4.4	4.5	1.9	2.3
60-64	23.5	27.7	13.4	7.3	3.8	1.8	2.1
Females							
25-29	0.9	1.8	0.5	0.2	10.0	2.7	3.7
30-34	1.0	1.8	0.4	0.3	6.7	1.6	4.1
35-39	1.5	2.4	0.7	0.3	7.2	2.2	3.3
40-44	2.2	3.2	1.1	0.6	5.4	1.9	2.9
45-49	3.2	4.2	1.5	1.0	4.1	1.5	2.8
50-54	4.7	5.8	2.4	1.7	3.4	1.4	2.4
55-59	6.9	8.1	4.0	2.2	3.6	1.8	2.0
60-64	10.4	11.6	5.8	3.6	3.2	1.6	2.0

Sources: IPUM and National Health Ministry from Argentina

For the year 2001, mortality tended also to be lowest for those with the most education and highest for those with least education. For example, for females aged 25-29, the ratio of death rates between the least educated and the most educated group is 7.8. Similar to the observed in 1991, these ratios decrease gradually at older ages, for males and females (Table 4).

All the ratios between the highest education level with the least education level are higher than 1.0, supporting the mentioned inverse relationship between mortality and education. However, we can observe that the ratios between the least education level with the middle education level is equal or lower than 1.0 for almost all the age groups for the female population, with the exception of the 25-29 age group. This reflects that for this year the death rates of the women with middle education level were higher than the death rates of the women with the least education level for almost all age groups (Table 4). .

Table 4. Death rates by age, sex and education groups: Argentina Population 2001 aged 25-64 years.

		Death rates by education group (per 1000)			Ratio		
Sex and Age groups	Death rates	0 to 7	8 to 12	13 +	0 to 7 vs. 13+	8 to 12 vs. 13+	0 to 7 vs. 8 to 12
Males							
25-29	1.8	3.7	1.0	0.4	8.5	2.3	3.7
30-34	2.0	3.8	1.1	0.5	7.8	2.4	3.3
35-39	2.4	4.0	1.5	0.7	5.8	2.1	2.7
40-44	3.3	5.1	1.9	1.0	5.1	1.9	2.7
45-49	5.5	7.8	3.3	1.9	4.2	1.8	2.4
50-54	8.5	11.5	5.3	3.1	3.8	1.7	2.2
55-59	14.3	18.4	9.0	5.2	3.6	1.7	2.1
60-64	21.7	27.1	12.9	8.9	3.0	1.5	2.1
Females							
25-29	0.7	1.1	0.9	0.1	7.8	5.9	1.3
30-34	0.9	1.2	1.3	0.2	6.6	7.0	1.0
35-39	1.3	1.4	1.9	0.2	6.0	7.9	0.8
40-44	1.9	2.0	2.7	0.5	4.0	5.6	0.7
45-49	3.0	2.9	4.7	0.7	4.1	6.5	0.6
50-54	4.4	4.1	6.8	1.2	3.3	5.4	0.6
55-59	6.6	5.7	11.3	1.7	3.3	6.5	0.5
60-64	9.8	8.1	18.1	2.9	2.8	6.3	0.4

Sources: IPUM and National Health Ministry from Argentina

During the period 1991-2001, for both sex, the ratio of the death rates between the group with the lowest level of education and the group with the highest education level showed a slight decline (with the exception of the male group aged 30-34 and the female group aged 45-49 which remained equal). This decline was, on average, a little more pronounced for the male population.

4. Conclusion

We observed a strong and inverse relationship between education groups and mortality for adult males and adult females at both younger and older ages. These results are consistent with those from similar studies from other the United States (Molla et al 2004) and Finland (Valkonen et al. 1997).

During the analyzed period, for both sex, the ratio of the death rates between the group with the lowest level of education and the group with the highest education level showed a slight decline.

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