Living Arrangements of Lebanese Elderly Non-married Women:

Evidence from the Population and Housing Survey 1996

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Abstract

Objective: The objective of this study is to examine the living arrangements of unmarried elderly women in Lebanon using data from a large household survey and logistic regression analysis. The main focus is to assess regional differentials in the residential choice of the elderly. Lebanon is characterized by strong family obligations and a patriarchal family system, an exceptionally low and still declining fertility rate, an increased longevity of the elderly, 17 years of civil war and a continuing emigration of young adults. Moreover, Lebanon lacks public services, especially for those in need of care. War events, the strong migration of adult children and the cost of living are expected to have an impact on the residential choice of this vulnerable segment of the population.

Data and Methods: The analysis will be based on a sample of nearly 6000 Lebanese currently unmarried elderly women (aged 65+) taken from the 1996 Population and Housing Survey; a large household survey conducted by the Ministry of Social Affairs in collaboration with UNDP and based on a nationally representative sample size of nearly 68,000 households. The dependent variable is the living arrangement of the unmarried elderly woman: whether living alone, with a son or daughter, with children and other relatives, or with other people. The independent variables are age, marital status, educational level, fertility, number of surviving children, number of surviving daughters, disability, standard of living, crowding in the household, and place of residence (Governorate). Multilevel analysis will be used where both individual and community characteristics will be taken into consideration. The method of analysis will consist of descriptive univariate and bivariate analysis along with logistic regression models.

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Introduction:

As a result of the major advances in medical technology, developing countries are recently witnessing a considerable change in their population composition following the rise in the proportion of elderly. If fertility and mortality declines continue as predicted by the United Nations, population aging is expected to spread rapidly throughout the developing world including the Middle East region. Thus population aging has become a new and popular line of research in the Middle East, let alone Lebanon.

Given its unique characteristics: strong family obligations and a patriarchal family system, an exceptionally low and still declining fertility rate, an increased longevity of the elderly and constant emigration of young male adults, Lebanon has been undergoing a dramatic transition in the population composition from a young population to an old one. Such a rapid shift is worrying in the case of Lebanon since it lacks public services, especially for those in need of care. Elderly care centers are rare in Lebanon, and there is no national welfare system. As a result, older adults have become heavily dependent on members of their households and on their families for support and well-being.

The objective of this study is to describe and understand the living arrangements and residence patterns of Lebanese elderly women aged 65 and above who are residing in Lebanon and are currently unmarried (never-married, widowed, divorced).

The main strength and importance of this study lies in its large sample size. Nearly 6,000 elderly women from all around Lebanon are being studied. Moreover, the methodology is also significant. On the other hand, given that little attention has been placed on the policy options in response for population aging in Lebanon, this study should shed a light on the existing living conditions of the elderly and provide policy makers with some background material and some recommendations.

Background Information:

Changing Kinship Systems:

As was mentioned before, developing countries have been experiencing major changes in their population dynamics and structure. There is a shift away from agricultural dependence into industrialization. Fertility levels are decreasing, literacy rates are rising, urbanization is spreading and the life expectancy is rising. These factors, according to Goode (1963), are expected to have an impact on the prevailing kinship system in these societies. In fact, it is considered that as a society becomes more industrialized and urbanized, families are reduced in size and move from the extended structure towards a more conjugal system (Goode, 1963). Such a process is termed "convergence" by McDonald (1992). The shift towards an independent nuclear family is expected to weaken the relationship between generations and hence decrease the household and kin support for the elderly (Goode, 1963), thereby increasing the propensity of the older adults to live alone or in institutions.

Hence, family obligation and kinship relations are expected to have a direct effect on the living arrangements of elderly (Bongaarts & Zimmer, 2001). These relations being strong in Lebanon, it is expected that a high proportion of the older non-married women are not living alone but with family members. However, the major changes that are shaping the Lebanese population structure are expected to affect intergenerational family relations.

Determinants of the Living Arrangements of Unmarried Elderly women:

The preexisting kinship system and the level of autonomy that is granted to elderly women in a society has been shown to influence the extent to which they view their residence choice within their locus of control and determine whether the choice of living alone, even with

the availability of kin, is possible, and whether institutions are a socially acceptable alternative (Bongaarts & Zimmer, 2001; and Burr & Mutchler, 1991).

Once the availability of and the accessibility to several alternatives are realized, older men and women alike are expected to make a logical smart decision that they deem optimal in their own specific case (Logan & Bian, 1999; and Morrissey, 1998). In other words, they are expected to choose the place that they believe will allow them to lead a healthy and acceptable life.

The economic or rational perspective concerning the residential choice of elderly has gained quite an appeal to the extent that several studies have demonstrated that cultural dimensions, family obligations and strong kin relations have a weak effect on the living arrangements of elderly (Thomas & Wister, 1984). Moreover, it has been argued that income growth is the single most important determinant of living arrangement (McGarry & Schoeni, 2000), and that elderly co-reside with their children to economize on living costs whereas unmarried elderly who are better off economically are more likely to be living alone because they use their income to "purchase privacy" (Da Vanzo & Chan, 1994)

Elderly do prefer to live alone; they wish to live independently for as long as possible without becoming a burden to their children (Izuhara, 2000; Da Vanzo & Chan, 1994; and McGarry & Schoeni, 2000). However, there are several factors that prevent them from doing so; these are mainly the absence of welfare systems and pension plans in developing areas among other factors. This is probably the reason why the household unit in the developing world is the main source of support that is responsible for the distribution of care for the elderly (Bongaarts & Zimmer, 2001).

Many factors have been shown to influence the residential choice of currently unmarried elderly women whether at the individual or the community level. At the individual level,

variables such as gender, ethnicity, age, marital status, fertility and the number of surviving children, educational level, employment, income, and property ownership have been shown to be good predictors of the living arrangement of the older adults. Community-level variables also are expected to affect the living arrangements of elderly. Factors such as the level of development of the community in terms of education or literacy rates, labor force participation, GNP, life expectancy, along with the geographical setting whether urban or rural, are also good predictors of the residential pattern of the elderly.

Age has been found to influence the residential choice of elderly females. Studies show that, as people get older, they become more reluctant to living alone because of their increased need for care and support and hence their probability of living alone decreases considerably (Chuks, 2002; Peek, Henretta, Coward, Duncan & Dougherty, 1997; Thomas & Wister, 1984; and Elman & Uhlenberg, 1995). However, the strength of association and the type of the relationship between age and the choice of residence is controversial (McGarry & Schoeni, 2000), and the relationship is not expected to be linear (Elman & Uhlenberg, 1995).

Health Status is considered to be one of the major determinants of the living arrangements of the elderly in general including women (Peek et al, 1997; Bongaarts & Zimmer, 2001; Cameron, 2000; Logan & Bian, 1999; Morrissey, 1998; and Macunovich, Easterline, Schaffer and Crimmins, 1995; Burr & Mutchler, 1992). A deteriorating health and the presence of a certain disability considerably increase the elder's need for care and support and therefore nearly eliminate the preference for and the probability of living alone.

Fertility levels or the number of children ever born and the number of surviving children have also been considered to be determinants of the living arrangements of elderly women. As the availability of children increases the probability of living alone decreases (Peek et al, 1997;

Elman & Uhlenberg, 1995; Wolf, 1995; and Macunovitch et al, 1995) and elderly would have a wider margin of options to choose from.

Educational level and years of schooling have also been shown to affect the residence of elderly men and women. (Thomas & Wister, 1984; Chuks, 2002; Costa, 1999; and Bongaarts & Zimmer, 2001). Where levels of education are higher, older adults live in smaller households, with fewer children and other adults, and are more likely to be alone (Bongaarts & Zimmer, 2001). Level of Schooling affects the living arrangements of elderly but it may be correlated with several confounding variables such as: larger migration rates and financial security due to remittances, better health because of increased knowledge and greater earning power, and the ability to express a higher preference for privacy (Bongaarts & Zimmer, 2001)

Moreover, studies have shown that living arrangements vary by the place of residence whether urban or rural (Grau, 2002; Chuks, 2002; Peek et al, 1997; and Bongaarts & Zimmer, 2001). Other factors being controlled for, the probability of a woman living alone in a rural setting was shown to be higher than that in an urban setting. The reason behind this might probably be the proximity of relatives in rural settings or the unavailability of kin due to migration of young adults (Grau, 2002; and Peek et al, 1997).

Ethnicity and marital status also appear to be associated with the residence patterns of the elderly women. Living arrangements seem to differ by race even after controlling for other variables (McGarry & Schoeni, 2000; Costa, 1999; Peek et al., 1997; and Burr & Mutchler, 1992) and ethnic origins appear to strongly influence intergenerational relations and affect co-residence (Thomas & Wister, 1984). Marital status, on the other hand is also a major determinant of living arrangement (Cameron, 2000; and Elman & Uhlenberg, 1995). Widowhood status affects the choice of residence as well (Peek et al., 1997). Currently unmarried elderly parents are more likely to live with their children in developing countries (Cameron, 2000). Also, gender

seems to be correlated with the choice of living arrangements; males are more likely to live with their spouses than women whereas women are more likely to be living with kin, mostly children, or alone (Bongaarts & Zimmer, 2001). It could be argued however that such a correlation is confounded by the life expectancy which is usually higher for males than for females.

Objective:

The present study aims at describing and understanding the living arrangements of currently unmarried Lebanese elderly women who are currently residing in Lebanon, thereby assessing and explaining the residential characteristics of a specific group of elderly without going into gender and ethnic differences.

Data and Methods:

Data Source:

After the Lebanese civil war, which extended from 1975 to 1990, the Ministry of Social Affairs with the help of the UNDP underwent a nation-based survey that covered all 6 governorates and 26 Caza in 1996. The survey entitled "Population and Housing Survey" was intended to serve as a mini-census that would cover for the lack of a full-scale national census in Lebanon for years to come.

The population and housing survey (PHS) targeted the de jure population of Lebanon, excluding Palestinian refugees. The sample was divided into two strata, the first one consisted of 68,650 households (1373 primary sampling units in clusters of 50 households) and was based on the sampling frame of the 1988 population counts of villages and urban blocks, while the second stratum consisted of a sample of 80 areas (80 primary sampling units) which status was ambiguous regarding whether they were inhabited or not, in order to assure complete coverage of the population. The total sample size was approximately 70,000 households (1453 primary sampling units) and was considered self-weighting and of sufficient size to provide reliable information from each Caza.

It is important, however, to evaluate the quality of the original PHS data before starting the analysis of the present study, in order to assess the reliability of the available information. A detailed evaluation of the PHS data is available in Appendix I. The original sample data shows some digit preference in age reporting especially among females. The Myers' accuracy index, however, was calculated to be 25.36. This means that the data is slightly inaccurate but acceptable for a developing country and that it is reliable to be used for research but caution is advised when inferring any conclusions associated with age and sex.

Target Population:

The target population for this study consisted of Lebanese elderly women aged 65 years and older who are not currently married, that is, women who are never-married, divorced, or widowed. Using the PHS database, 5891 women were found to be eligible for inclusion in the study.

Variables:

The outcome variable of interest is the living arrangement of unmarried Lebanese elderly women. The sample is grouped, depending on the relation of the elderly to the household head and other household members, into four categories: living alone, living with children, living with children and others, or with others. The last category comprised the elderly women who are living with siblings, surviving parents, other relatives or with non-relatives.

Several variables are included that are expected, in line with previous research, to influence the living arrangements of elderly; such variables assess the demographic, socioeconomic and health characteristics of the sample.

Demographic Variables:

Age in years is entered as a categorical variable in the bivariate analysis, divided into 5 groups: 65-69, 70-74, 75-79, 80-84 and 85+. In the regression analysis, however, age is treated as a continuous variable. Age^2 is also included in the model because a nonlinear association is expected between age and living arrangements.

The place of residence is also used in the analysis. The sample is divided into 6 groups based on the governorate they live in, whether Beirut, Mount Lebanon, North Lebanon, South Lebanon, El-Nabatiyye or El-Bekaa. In addition, the marital status of the elderly women is included as well; whether never-married, divorced or widowed.

Finally, variables such as fertility, the number of surviving children and the number of surviving daughters are included as independent categorical variables. The number of children ever born and the number of surviving children are grouped using the same 4 subcategories for comparison purposes: none, 1-4, 5-7, and 8 or more. On the other hand, the number of surviving daughters is grouped into 4 equal categories (none, 1 surviving daughter, 2 surviving daughters, 3 surviving daughters or more) to be able to control for its possible effect.

Health:

As was mentioned before, health is considered to be a good predictor of the living arrangement of elderly (Peek et al, 1997; Bongaarts & Zimmer, 2001; Cameron, 2000; Logan & Bian, 1999; Morrissey, 1998; Macunovich et al, 1995; and Burr & Mutchler, 1992). Several indicators should be combined to assess health, but due to the lack of data on health in the PHS, the health indicator in this study is restricted to only one available variable which is "disability": a dichotomous variable (yes/no) that was reported yes if the elderly had any type of the physical or mental disabilities mentioned in the questionnaire.

Socioeconomic Variables:

First, the educational level of the elderly is included as a categorical variable with 3 groups: illiterate, below primary, primary, and preparatory or higher. These groups are used owing to the low educational attainment of elderly women in Lebanon.

The second variable is crowding of the household. Crowding is reported "yes" if the household where the elderly is living had more than two people per room, and "no" if it had two people or less per room.

Finally, standard of living index is used which consists of the score of seven indicators: Ownership of the household ("1" if "Yes"/ "0" if "No"), the presence of a heating system in the household ("1" if "Yes"/ "0" if "No"), the availability of a sewage connection to the public

network (“1” if “Yes”/ “0” if “No”), the availability of a connection to the public water network (“1” if “Yes”/ “0” if “No”), the ownership of a real estate (“1” if “Yes”/ “0” if “No”), the ownership of at least one car (“1” if “Yes”/ “0” if “No”), and the availability of at least one telephone line (“1” if “Yes”/ “0” if “No”). The standard of living index is weighted by using the following formula:

Weighted standard of living index =

Household ownership* ln (frequency of household ownership in the sample) +

Heating system* ln (frequency of availability of heating system in the sample) +

Connection to water network * ln (frequency of connection to the water network in the sample) +

Connection to sewage network * ln (frequency of connections to sewage network in sample) +

Ownership of an estate * ln (frequency of estate ownership in the sample) +

Ownership of at least one car * ln (frequency of car ownership in the sample) +

Availability of a telephone line *ln (frequency of telephone lines in the sample).

After replacing the frequencies, this formula is reduced to:

Weighted standard of living index =

Household ownership * ln (67.4)+ heating system* ln (76.7) + connection to water network * ln (90.0) + connection to the sewage network * ln (63.4) + ownership of an estate * ln (40.9) + ownership of at least one car * ln (43.8) + availability of a telephone line *ln (41.8).

Scores can range from 0 to 28.42, the answers are grouped into four nearly equal categories: low (ranging from 0 to 12.87), lower middle (ranging from 12.99 to 16.77), upper middle (ranging from 16.78 to 20.91) and upper (ranging from 20.93 to 28.42).

Methods of Analysis:

Multilevel analysis will be used where both individual and community characteristics will be taken into consideration. General characteristics of the sample will be assessed using

descriptive univariate statistics whereas possible relationships among the independent variables and between independent and dependent variables using bivariate analysis. Finally, binary and multinomial logistic regression models will be carried out.

Results:

A first look at the sample using univariate statistics shows that the majority of unmarried elderly women in Lebanon live with their children (~50%) (Table I). However 25% of the sample is composed of elderly women who are living alone; a very large proportion given the preexisting kinship system in Lebanon and the absence of a national support plan.

(Table I about here)

Table I shows that the majority of the elder women are ever-married (around 89%) but marriage appears not to be universal in the older age groups in Lebanon since 11% of the women are never married, which is also an interesting result in a developing area among an elderly population. This rate affects the kin availability of the elderly women whereby 16% of the have no children at all.

There appears to be a consistency in the age distribution of the sample, a third of the women are between 65 and 70 years old which constitutes the larger age group, and their proportion decreases to reach nearly 12% between ages 80 and 85, and 85 and above (Table I). As for the educational level, table I shows that elderly women are mostly illiterate (63%); only a small proportion (4%) reached preparatory school. Also, our sample is not equally distributed across governorates (district), the largest proportion lives in Mount Lebanon (38%), followed by Beirut and North Lebanon (around 19% each), then by the Bekaa region (11%) and finally by the Southern governorates (6% each).

Bivariate analysis, summarized in Table II, showed that the living arrangements of currently unmarried elderly women varied significantly by marital status. Widowed women mainly co-reside with their children (56%), whereas most never-married women live with other relatives (69.6%) and the majority of divorced women either live alone (35.6%), or with their children (30%). Table II also shows that living Arrangements were found to vary by educational level and wealth. The higher the level of educational attainment the higher is the probability of living alone, whereas the higher the wealth index the lower is the probability of living alone.

The type of living arrangement also varied by kin availability measured by the number of surviving children; the larger the number of surviving children the less likely elderly women were to live alone or with other relatives. On the other hand, disability appeared to have no effect on the residential choice of Lebanese unmarried elderly women (Table II).

(Table II about here)

Moreover, it appears that the characteristics of the elderly differ by place of residence. Findings from bivariate analysis (Table II) suggest that living arrangements varied significantly between Lebanese states. It seemed that regions mainly consisting of rural areas (Bekaa, South Lebanon) had a higher prevalence of loners than the other states. This may also be due to internal migration of children (rural to urban) and/or the Israeli invasion/occupation and subsequent forced migration of the young population. The effect of age on the living arrangements of elderly unmarried women is slightly apparent in our bivariate analysis, but not after controlling for the place of residence (See appendix II).

Using binary logistic regression analysis, age (continuous) and age squared were found not to be associated with the living arrangements of elderly women in Lebanon (Table III). On the other hand, the choice of living arrangement of elderly women appears to be associated with

marital status, number of surviving children, educational level, standard of living and place of residence.

(Table III about here)

Table IV indicates that the odds of living alone among divorced women is nearly 3 times higher than that of never-married women and whereas that of widows is nearly 4.6 times higher ($p<0.001$). On the other hand, the odds of living alone among women who have no surviving children are 11.5 times higher than those among women who have 8 or more surviving children. These odds are decreasing with increasing number of surviving children; in fact, the odds of living alone among women who have 1-4 surviving children is only 2 times higher than those among women who have 8 or more children ($p<0.001$). Also, there is no significant difference in the odds of living alone between illiterate women and women with below primary education; however, a highly significant difference appears when comparing illiterate women to women with higher educational levels (Table III). Binary logistic regression analysis also shows that the odds of living alone decrease with the increasing standard of living, and that there are significant regional differences in the living arrangements (Table III).

Further analysis using multinomial logistic regression also showed the absence of the age factor on the choice of living arrangement of elderly women in Lebanon (Table IV). The educational level appears to affect the residential choice of elderly; however, the probability of living alone doesn't seem to be associated with increasing educational level, the effect of educational attainment appears to be clearer in the probability of living with children compared to living with others (Table IV). As for the number of surviving children, the major contributing factor to the residential choice of elderly is shown to be the total absence of any surviving children compared to the availability of 8 or more children that proved to significantly affect the

probability of living alone compared to other residential choices. The effect of the increasing number of surviving children is clearer among women living with their children (Table IV).

(Table IV about here)

The standard of living appears to be significantly correlated only with the probability of living alone. In fact, table IV demonstrates that as the standard of living increases the odds of elderly women living alone becomes significantly higher. The significance of the effect of the standard of living however disappears among women who are living with their children.

Finally, it also appears that there are significant regional variations in the probability of living alone among unmarried elderly women. The place of residence, however, doesn't seem to be related to the preference of living with children (Table IV).

Discussion:

Unlike previous studies, this study did not find any significant association between age and the living arrangements of elderly especially not after controlling for the place of residence. The association between age and living arrangements has been proven by many studies (Chuks, 2002; Peek, Henretta, Coward, Duncan & Dougherty, 1997; Thomas & Wister, 1984; and Elman & Uhlenberg, 1995). As people - men and women alike - get older, their preference for and the probability of living alone decreases considerably because they become less capable of caring for themselves and more in need for support. The reason behind the absence of the age effect in the present study could be attributed to other confounding factors such as migration and war events. It might be argued that the older the ever-married women the older the children they have and the more likely they migrate; intense internal and international migration of young adults could be behind the relatively high proportion of elderly women living alone compared to other developing areas. On the other hand, war events that spread throughout the period ranging from

1975 to 1990 might have intensified family relations and in turn increased the probability of living with children. Further research should be performed to fully assess the effects of these two variables.

The results of this study are in accordance with previous research in terms of the relationship between the residential choice of elderly, number of surviving children, and educational level, but not between residential choice and marital status or standard of living. Ever-married women are more likely to be living alone than never-married women possibly because of the higher social status and increased level of autonomy that is granted to women upon marriage.

On the other hand, the strong family obligations in Lebanon make it only natural that elderly are taken care of and housed by their adult children especially in the case of currently unmarried women. It is possible that as the standard of living increases, the ability of the children to care for their mothers is clearer.

Finally, it is important to note the significant regional differences in the choices of the living arrangements of the elderly women. It is possible that there is a correlation between the place of residence and other independent variables that could be creating these regional differences. Further analysis should be performed on the community level controlling for the governorate to understand the exact association between the current place of residence and the living arrangements of elderly unmarried women.

Conclusion and Limitations:

The aim of this research was to describe and understand the variations in the living arrangements of Lebanese women aged 65 years and above and who are currently unmarried. The analysis showed that the residential choice of elderly women in Lebanon is associated with

marital status, educational level, standard of living, and availability of children but not with age. The analysis also revealed significant association with the place of residence by governorate. It is shown that the characteristics of elderly women differed significantly by governorate; the age composition and educational levels of elderly women differ by governorate.

This study suffers from several limitations. It is a cross-sectional study that does not allow for the assessment of causality. It also suffers from the limited number of variables that are available for analysis. First, the Population and Housing Survey questionnaire did not collect any information regarding the proximity of relatives to the place of residence of the elderly woman. Second, no information has been collected from elderly women who are institutionalized. Third, no information is available regarding the health status of the elderly women except for physical or mental disability, more appropriate measures would be the ability to perform daily activities. Also, no information is available regarding the National Social Security coverage. Finally, the place of residence is specified in terms of the governorate which is expected to encompass much variability especially in terms of rural versus urban setting as well as in terms of community characteristics.

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Tables and Figures:

Table I: Summary of descriptive statistics for the independent and dependent variables

Variable	%
Living Arrangement:	
Loner	25.0
With Children Only	49.6
With Children and Others	11.7
Others	13.8
Age Group:	
65-70	31.4
70-75	27.8
75-80	15.8
80-85	12.3
85+	12.6
Marital Status:	
Never Married	11.0
Widowed	87.5
Divorced	1.5
Children ever born:	
no children	15.9
1-4 children	29.3
5-7 children	28.6
8+ children	26.1
Surviving children:	
no children	16.4
1-4 children	34.9
5-7 children	31.6
8+ children	17.1
Surviving daughters:	
None	24.3
1 daughter	17.1
2 daughters	20.6
> 2 daughters	37.9
Educational Level:	
Illiterate	63.3
Below Primary	15.1
Primary	12.0
Preparatory+	4.0
Proportion Disabled:	2.9
Crowded Households:	10.5
Own a car or more:	43.8
Own a real estate:	40.9
Own a telephone or more:	41.8
Own a house:	67.4
Standard of living:	
Lower	27.2
Lower Middle	22.2
Upper Middle	25.5
Upper	25.1
Distribution by Region:	
Beirut	19.0
Mount Lebanon	38.5
North	18.4
South	6.4
El-Nabatiyye	6.5
El-Bekaa	11.1

** weighted sample*

Table II: Summary of Bivariate analysis:

Independent Variable	Living Arrangements				Total	
	Loner	With Children	With Children and Others	Others	N	%
Age Group:						
65-69	21.8	50.5	11.0	16.7	1849	100.0
70-74	26.5	49.8	11.4	12.2	1639	100.0
75-79	26.2	49.3	12.8	11.7	929	100.0
80-84	28.1	46.7	10.6	14.6	726	100.0
85+	24.5	49.9	13.9	11.7	742	100.0
Marital Status:						
Never Married	30.4	0.0	0.0	69.6	649	100.0
divorced	35.6	30.0	8.9	25.6	90	100.0
Widowed	24.1	56.1	13.2	6.5	5147	100.0
Children ever born:						
none	41.3	0.0	0.0	58.7	937	100.0
1-4 children	25.6	52.1	15.5	6.9	1725	100.0
5-7 children	22.3	61.3	11.4	5.0	1686	100.0
8+ children	17.2	64.1	15.0	3.7	1538	100.0
Surviving children:						
none	41.6	0.0	0.0	58.4	963	100.0
1-4 children	24.6	53.1	15.4	6.9	2055	100.0
5-7 children	21.5	62.6	11.8	4.1	1859	100.0
8+ children	16.1	65.8	15.2	2.9	1007	100.0
Surviving daughters:						
none	37.6	18.1	3.0	41.4	1434	100.0
1 daughter	21.7	53.6	18.1	6.5	1009	100.0
2 daughters	24.0	56.5	14.1	5.4	1214	100.0
> 2 daughters	18.8	64.2	13.1	3.9	2230	100.0
Educational Level:						
Illiterate	24.8	52.8	11.5	10.9	3725	100.0
Below Primary	21.6	51.7	12.5	14.3	890	100.0
Primary	25.2	44.7	10.9	19.1	705	100.0
Preparatory+	31.0	31.2	12.5	25.2	567	100.0
Disability:						
Yes	24.3	49.1	10.4	16.2	173	100.0
No	25.0	49.6	11.7	13.7	5712	100.0
Crowding:						
Yes	0.0	65.7	22.9	11.4	616	100.0
No	27.9	47.7	10.4	14.1	5270	100.0
Standard of living:						
Lower	36.0	43.6	8.8	11.7	1604	100.0
Lower Middle	31.8	46.4	9.5	12.2	1303	100.0
Upper Middle	18.7	54.7	12.5	14.1	1500	100.0
Upper	13.3	53.7	16.0	17.1	1478	100.0
Governorate:						
Beirut	25.8	43.0	14.9	16.2	1118	100.0
Mount Lebanon	19.1	53.8	11.7	15.4	2266	100.0
North Lebanon	23.9	49.3	12.0	14.8	1086	100.0
South Lebanon	33.3	47.9	10.6	8.2	378	100.0
El Nabatiyye	42.1	38.7	9.6	9.6	385	100.0
El Bekaa	30.5	53.9	7.7	8.0	653	100.0

**weighted sample*

Table III: Results of the Binary Logistic Regression Model:

	Logit	Odds Ratio	Std. Error
Age:			
Age	0.287	-	0.071
Age squared	-0.002	-	0.000
Marital Status:			
Divorced	1.187***	3.278	0.279
Widowed	1.525***	4.594	0.157
Surviving Children:			
None	2.442***	11.495	0.157
1-4 surviving children	0.745***	2.107	0.107
5-7 surviving children	0.474***	1.606	0.107
Educational Level:			
Below Primary	0.068	1.071	0.100
Primary	0.458***	1.581	0.109
Preparatory+	0.764***	2.147	0.120
Standard of Living:			
Lower middle	-0.315***	0.730	0.085
Upper middle	-0.976***	0.377	0.091
Upper	-1.491***	0.225	0.103
Governorate:			
Beirut	-0.471***	0.624	0.123
Mount Lebanon	-0.759***	0.468	0.109
North Lebanon	-0.547***	0.579	0.119
South Lebanon	0.016	1.016	0.147
El Nabatiyye	0.391**	1.478	0.143

*- * P value ≤ 0.05; ** P value ≤ 0.01; *** P value ≤ 0.001*

- Dependent variable: 0-others; 1-loner

- Log likelihood = 5733.013

- weighted sample

Table IV: Results of the Multinomial Logistic Regression Model:

	Living Arrangements								
	Loner			With Children			With Children & Others		
	Logit	Odds Ratio	Std. Er.	Logit	Odds Ratio	Std. Er.	Logit	Odds Ratio	Std. Er.
Age:									
Age	0.222	-	0.138	-0.099	-	0.096	-0.145	-	0.107
Age squared	-0.002	-	0.001	0.000	-	0.001	0.001	-	0.001
Marital Status:									
Divorced	0.558	1.746	0.530	1.411	4.100	.	1.606***	4.981	2.315
Widowed	1.571***	4.813	0.781	2.672***	14.463	5.167	2.674	14.510	
Surviving Children:									
None	-0.803***	0.448	0.109	-45.907	0.000		-45.909	0.000	
1-4 surviving children	-0.075	0.927	0.218	-0.834***	0.434	0.097	-0.733**	0.480	0.116
5-7 surviving children	0.126	1.134	0.271	-0.300	0.741	0.165	-0.541*	0.582	0.140
Educational Level:									
Below Primary	-0.080	0.923	0.157	-0.220	0.802	0.146	-0.195	0.823	0.169
Primary	-0.014	0.986	0.162	-0.662***	0.516	0.093	-0.694***	0.499	0.107
Preparatory+	0.197	1.218	0.210	-0.965***	0.381	0.075	-0.642**	0.526	0.123
Standard of Living:									
Lower middle	-0.356**	0.701	0.104	-0.063	0.939	0.153	-0.045	0.956	0.187
Upper middle	-0.944***	0.389	0.064	0.035	1.036	0.187	0.150	1.162	0.241
Upper	-1.523***	0.218	0.034	-0.077	0.926	0.154	0.232	1.261	0.245
Governorate:									
Beirut	-0.637**	0.529	0.121	-0.340	0.712	0.172	0.451	1.570	0.454
Mount Lebanon	-1.008***	0.365	0.077	-0.342	0.711	0.159	0.046	1.047	0.285
North Lebanon	-0.829***	0.437	0.095	-0.422	0.656	0.150	0.126	1.134	0.318
South Lebanon	-0.239	0.787	0.228	-0.388	0.679	0.206	0.118	1.126	0.407
El Nabatiyye	-0.181	0.834	0.232	-0.783**	0.457	0.135	-0.173	0.841	0.302

**** P value ≤ 0.05; ** P value ≤ 0.01; *** P value ≤ 0.001.***

APPENDIX I:

EVALUATION OF THE ORIGINAL DATA

Some of the PHS results were compared to other previous minor surveys to check the consistency of the data but there is no evidence showing that a Post-Enumeration Survey was done. According to the reports distributed by the Ministry of Social Affairs it was mentioned that there was a 1% inconsistency only between the PHS and the report of the Educational Center of Research and Development concerning registered school and university students and a 4% inconsistency between the PHS and the 1995 National Budget Report concerning numbers of public workers in 1995. Such a low inconsistency level implies little errors especially with respect to the compared variables.

However, overall Data quality evaluation cannot be performed with techniques based on two time periods in this case because of the lacking periodical data in Lebanon; in other words, there are no other national representative surveys that could be used for comparison purposes.

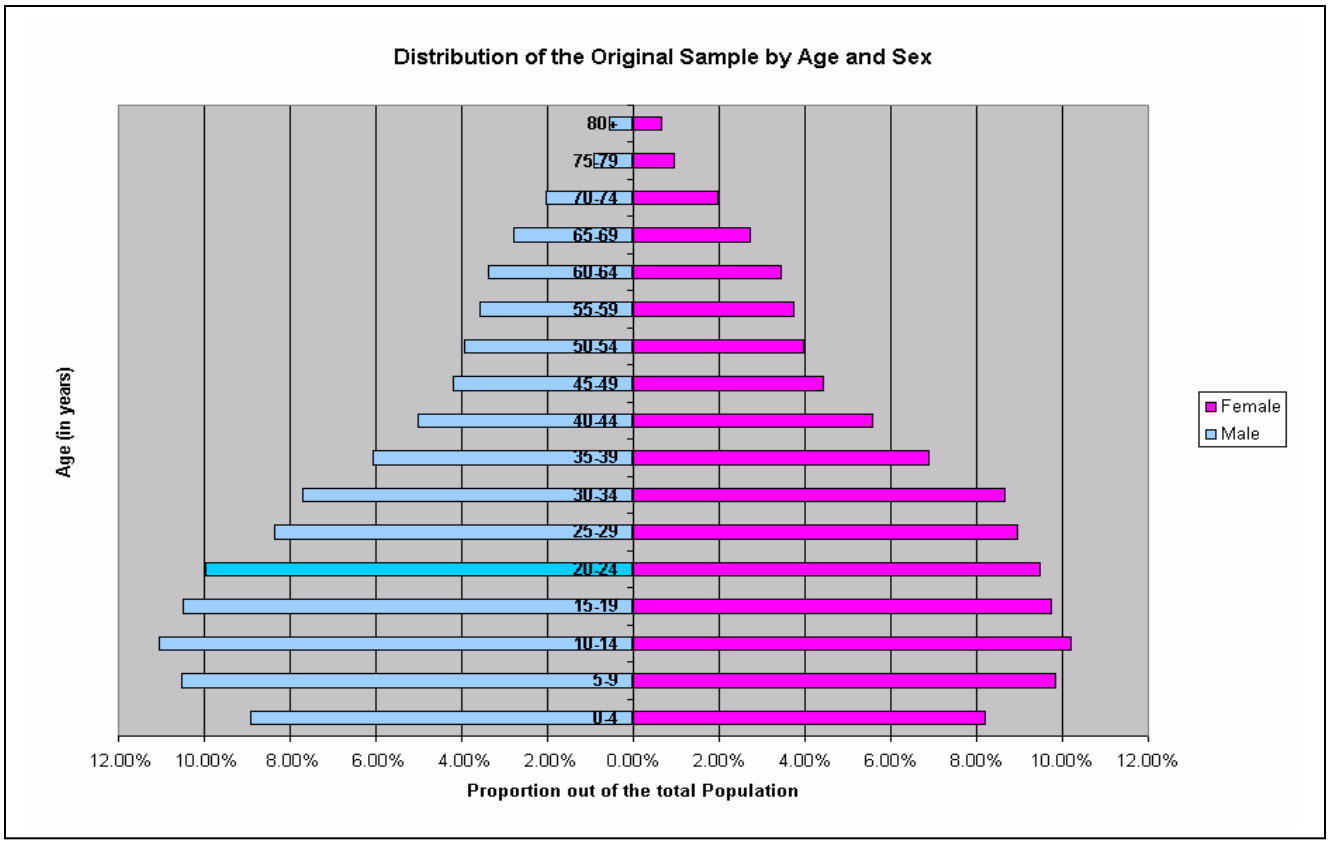
Data quality can be assessed by examining the sample design and final sample size, as well as the age/sex structure of the population and by checking for distortions that cannot be explained by delaying fertility or migration, but which could be associated with coverage and content errors (e.g. digit preference in reporting age), and by calculating the Myer's Accuracy Index.

The frame used for the PHS sample selection is relatively old (1988 compared to 1996). Furthermore, in 1988 the civil war was still going on and it was not over till 1991; the validity of using a sample frame that was created during the civil war in a survey that was conducted 5 years after the war is questionable especially that a very large proportion of the Lebanese population were forced to migrate within Lebanon and that a portion of the population began to return as soon as the war was over. This problem has been partially but not entirely resolved when, by the

time of the survey, an additional sample of 80 areas was taken from a total of 800 areas that were considered as having zero population in the sampling frame or included in other areas or were erroneously omitted in order to ensure full coverage of the population.

One of the annexes that were distributed with the raw data of PHS stated the areas that were not included in the survey. These areas are expected to have different characteristics than the captured ones but they were not included in the analysis either because the inhabitants refused to be interviewed (Ouza'i) or because of the Israeli occupation (Southern and West Bekaa Villages). These two drawbacks suggest that there was a coverage error in the original sample.

Figure I: Distribution of the PHS Sample by Age and Sex:



**Source: PHS raw data, Ministry of Social Affairs (1996).*

A distortion can be noted when comparing the proportion of males to females between 25 and 49, where the proportion of males seems less than that of females; this could be due to mortality due to civil war events and to international migration.

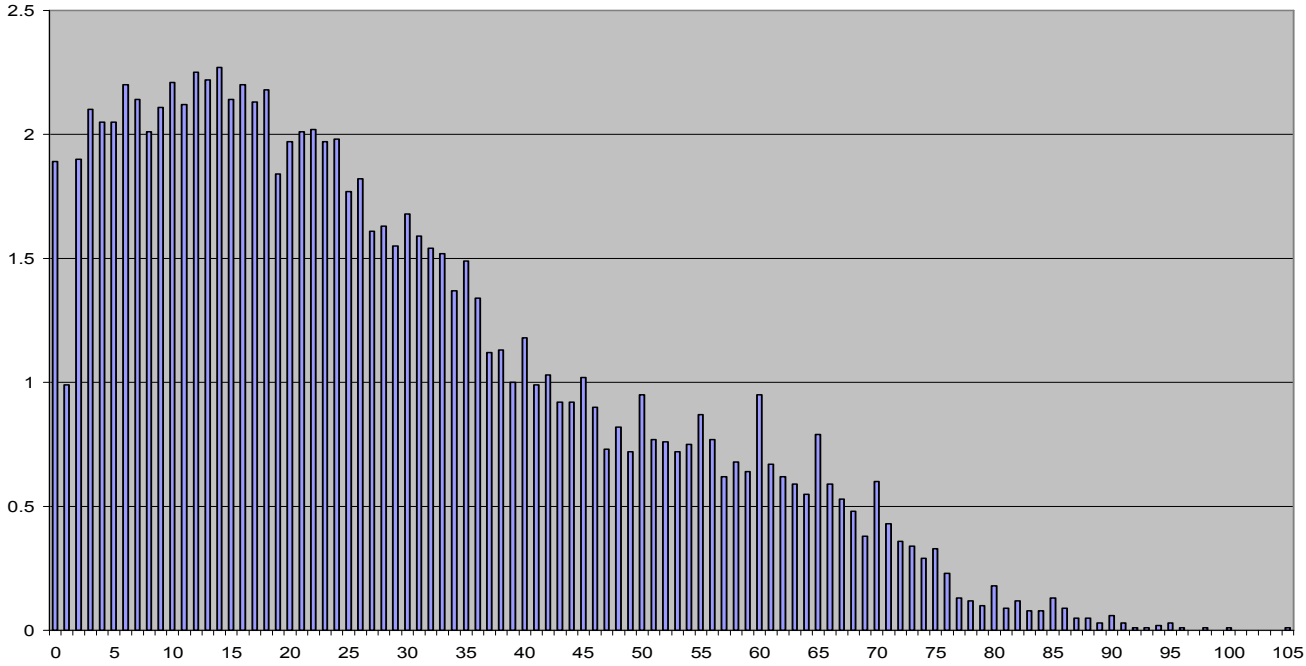
However due to war events and international migration, a larger distortion in the 25-49 age group was expected. Could there be an underreporting of females? Or is it that the mortality due to war and migration during the war and early post-war period affected men and women equally?

Finally, it is also noted that the proportion of females aged less than 25 is less in every age group than that of males. It is known that the Sex Ratio at Birth is ~105-108 male births per 100 female births but it is unusual to have a constant Sex Ratio until the age of 25 especially in times of war (population aged <25 years can be considered the war generation since the Lebanese civil war started in 1974).

Digit Preferences:

Digit Preference among males:

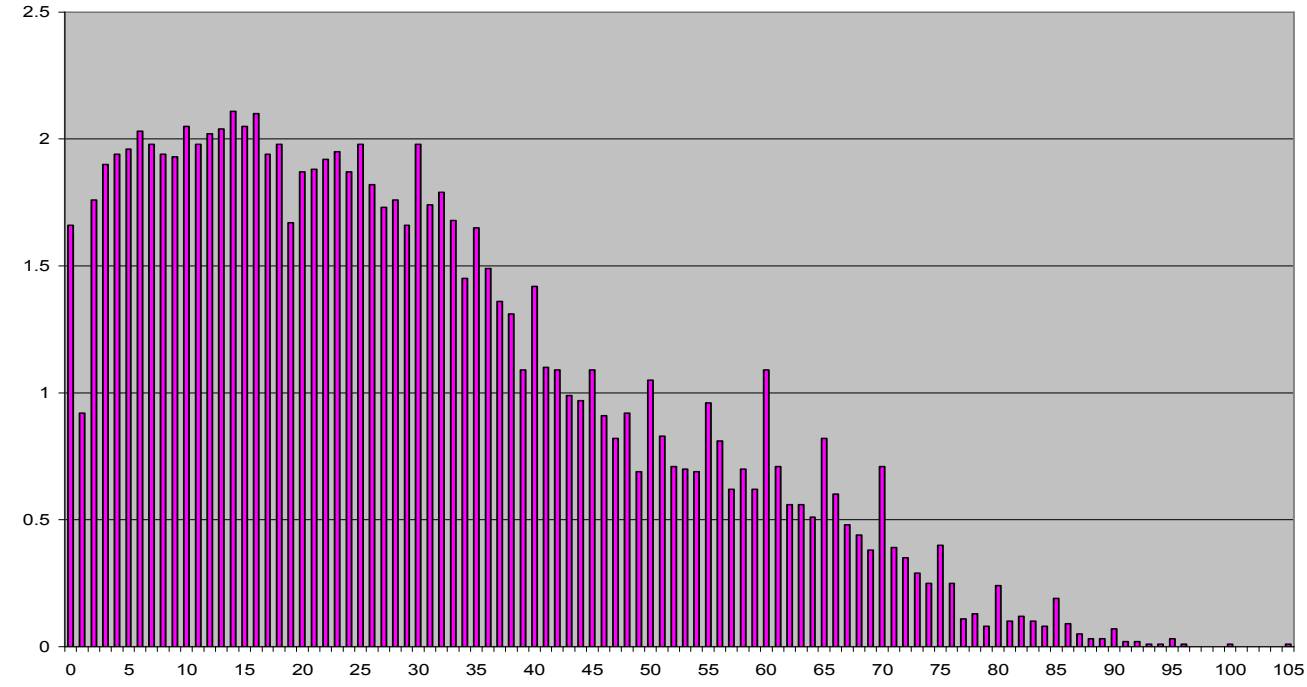
Figure 2: Distribution of males in the PHS sample by the reported Age in years



**Source: PHS raw data, Ministry of Social Affairs (1996).*

Digit Preference among Females:

Figure 3: Distribution of females in the PHS sample by the reported Age in years



**Source: PHS raw data, Ministry of Social Affairs (1996).*

These two graphs indicate the presence of digit preference in particular 0 and 5 and especially among females. This digit preference becomes clearer among older age groups. Such a distortion in the age distribution of elderly females in the original PHS sample might distort the age variable used in the present study and its potential correlation with the dependent variable.

The assessment of digit preference, however, is not an accurate evaluation of the data quality and could be biased. A more accurate evaluation technique would be the Myers' index, that accounts for the possibility that numbers ending in "0" could naturally be higher that the following numbers ending with "1" through "9" because of the effect of mortality.

Myer's Accuracy Index:

Table 1: Checking for consistency of the PHS primary data using Myer's Accuracy index:

Age	population		Age Ratios		Sex Ratio	Age Ratio Deviation		Difference of Sex Ratios
	Male	Female	Male	Female		Male	Female	
0-4	12,675	11,807	-	-	107.35	-	-	-
5-9	14,933	14,193	105.25	107.02	105.21	5.25	7.02	2.14
10-14	15,702	14,717	105.29	104.16	106.69	5.29	4.16	1.48
15-19	14,892	14,065	99.79	99.00	105.88	0.21	1.00	0.81
20-24	14,146	13,698	105.64	101.57	103.27	5.64	1.57	2.61
25-29	11,890	12,908	94.81	98.62	92.11	5.19	1.38	11.16
30-34	10,935	12,480	106.60	109.18	87.62	6.60	9.18	4.49
35-39	8,626	9,954	95.46	96.99	86.66	4.54	3.01	0.96
40-44	7,137	8,045	97.87	98.39	88.71	2.13	1.61	2.05
45-49	5,959	6,399	93.53	92.87	93.12	6.47	7.13	4.41
50-54	5,606	5,735	101.71	97.35	97.75	1.71	2.65	4.63
55-59	5,064	5,383	97.36	100.76	94.07	2.64	0.76	3.68
60-64	4,797	4,950	106.60	106.36	96.91	6.60	6.36	2.84
65-69	3,936	3,925	102.53	100.49	100.28	2.53	0.49	3.37
70-74	2,881	2,862	110.07	107.65	100.66	10.07	7.65	0.38
75-79	1,299	1,392	71.12	73.36	93.32	28.88	26.64	7.34
80-84	772	933	74.95	82.42	82.74	25.05	17.58	10.58
85+	761	872	-	-	-	-	-	-
Total	142,011	144,318	-	-	98.40	-	-	-

**Source: PHS raw data, Ministry of Social Affairs (1996).*

- Sex ratio Score = Average Difference of of Sex Ratios = 4.00
- Male Age Ratio Score = Average Male Age Ratio Deviation = 7.43
- Female Age Ratio Score = Average female Age Ratio Deviation = 6.14
- Accuracy Index = 3*Sex Ratio Score + Age Ratio Score of Males + Age Ratio Score of Females = 25.36 >20

Appendix II:

Table A-I: Distribution of the elderly women in the sample by age and governorate:

Governorate		Age Group					Total	
		65-69	70-74	75-79	80-84	85+	N	%
Beirut		33.7	30.6	14.7	12.2	8.8	1119	100.0
Mount Lebanon		32.7	27.2	16.2	11.6	12.3	2266	100.0
North Lebanon		29.8	26.8	14.4	14.5	14.5	1086	100.0
South Lebanon		34.7	28.8	16.4	8.7	11.4	378	100.0
El-Nabatiyye		28.0	26.7	15.5	11.9	17.9	386	100.0
El Bekaa		25.7	27.3	18.2	14.1	14.7	653	100.0
Total	**N**	1850	1639	929	728	742	5888	100.0
	%	31.4	27.8	15.8	12.4	12.6	100	100.0

weighted sample

Figure A-I: Distribution of Lebanese elderly unmarried women by Age group and place of residence

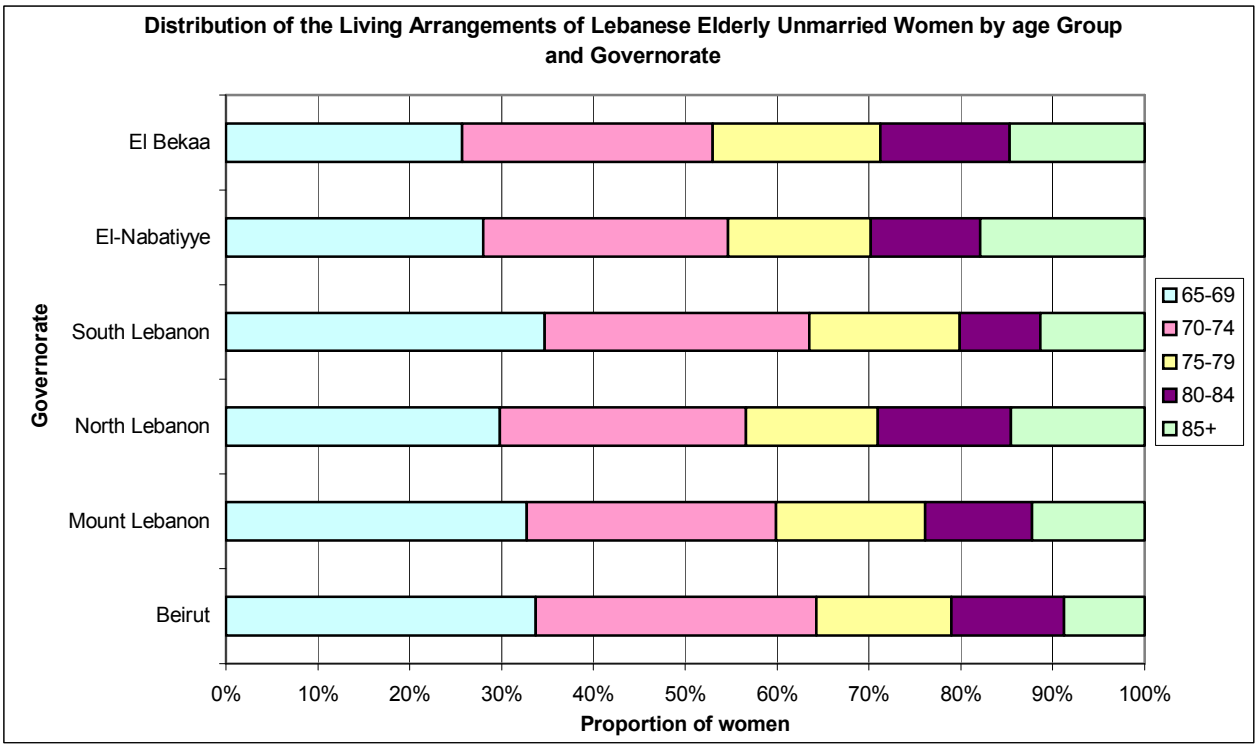


Table A-II: Distribution of Lebanese elderly unmarried women by educational level and governorate

Educational Level	Governorate						Total
	Beirut	Mount Lebanon	North	South	El Nabatiyye	El Bekaa	
Illiterate	38.9	59.7	70.2	75.3	87.8	84.5	63.3
below primary	16.0	17.7	15.5	13.8	9.9	8.0	15.1
Primary	20.1	13.5	9.6	8.2	1.8	4.9	12.0
preparatory+	25.0	9.1	8.2	2.7	0.5	2.6	9.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Figure A-III: Distribution of Lebanese Elderly women by place of residence and educational level

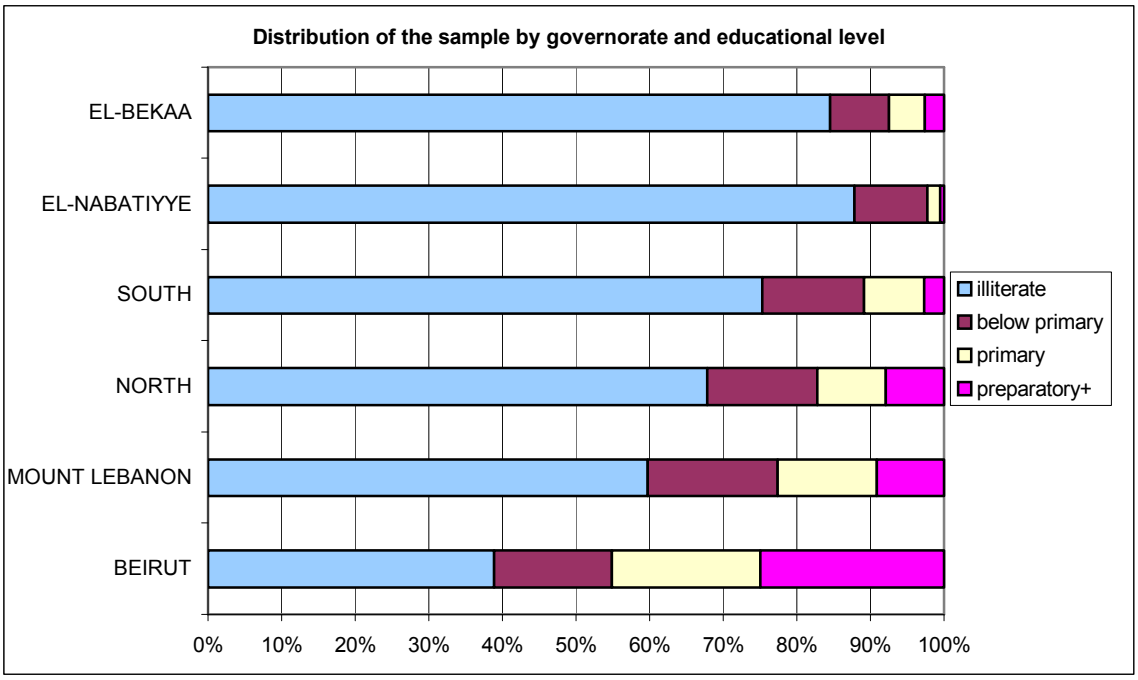


Table A-IV: Distribution of the Living arrangements of Elderly by Age Group and Governorate:

Governorate		Age Group					Total
		65-69	70-74	75-79	80-84	85+	
Beirut:							
	Loner	23.1	28.1	27.9	22.1	29.6	25.8
	with children only	44.8	38	44.8	47.8	44.9	43.1
	with children and others	15.6	17.8	13.9	8.1	13.3	14.9
	Other	16.4	16.1	13.3	22.1	12.2	16.2
Total	N	377	342	165	136	98	1118
	%	100	100	100	100	100	100
Mount Lebanon:							
	Loner	18.3	20.9	21	17.4	16.5	19.1
	with children only	52.2	56.5	54.2	52.3	53	53.8
	with children and others	10	9.4	13.4	15.9	15.1	11.7
	Other	19.5	13.1	11.4	14.4	15.4	15.4
Total	N	742	616	367	264	279	2268
	%	100	100	100	100	100	100
North Lebanon:							
	Loner	21.4	25.1	22.6	31.4	20.9	23.9
	with children only	50.5	50.9	45.8	44.9	51.9	49.3
	with children and others	9.3	11.7	15.5	9	17.1	11.9
	Other	18.9	12.4	16.1	14.7	10.1	14.9
Total	N	323	291	155	156	158	1083
	%	100	100	100	100	100	100
South Lebanon:							
	Loner	25.8	31.5	38.7	48.5	40.9	33.2
	with children only	50	49.1	45.2	42.4	45.5	47.8
	with children and others	15.2	10.2	8.1	0	11.4	10.8
	Other	9.1	9.3	8.1	9.1	2.3	8.2
Total	N	132	108	62	33	44	379
	%	100	100	100	100	100	100
El-Nabatiyye:							
	Loner	36.1	36.9	39	58.7	52.9	42.4
	with children only	36.1	43.7	44.1	30.4	35.3	38.5
	with children and others	13	11.7	6.8	2.2	7.4	9.4
	Other	14.8	7.8	10.2	8.7	4.4	9.6
Total	N	108	103	59	46	68	384
	%	100	100	100	100	100	100
El-Bekaa:							
	Loner	23.8	36	32.2	39.1	21.1	30.4
	with children only	64.3	52.2	50	42.4	55.8	54.1
	with children and others	4.8	6.2	10.2	9.8	10.5	7.7
	Other	7.1	5.6	7.6	8.7	12.6	7.8
Total	N	168	178	118	92	95	651

	%	100	100	100	100	100	100

Table A-V: Living Arrangements of Elderly by Governorate and Age Group:

Age Group		Governorate						Total
		Beirut	Mount Lebanon	North	South	El-Nabatiyye	El-Bekaa	
65-69 years:								
Loner		23.1	18.3	21.4	25.8	36.1	23.8	21.9
with children only		44.8	52.2	50.5	50.0	36.1	64.3	50.4
with children and others		15.6	10.0	9.3	15.2	13.0	4.8	11.1
Other		16.4	19.5	18.9	9.1	14.8	7.1	16.6
Total	N	377	742	323	132	108	168	1850
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0
70-74 years:								
Loner		28.1	20.9	25.1	31.5	36.9	36.0	26.5
with children only		38.0	56.5	50.9	49.1	43.7	52.2	49.9
with children and others		17.8	9.4	11.7	10.2	11.7	6.2	11.4
Other		16.1	13.1	12.4	9.3	7.8	5.6	12.2
Total	N	342	616	291	108	103	178	1638
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0
75-79 years:								
Loner		27.9	21.0	22.6	38.7	39.0	32.2	26.2
with children only		44.8	54.2	45.8	45.2	44.1	50.0	49.4
with children and others		13.9	13.4	15.5	8.1	6.8	10.2	12.6
Other		13.3	11.4	16.1	8.1	10.2	7.6	11.8
Total	N	165	367	155	62	59	118	926
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0
80-84 years:								
Loner		22.1	17.4	31.4	48.5	58.7	39.1	28.1
with children only		47.8	52.3	44.9	42.4	30.4	42.4	46.8
with children and others		8.1	15.9	9.0	0.0	2.2	9.8	10.6
Other		22.1	14.4	14.7	9.1	8.7	8.7	14.6
Total	N	136	264	156	33	46	92	727
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0
85+ years:								
Loner		29.6	16.5	20.9	40.9	52.9	21.1	24.5
with children only		44.9	53.0	51.9	45.5	35.3	55.8	50.0
with children and others		13.3	15.1	17.1	11.4	7.4	10.5	13.7
Other		12.2	15.4	10.1	2.3	4.4	12.6	11.7
Total	N	98	279	158	44	68	95	742
	%	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table A-VI: Distribution of elderly women with surviving children by age and governorate:

Governorate		Age Group					Total
		65-69	70-74	75-79	80-84	85+	
Beirut:							
	Loner	18.3	25.1	21.3	17.1	24.7	21.3
	With children only	57.3	46.6	54.4	61.9	54.3	53.8
	With children and others	20	21.9	16.9	10.5	16	18.6
	Other	4.4	6.5	7.4	10.5	4.9	6.3
Total	N	295	279	136	105	81	896
	%	100	100	100	100	100	100
Mount Lebanon:							
	Loner	14.1	18.6	18.3	16.2	14.6	16.4
	With children only	67.5	66.8	61.8	59	59.9	64.3
	With children and others	12.9	11.1	15.2	17.9	17	14
	Other	5.4	3.5	4.7	6.8	8.5	5.3
Total	N	573	521	322	234	247	1897
	%	100	100	100	100	100	100
North Lebanon:							
	Loner	19.1	19.4	20.3	32.8	16.2	21
	With children only	66.3	62.4	55.5	52.2	57.7	60.2
	With children and others	12.2	14.3	18.8	10.4	19	14.5
	Other	2.4	3.8	5.5	4.5	7	4.3
Total	N	246	237	128	134	142	887
	%	100	100	100	100	100	100
South Lebanon:							
	Loner	19.5	29.3	35.2	46.9	39	29.8
	With children only	58.4	53.5	51.9	43.8	48.8	53.4
	With children and others	17.7	11.1	9.3	0	12.2	12.1
	Other	4.4	6.1	3.7	9.4	0	4.7
Total	N	113	99	54	32	41	339
	%	100	100	100	100	100	100
El Nabatiyye:							
	Loner	32.5	36.2	36	57.9	50	40.4
	With children only	47	47.9	52	36.8	38.7	45.3
	With children and others	16.9	12.8	8	2.6	8.1	11
	Other	3.6	3.2	4	2.6	3.2	3.4
Total	N	83	94	50	38	62	327
	%	100	100	100	100	100	100
El Bekaa:							
	Loner	19.6	27.2	27.6	34.1	21.1	25.3
	With children only	73	63.3	56.2	47.6	58.9	61.5
	With children and others	5.4	7.5	11.4	11	11.1	8.7

	Other	2	2	4.8	7.3	8.9	4.4
Total	N	148	147	105	82	90	572
	%	100	100	100	100	100	100