Estimation of the supply of informal care in Mexico: What influences the decision to care for the elderly?

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Introduction

Mexico is still a "young" country with pressing burdens on secondary and college education and high numbers of new potential workers entering the labour market each year. Still, given the rapid decrease in fertility rates in the past 30 years and the significant decreases in overall and infant mortality, it will complete its *demographic transition* in the next 20-25 years. This transition will cause a rapid increase in the percentage of population 65 years and older which is estimated to go from almost 7% of total population in the year 2000 to 15% in 2025 and 28% in 2050. In a parallel process, life expectancy in Mexico increased significantly by going from 35.9 years in 1930 (34.9 men and 36.9 women), to 74.6 years in 2002 (72.1 and 77.1 respectively) (Partida, 2004).

As with most Latin American countries, Mexico is experiencing what experts call a "mixed" epidemiological transition (Palloni et al 2002) with increasing prevalence of chronic diseases and a marked decrease in communicable diseases in some areas, while still suffering from moderate or high incidence of the latter in some regions of the country. These differences between regions are mainly due to lags in economic growth and marked differences in socio-economic development. According to Palloni, A. et al. (2002) alongside the fact that neither Mexico nor any other country in Latin America has institutional contexts – whether public or private—that may respond to the changing social and healthcare demands from an elderly population, for most countries in the region a highly compressed aging process will take place in the midst of weak economies, changing intergenerational relations, and constricting access to medical and health care.

In Mexico, health services are provided within a highly segmented system where services and users are divided according to the health institution that provides the service. Three main segments form the system: a) social security institutions, b) public services offered by the Ministry of Health, and c) the private sector. The largest differences can be observed between social security institutions and the benefits received by individuals affiliated to them, and the rest of the population. Not only are provision of services and users particular to each sector, but also each sector has its own funding mechanisms, finances, and administration. This can be further reviewed in Table 1.

Given the lack of long-term health and social care strategies for the elderly in Mexico, health and social development ministries have historically tried to compensate with alternative or palliative strategies to provide services for the elderly population. Just as health services are provided to those affiliated to a social security institution through their formal employment status, eligibility for pensions and retirement

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The work presented in this paper is part of my ongoing research and therefore should be considered work in progress.

benefits depends on past participation in formal employment. Those not affiliated to any of the social security institutions have access to health care provided by the Ministry of Health, and for those who can afford it, through direct out-of-pocket payments to private services providers. As for other type of services, the Social Development Ministry, through different agencies, provides some services to the elderly uninsured population, mainly recreational activities, prevention and self-care information programmes, etc. These factors have left informal caregivers, mostly women, to take the main responsibility for the provision of household care activities through the life cycle, from early childhood care and family health care, to health and long-term care for the elderly.

The National Population Council, CONAPO (CONAPO 2001) estimated that in 2000 73% of the population aged 60+ years in Mexico lived with their children or other close relatives. Because multi-generational living arrangements are still the norm in Mexico, informal care has an important role with respect to the health status of the elderly and their demand of services. It is known that, particularly in developing countries, the elderly population group becomes an important factor in terms of household care by simultaneously providing care and receiving care depending on their functional capabilities (Montes de Oca 1997, Robles 2006). However, changes in fertility rates, constant rural-urban migration, women's increasing participation in the labour force, among other factors have changed family size and composition and may pose future challenges to the availability of household care and support.

Given the current lack of long-term strategies for the elderly in Mexico, it is clear that the social development and health sectors are unprepared to cater for the needs of the growing elderly population. In addition, a possible decrease in availability of informal care highlights the importance of detailed information on health needs and use of services by the elderly, on how these needs will change in the future, as well as future demands they will generate in terms of both formal and informal support and services.

Long-term care services can be provided formally or informally and its provision will depend on the type of broad social and health system in place in each country as well as cultural norms prevalent in each society. In estimating the supply of informal care variables such as age, gender, health status including mental health, income, education level, and cost of providing services should be considered. It is also essential to take into account the availability of family and/or friends that can perform such activities, their socio-economic and demographic characteristics, as well as their willingness to do them.

Few analyses of the Mexican health system have considered the fundamental role of the household in the provision of healthcare and other services for the elderly. Together with the imminent ageing of the population and its current and future impact, this generates a great need for information on household dynamics around health care for the elderly, who is taking on such activities, and the opportunity costs generated in doing so. Within this context, this study aims to explore the characteristics and determinants of the provision of household health care for the elderly using a national survey of the ageing population in Mexico. This study estimates the determinants of the supply of informal care for the elderly in Mexico and of the time spent in such activities. It forms part of a larger research project on the elderly population in

Mexico and their health status, utilisation of health services, and estimated needs for the provision of social and health care services in the next decades.

Existing research on the Supply of Informal Care

In the past decades, the conditions faced by the elderly population and their long-term care services have been areas of concern, and a focus for a wide range of research studies. The areas most studied have been the finance of long-term care programmes and healthcare institutions, life-expectancy, current and future health and disability status of the elderly, and the best mix of services to provide. The role of family members in the support needed by the elderly seems to have been much less explored.

The impact of ageing and the need for healthcare services for the elderly have only recently been studied in Mexico. Initial work regarding the elderly and their use of services in Mexico was done after the National Health Survey 1994 (ENSA-II). In a first description of health service utilisation by the population 60 years and older Borges-Yáñez and Gómez-Dantés (1998) estimated socio-demographic characteristics, prevalence of chronic diseases, and determinants of health services utilization. Duran-Arenas L. et al. (1996) estimated the direct financial requirements for providing health care to the elderly in Mexico and the actual expenditure on services. One of the few studies to go beyond mortality-morbidity analysis is by Ham-Chande (2003), which examines the different health characteristics of growing old in Mexico and presents estimates of Active Life Expectancy.

More than ten years after these studies started and their conclusions regarding the need for making the health of an ageing population a priority, there are still no comprehensive social and health care strategies or programmes for the elderly, but a research agenda has been increasingly developing and will hopefully support the adequate planning and allocation of funds and services for the elderly in Mexico.

In studying Long-term care, it is necessary to recognise that the quantity and type of services that are provided depend on both the demand and supply of care. Although the demand for health services has been widely studied, service utilisation by the elderly, as well as the supply of informal care has been much less studied.

Household health care has been considered within the scope of the definition of household or domestic work. This definition has gone through a long theoretical consideration that has been widely analysed. Still, it is generally considered that it was Gary Becker (1976) who opened a new way for analysis of the household and all the activities related to it through microeconomic theories, and what is referred to as the "New Home Economics". Here, household activities including health care are viewed as a decision by household members as to who has the lower opportunity costs when staying home carrying out activities such as caring for children, an ill or elderly family member.

Informal care by adult children is a common form of long-term care for older adults and can act as a substitute for or complement to formal care. In the same way, elderly adults become important providers of care and support within the household. Informal care has also been shown on one hand, as a means of preventing or decreasing medical expenditures for the elderly, preventing further illnesses, and even

stopping them falling into poverty. On the other, it has been noted to increase participation of the elderly in different health and social care strategies as well as their use of services.

Several studies have estimated that between 85% and 90% of all needed health care is provided informally (Grunfeld et al. 2004). Informal caregivers are family members, friends, or neighbours who carry out these activities with no payment or compensation in exchange. La Parra (2001) estimated that in Spain, of total hours worked for those with worse health, health professionals carry out 12% while family members do the remaining 88% of total hours. Hellström and Hallberg (2004) in a study in Sweden note how even in such countries with sound formal care services for the elderly; responsibility of care relies heavily on informal carers.

According to Tomassini et al. (2004) family members provide the great majority of care received by older people in most European countries. Even though there is considerable variation across countries, with a higher proportion of older people receiving care and living with family members in southern European countries, the study shows there has been little change over time in attitudes towards elder care. Thus, even in countries with well established Long-term care programmes and policies informal care for the elderly remains the most common form of long-term care. Informal care is often preferred by the elderly to formal and institutional care, and can reduce medical expenditures if it substitutes for formal care (Harold van Houtven and E C Norton 2004). In this context, it is also necessary to consider that, particularly in developing countries; the elderly populations not only receive care, but are an important source of support within the household as providers of care and other activities.

Within the literature, there is considerable uncertainty and by no means general agreement about the future of informal care and its availability. Underlying the uncertainty about the future availability of informal care there is a wider social policy issue - not whether societies can continue to rely on informal care, but whether they should continue to rely on it (Pickard et al. 2000).

In a first study of care for the ill and disabled in Mexico Nigenda et al (2005, 2007) present different patterns of time dedicated to these activities by household members. The study included an analysis of the National Time Use Survey 2002 and in-depth interviews and focus groups. They estimated that 1 738 756 persons spent time providing care to ill persons and 1 496 616 to disabled persons, with an average of 6.09 hours per person. Of this care, approximately 66.4% was carried out by women and 33.6% by men. Their results show important differences in the hours delivered by gender and education level. Moreover, households tend to reorganize their structure to provide care to ill and disabled members. Women tend to have more responsibilities in the process.

In a study from Sweden, Hellström and Halberg (2004) investigate the determinants of receipt of help from informal or formal caregivers or a combination of both, by people aged 70 or more and living at home, the characteristics of the recipients, the help they received, and their quality of life (QoL). They analyse differences in gender, domicile, civil status, cohabitation and help with IADL, ADLs, between the groups of informal, formal, and a combination of informal and formal caregivers on one hand, and between four groups of informal helpers (spouses only, children or spouses of the child only, friends/neighbours only, and informal caregivers) on the other.

Using a nationally representative data from the National Survey of Families and Household 1987-88 Marks (1994) studies the prevalence of caregiving among men and women ages 35-64 in the US, examining differences between caregivers and non-caregivers in health, psychological well-being, social participation, and marital quality; all from a gender perspective. She found that one in five adults in the study had recently been involved in caregiving either in or out of their residence, with a ratio of female to male caregivers showing a much higher prevalence of male involvement than most non-representative sample studies indicate. Few health and well-being effects of caregiving were found to differ by gender.

Within the still scarce literature on the supply of informal care to the elderly, a factor of particular interest is to understand how caregiving is related to labour force participation.

Using data from the 1987-88 National Survey of Families and Households Wolf and Soldo (1994) estimate a simultaneous equations model of employment, hours of work, and provision of care to older parents by women in the US. A model of the effect of caregiving on employment through the analysis of time as a fixed resource, allocated between labour, and leisure is defined. In order to estimate the effect of providing parent care on married women's work behaviour, they design a structural model containing equations for caregiving, employment, and hours of work. In a study on the competing demands of work and caring for the elderly, Stone and Farley (1990), examine the employment decisions of informal caregivers of a nationally (US) representative sample of disabled elders. Competing demands of caring and employment are viewed as a problem of time allocation, where the caregiver must decide how between his or her limited time to caregiving, to employment, and to all other activities or “free time”.

With data from the 1986-1988 Survey of Income and Program Participation Ettner (1995) uses several data panels to analyse how informal caregiving of disabled elderly parents has affected female labour supply. In specifying the model, the author takes into consideration the fact that a significant proportion of the women in the sample do not work. In a further study on impact of caring on labour supply, using data from the 1987 National Survey of Families and Households, the author (1996) found finding that work hours were consistently reduced by caregiving, although the effect was significant only for women providing care to parents residing outside the household.

In an analysis of the relationship of informal care on paid-work, Heinz (2004) used the British Family and Working Lives Survey 1994–95 to study the timing of informal care-giving to a sick, disabled or elderly person and examines the effect of caring on employment. The results show that most carers look after only one dependant during their lives, and only around one-fifth to one-third look after a second dependant before the age of 65 years. Of all informal carers, about one-third had not been employed when they started caring for the first time in their lives, another third said that caring had no effect on their work arrangements, and about one-third reported one or several effects on their work arrangements, most commonly that they stopped working, with higher impacts on part-time than full-time workers.

For the Netherlands, van de Berg and Woittiez (2005) investigate the labour and care supply decisions of potential caregivers, by developing a utility maximisation model in which hours of care and hours of work are included. A structural model is also developed to show the direct relation between these two phenomena. The model takes into account simultaneity between hours of work and hours of care.

In an analysis of these studies, it is clear that even in countries with strong formal care services for the elderly healthcare and support for the elderly relies heavily on informal carers, mainly family members. While there is a wider literature focused on the different interactions between informal care and labour force participation and the availability of informal care and its relation to formal care use, few studies concentrate on the internal household dynamics and the determinants of the decision to care and time spent caring independent of other "external" factors such as formal work or availability and use of formal services. Also, the impact of the receipt of informal care versus formal care on the health status of the elderly has barely been studied.

It is important to note how a range of perspectives have been used to study informal care, with a similarly wide range of methods used for its estimation, going from simple regression analyses to complex three or four simultaneous equation models.

In this context, and given the very scarce literature on informal care in Mexico, an innovative study is proposed to estimate the supply of informal care to the elderly in Mexico, in the hope that it will generate relevant information for future planning of strategies to care for the growing elderly population.

Definition of the model and estimation

In estimating the supply of informal care for the elderly in Mexico, there were important issues that had to be considered. First, the typology of care that was to be estimated was considered. In this sense, it would be optimal not only to be able to estimate what determines if a person is giving care for the elderly, but if they are, how much time is allocated to such care and what determines this time spent caring. This in result defined the second issue to consider which are the variables and possible determinants that were relevant in these estimations. Thus, the characteristics of those caring for the elderly, both residents and non-residents, and the characteristics of the elderly that act as part of the determinants of receiving care, were reviewed. Socio-demographic, economic and health factors of both groups the carers and the cared for, were analysed for inclusion in the model of estimation. It was considered especially important to be able to identify, if possible, what specifically may be determining or the differences between those children or close relatives of the elderly that help with caring activities and those who are not.

In estimating total time spent in caring activities for the elderly, regression OLS analysis can be done on caregiving time (DV) subject to the effect of different factors of the caregivers and the elderly population group (IV). On the other hand, in order to estimate the factors determining the decision to care for an elderly person could be estimated with probit models of caring decisions (DV), again determined by different factors defining the carer and the cared for. Also, probit analysis on the decision to care is an alternative method to estimate part our subject of interest.

Although the estimation of these two equations in two stage models could be accurate, assumptions on the data available on the decision to care would have to be made. That is, it would have to be assumed that the missing data or data on those not giving care were missing completely or randomly selected out of our sample.

However, if we assume, as it occurs in most labour-work decisions, that the decision to care or not to care is made by the individual, those who did not care constitute a self-selected sample. Not taking this into account would lead to sample selection bias in our estimation and therefore appropriate models that take this sample selection into account are much more accurate. In order to solve this selection problem (individuals caring), the best model to estimate the supply of informal care to the elderly in Mexico seems to be a Heckman[1] Selection Model. This model assumes that missing values of the dependent variable imply that the dependent variable is unobserved or not selected. For this reason it has been considered as a good way of predicting the value of the dependent variable that would be observed in the absence of selection (considering the missing values). Definitions of this model note that if a data set specifies a binary variable that identifies the observations for which the dependent is observed/selected or not observed, it is much convenient to use over other models and therefore was selected as the method of estimation in this study.

In order to estimate our model, a structural equation defining the determinants of time spent in caring and a selection equation defining the decision to care were specified. The first equation, a regression model predicting time spent caring, and the second one, a model predicting whether an individual will be caring or not for an elderly person (selection). This model will use of information from those caring and those not caring allowing for the study of differences among them in determining the decision to care and time spent caring. The two equations of the initial model are:

TotalCare= f (gender, marital status, main activity, children under 18, household type, health status of elderly, age of the elderly)

Carergiver= f (age, gender, education level, marital status, age of co-residents, main activity, individual income, health status, children under 18, household type, health status of elderly, age of the elderly)

Data

The model is estimated using data from the Mexican Health and Ageing Study (MHAS) 2001, which is a prospective panel study that included 15,230 respondents (9,806 identified respondents and 5,424 spouse/partners), and has national representation of the 13 million (non-institutionalised) Mexicans born prior to 1951. Spouse/partners of eligible respondents were interviewed, even if the spouse was born after 1950, and a follow-up of the complete sample was done in 2003. In total, the overall response rate was of 91.85%. Given the special interest of the researchers involved in the study on migration to the United States, residents of high migration states (Durango, Guanajuato, Jalisco, Michoacan, Nayarit and Zacatecas) were over-sampled.

The MHAS sample was drawn from the 4th Quarter wave of the 2002 National Employment Survey, ENE (Encuesta Nacional de Empleo). MHAS is representative of the non-institutionalized population aged 50 and over in 2000 in Mexico. It is important to note that in Mexico it is estimated that only about 0.5% of the total population 60 years and older live in formal residential care facilities (Gutierrez R et al 1996).

[1] James Heckman "Shadow Prices, Market Wages, and Labour Supply" (1974)

The survey provides demographic, health, health service utilisation, and socioeconomic information on the respondents. In order to gather data on family characteristics of the elderly, the study also includes demographic and socioeconomic information on all co-residents, and non-resident children of the selected respondents (and their spouse/partners). The questionnaire also solicited information on whether or not the respondent needed help with different activities, if respondent received help with these activities, the relation of the carer to the respondent, and the intensity of the care received (in days a month and hours a day).

Specifically, the survey includes information on the following issues: health measures, including self-reports of conditions, symptoms, functional status, risk behaviour, use/source/costs of health care services, depression, pain, reading and cognitive performance tests; health and living condition of the respondent including those at childhood; household roster which includes information on all children and socio-demographic data for those still alive; financial transfers and help given to and received by the respondent from their children, as well as time and financial help to respondent's parents; economic data including sources and amount of income, and assets; environment and condition of the household, and anthropometric measures for a random sub-sample (20%) of the respondents.

Generation of data set from MHAS for model estimation

The unit of observation for the analysis in this paper is the potential caregiver. The analysis has been further restricted to focus on potential caregivers who are in the same household as the over-50s who are the focus of the MHAS. It is planned to extend the analysis to include non-resident children at a later stage.

It is a non-trivial task to extract the relevant data from the MHAS so as to generate a dataset of family members who are living with the respondents. First, there are different files for different sections of the questionnaire. Second, the focus of this analysis is on the potential care-givers rather than the respondents themselves. Third, while some households have a single respondent many have two, and there is a variable number of potential care-givers in each household.

The master data set (elderly+ co-residents) included 38,886 observations, 15,409 from sampled population and a total of 23, 477 household co-residents. This first analysis was done with respect to the help received with Activities of Daily Living, ADLs only. Further analysis is contemplated to also include help with Instrumental Activities of Daily Living, IADLs.

According to the MHAS there were 810 persons identified as carers who helped the respondents with Activities of Daily Living, ADLs. Of these 810 carers, 497 are household residents, 241 are non-resident children, and 72 are non-resident, unrelated paid carers. These household co-residents, who helped with care for ADLs, were 69% female and 31% male. From total amount of care given, 67% is undertaken by children of the respondent/spouse, 7% by children-in-law, 12% by grandchildren, 6% by other relatives, 4% by other person (non household non-paid), and 4% by paid formal carers.

The data set was further restricted by selecting only individuals 12 years of age and older. This was done primarily because other relevant surveys in Mexico that could serve as comparison with our study, for

example the National Time Use Survey, the National Income and Expenditure Survey, define this age for their respondents. Also this cut-off point is sensible since the main questions on co-residents socio-demographic characteristics such as education attainment, main activity, health status, financial situation, among others, were only asked of co-residents 12 years and older. Dropping persons less than 12 years of age and the sampled respondents resulted in a sample of 17,979 persons.

Definition of Variables and descriptive statistics

Definitions and summary statistics for the included variables are presented in Table 2. There are two main groups of variables, those related to the caregiver and potential caregivers, and those related to the ageing population group receiving such care. Regarding the caregiver, variables included in initial and final versions of the model include: age, gender, education attainment, financial situation, marital status, main activity, if they have children under 18 years old. For the respondent and spouse we have average number of chronic disease, self-reported health, age, and a variable indicating if they had to stay in bed due to illness or injury in the past year, as an additional indicator of "burden of care" within the household.

Results

The first step was to estimate a probit model for the decision to care in order to test the relevance of the selected variables. From the original set of variables, marital status, if the co-resident has children under the age of 18, the age of the co-resident, and education level were dropped from the model due to their lack of statistical significance.

From this first estimation of determinants of the decision to take on caring activities, gender, living in more urban areas, stating housework as main activity, high number of chronic diseases, bad self-reported health having had to spend days in bed, and number of co-residents in the household were all significant, with financial situation of the potential carer and overall indicators of good health being not as significant. The detail of these results can be found in Table 3. Note that as the number of chronic diseases and the age of the respondent increases the probability of care increases and the statistical significance increases. It is only membership of the oldest age group (75+) that is significant in terms of the decision to care (consistent with other studies).

According to the results, being male decreases the probability of being a carer compared to women. Living in more urban areas appears to increase the probability of caring. The financial situation of the carer seems to be unimportant, possibly suggesting that the decision whether or not to care is based more on opportunity costs than on the ability to buy formal care. Interestingly, the main activity of the co-resident seems to be significant for those declaring housework as their main activity compared to those in formal employment and full time students, while those not working are the least likely to be giving care.

As was expected, decreasing health status of the respondent tends to be significant determinant of giving care as well as age for the eldest population group. Finally, as the number of co-residents increases which can be regarded as an indicator of additional potential caregivers, the probability of being a carer decreases.

In the initial specification of the probit model residence in a larger community and gender of the potential carer both had statistically significant coefficients. However, it is possible that these variables have their impact through other variables, for example, the effect of age of the respondent may differ between more and less urban areas. Interaction terms between gender and community size and the other independent variables were generated, in order to explore these possibilities.

For the more urban areas, interaction effects were generated with the age of the sampled respondent; the main activity stated by co-residents, the number/level of chronic diseases of the sampled respondent, their self-reported health, number of days spent in bed, and the average number of co-residents in the household. Regarding gender, the interaction terms were the main activity of the co-resident, respondent's level of chronic diseases, self-reported health of the respondent and days spent in bed.

The probit model was estimated including these interaction effects and without the gender and more urban characteristics respectively. The results are shown in Tables 4 and 5. When interaction terms between community size and other independent variables are included the coefficient of community size variable ceases to be statistically significant (and the variable has thus been omitted).

There are differences between more and less urban areas with respect to the impact of age, self-reported health and number of co-residents (Table 4) Although none of the interaction terms appear to be highly significant, being in a more urban area accentuates the effect of age group of the respondent on the probability of being a carer, but this difference decreases as age group increases.

The effect of self-reported health on the probability of caring is increased for those living in more urban areas. The negative relationship between number of co-residents and the probability of caring is weaker in more urban areas compared to less urban areas.

The inclusion of variables interacted with gender (Table 5) has very little impact on the other independent variables and the coefficients of the interaction variables are not statistically significant. Male co-residents seem to have more positive effects on caring for those who reported house work as main activity, compared those in work or full time students, whereas those not working have a negative effect. It is difficult to imagine why people in this last group, those not working, have a negative probability of caring, when at least in theory they could be dedicating more time to such activities. With respect to the interacted variables referring to health indicators of the respondent, there seem not to be any clear patterns of the effect of being male in the different levels of these variables and its relation to the decision to take on caring activities.

The third step was to fit a Heckman Selection Model, including the original non interacted variables, and those interacted variables that seemed to have larger effects on the overall decision to care. The results are presented in Table 6. The decision to care equation is defined by the same binary variable as the probit model and the time spent caring is the total hours per month that the co-resident helps the respondent with caring activities. It is important to note that unexpectedly, variables that were thought to be relevant in determining time spent in caring activities where not. Even when trends in some health status variables are as expected, only the age of the oldest age group (75+) and the average number of co-residents seem to be significant.

Finally, an alternative modelling approach was explored by estimating a bivariate probit with selection model. Again, the decision to care is modelled with a binary caring/not caring variable, while time spent caring was recoded so as to distinguish those providing high levels of care (in terms of time spent caring) from those who don't. As can be seen in Table 7 the indicators of the health status of the sampled respondent, such as having spent days in bed and number of chronic diseases seem to be significant in terms of the decision to care while other variables seem unimportant such as self reported health. Again, age of the respondent for those in the oldest age group seems to be a significant factor. Besides gender, as in the initial probit model, reporting housework as the main activity seems to be a significant factor determining the decision to care, but not the time spent caring. With respect to being a high level carer, the only factors that seem significant are some values of self-reported health and the average number of co-residents.

Discussion

In recent years, public spending on health has increased. Also, there is an increasing interest and concern about the impact that the rapid ageing process in Mexico will generate in both the social and health spheres. Still, there has been no agreement, and much less global efforts and polices, to face these problems at regional and national level. In this context, the interaction between the different institutions and the family is going to be important in order to manage the burden of care within the household without generating excessive expenditures within the social and health systems.

In this study we have seen how different health indicators of the ageing population and characteristics of the elderly determine the decision to help the elderly with ADLs and time spent on such activities. The number of chronic diseases, belonging to the oldest population group, spending many days in bed, and the average number of co-residents appear to be the most significant determinants of both the decision to care and the time spent caring.

The fact that most of the carers' and potential carers' traits or characteristics turned out to be not significant in the analysis of time spent caring raises a question regarding the information collected in this survey regarding the carers and the method of collection. Because the survey focussed on ageing, the sampled respondents' characteristics are the main interest and as a bi-product they are asked to provide information not only on those helping them with caring activities but on the rest of the co-residents of the household, leaving us with indirect, potentially biased or misinformed responses. This constitutes one of the main weaknesses of this work.

As an example of how access to such information could be of great value, we can think of surveys from other countries where carers constitute the sample and information is gathered directly not only on the main activity of the carer, but also for example, for those who work, on whether they do so full-time, part-time, on the opportunity costs of caring that are faced by caregivers, details of the type of care given and of the amount of time spent, among other issues.

The distribution of time spent caring may also generate challenges for the estimation as seen by our results. Instead of detailed information on the type of activities done and the time spent on each, data from

MHAS only includes questions on how many days per month and hours per day co-residents dedicate to helping respondents with these activities. The distribution of time seems to be highly skewed with several respondents declaring very large number of hours per day making it harder to model the determinants of time spent on these caring activities.

Given the nature of the data set and its complexity, different models were reviewed in order to find a best estimation possible. The data available seems to explain the decision to help or care for the elderly much better than the time spent caring. A likely reason for this could be that we only have indirect information on the carers, as reported by the person receiving the care.

Still, this work is relevant given that is one of the first efforts to estimate the supply of informal care in Mexico, and the first (that I know of) to estimate supply of informal care to the elderly using a nationally representative data set versus small qualitative studies that have been done. Another feature of this study is the use of sample selection models thus explicitly recognising that the carers do not constitute a randomly selected sample but a self selected one.

Due to large differences within Mexico in terms of the size of municipalities, a variable that distinguishes between localities with populations greater than and less than 100,000 is unsatisfactorily crude. A variable which distinguished more sensitively between communities of different sizes would permit better modelling of the decision to become a carer.

In a country with no long-term social and health services for the elderly where mainly family and on occasions close friends really matter in terms of caring by providing most care for the elderly at home, and continuing social and economic changes, detailed information on who is giving such care, the type and time of care given seems a national priority. This study estimating current supply of informal care to the elderly in Mexico should be viewed as an important first attempt to have a clearer knowledge on this subject. Nevertheless, as it was noted above, important constraints in the data used leave us with many questions and ideas for further work in this area. One of the main factors to be considered could be the benefit of conducting a survey at national/regional level that gathers information directly from carers.

List of references

Becker, Gary (1965) "Theory of the allocation of time" Economic Journal, Vol. 75, pp. 493-517

Borges-Yañez S A and H. Gomez-Dantes (1998) "Health service utilization by the 60-year-old and older population in Mexico" Salud Publica de Mexico Vol. 40

Consejo Nacional de Poblacion (2001) "El perfil sociodemografico de los hogares en Mexico, Serie: Documentos Tecnicos, Mexico

Durán-Arenas L, R Sanchez R, M Vallejo M, J Carreon J and F Franco (1996) "Health care financing for the elderly" Salud Publica de Mexico, Vol. 38

Ettner, Susan L. (1995) "The impact of "Parent Care" on female labour supply decisions" Demography, Vol. 32, No. 1, February.

Ettner, Susan (1996) The Opportunity Costs of Elder Care, The Journal of Human Resources, Vol. 31, No. 1. pp. 189-205

Grunfeld, E, T Whelan, J Clinch, L Reyno, C Earle, R Willan, M Coristine, T Janz, and R.Glossop (2004). "Family caregiver burden: results of a longitudinal study of breast cancer patients and their principal caregivers" Canadian Medical Association Journal, Vol. 170, No. 12

Gutierrez Robledo, LM, Reyes-Ortega G., Rocabado-Quevedo F, Lopez Franchini J. (1996) "Evaluacion de las instituciones de cuidados prolongados para ancianos en el Distrito Federal. Una vision critica" Salud Publica de Mexico; vol. 38, no. 6, Cuernavaca, Mexico

Ham Chande, Roberto (2003) "El envejecimiento en México: el siguiente reto de la transición demográfica", El colegio de la Frontera Norte, México

Harold Van Houtven, C and Edward C Norton (2004) "Informal care and health care use of older adults" Journal of Health Economics, Vol. 23

Heckman, James (1974) "Shadow prices, market wages, and labor supply", Econometrica, Vol. 42, No. 4, July.

Heckman, James (1976) The Common Structure of Statistical Models of Truncated, Sample Selection and Limited Dependent Variables, and a Simple Estimator for such Models, *Annals of Economic and Social Measurement, vol.* 5, pp 475-492.

Hellström, Ylva and Ingalill R. Halberg (2004) Determinants and characteristics of help provision for elderly people living at home in relation to quality of life" Nordic College of Caring Sciences, Scand J Caring; 18, 387-395.

Henz, Urusla (2004) The effects of informal care on paid-work participation in Great Britain: a lifecourse perspective, In an analysis of the GB 1994-95 Family and Working Lives Survey, Ageing & Society 24, 2004, 851–880, Cambridge University Press, United Kingdom

La Parra, D. (2001) "Contribución de las mujeres y los hogares más pobres a la producción de cuidados de salud informales." Gaceta Sanitaria Panamericana, Vol. 15, No. 6, pp. 498-505

Marks, Nadine F. 1994. "Midlife Caregiving: Do Effects Differ by Gender?" NSFH Working Paper No. 64. Center for Demography and Ecology, Madison, Wisconsin.

Marks, Nadine F. Caregiving across the Lifespan: National Prevalence and Predictors; Family Relations, Vol. 45, No. 1 (Jan., 1996), pp. 27-36

Mexican Health and Aging Study, MHAS http://www.mhas.pop.upenn.edu/english/home.htm

Montes de Oca, Verónica (1997) "La actividad económica de las mujeres en edad avanzade en México: entre la sobrevivencia y la reproducción cotidiana" Paper delivered at the 1997 meeting of the Latin American Studies Association, Guadalajara, México, April 17-19

Nigenda G, Cecilia Matarazzo, Mariana Lopez-Ortega (2005) "Los cuidados a la salud en el hogar: Tendencias e inequidades. Análisis desde una perspectiva de género"; Fundación Mexicana para la Salud, Funsalud, México, DF

Nigenda, Gustavo Mariana López-Ortega, Cecilia Matarazzo, Clara Juárez-Ramírez, "La atención de los enfermos y discapacitados en el hogar. Retos para el sistema de salud mexicano"; Salud Pública de México 2007; Vol. 49(4):286-294(1).

Palloni, Alberto, Guido Pinto-Aguirre and Martha Pelaez (2002) "Demographic and health conditions of ageing in Latin America and the Caribbean", International Journal of Epidemiology; 31: 762-771, Great Britain

Palloni, Alberto, Beth Soldo, and Rebeca Wong (2002), Health Status in a National Sample of Elderly Mexicans, Paper prepared for presentation at the Gerontological Society of America Conference, Boston

Partida Bush, Virgilio (2004) *Situacion demografica nacional* in: "La situacion demografica de Mexico" Consejo Nacional de Población, Mexico

Pikard Linda, Raphael Wittenberg, Adelina Comas-Herrera, Bleddyn Davies and Robin Darton (2000) Relying on informal care in the new century? Informal care for elderly people in England to 2031; Ageing & Society (2000), 20: 745-772, Cambridge University Press, United Kingdom.

Robles Silva, Leticia (2006) "La vejez: Nuevos actores, relaciones sociales y demandas políticas" Relaciones 105, Invierno 2006, Vol. XXVII, El Colegio de Michoacan, A.C. Mexico

Stone, Robyn I. and Pamela Farley Short (1990) "The competing demands of employment and informal caregiving to disabled elders" Medical Care, June, Vol. 28, No. 6.

Tomassini, Cecilia, Karen Glaser, Douglas A. Wolf, Marjolein I. Broese van Groenou and Emily Grundy (2004) "Living arrangements among older people: an overview of trends in Europe and the USA" Population Trends 115, National Statistics, UK.

van den Berg, Bernard and Isolde Woittiez (Version: 27 January 2005) The relation between informal care and labour supply: A structural equation model. http://team.univ-paris1.fr/espe2005/papers/woittiez_paper.pdf

Wong Rebeca, Mónica Espinoza, Alberto Palloni (2007) Adultos mayores mexicanos en contexto socioeconómico amplio: salud y envejecimiento; Salud Pública Méx; Vol. 49(sup 4):436-447.

Table 1 Main characteristics of the Mexican Health System

Sector/ Institution	Percentage of population served	Group of population served	Funding/ Finance scheme	Services provided
Ministry of Health	Approximately 40%	Un-insured	Public funds from general taxes. Some public funds from the states.	Ambulatory care at community health centres throughout the country, second and third level hospital and specialized interventions at general and specialized hospitals.
Social Security Institutions: Mexican Social Security Institute, IMSS	Between 35% and 40%	Insured given their formal employment status, through the company they work in.	Three-way funding scheme: a) public funds from general taxes, b) fee from workers/employees, c) fee from employers	The IMSS has a package of coverage schemes the most important of which are: a) sickness and maternity insurance, b) disability, unemployment, old age, and death insurance, c) labour risks insurance, and d) day care centres. Ambulatory care clinics, specialization clinics and hospitals.
Social Security Institutions: Social Security Institute for government employees, ISSSTE	Approximately 10% of the population (10 million workers and their families)	Insured given their employment in federal/state government institutions.	Three-way funding scheme: employer, employee and public funds from general taxes. Government as employer provides this fee and the public funds percentage of the fee, the rest is provided by the employee.	Package of medical insurance, disability, old age and unemployment schemes.
Private sector	Approximately 5%	Those with no social security or public insurance (users of private consultant services) and those with private insurance schemes.	Out-of pocket payments, health insurance policies for major interventions and ambulatory care based on co-payments.	Mainly specialist consultant and hospital services.

Table2. Description of variables and summary statistics

	N	Mean	SD
Co-residents			
more urban (murb)	17979	0.67	0.46
male	17979	0.48	0.49
Financial situation (reference=Good)			
Good	17979	0.20	0.40
financialsituation2 (Fair)	17979	0.65	0.47
financialsituation3 (Bad)	17979	0.14	0.34
Main activity			
Formal work and full time students	17979	0.77	0.41
Housework	17979	0.14	0.34
Did not work	17979	0.07	0.27
Sampled Respondent/Spouse			
Average number of chronic diseases			
chronic disease1 (0=	17571	0.29	0.45
chronic disease2 (0/1)	17571	0.15	0.36
chronic disease3 (1/2)	17571	0.31	0.46
chronic disease4 (3+)	17571	0.22	0.41
Average self-reported health			
self-health1 (Good)	16991	0.26	0.44
self-health2 (Good/Fair)	16991	0.16	0.36
self-health3 (Fair/Poor)	16991	0.40	0.49
self-health4 (Poor)	16991	0.16	0.37
Days in bed – Sick Leave			
sick leave1 (0 days in bed)	17914	0.70	0.45
sick leave2 (1-15)	17914	0.13	0.34
sick leave3 (16-30)	17914	0.13	0.34
sick leave4 (30+)	17914	0.02	0.13
Age group of sampled respondent			
age_r1 (18-49)	17994	0.17	0.37
age_r2 (50/59)	17994	0.34	0.47
age_r3 (60/69)	17994	0.27	0.44
age_r4 (70+)	17994	0.21	0.40
Average nr. of co-residents	17995	3.32	1.79

Table2 (cont) Description of variables and summary statistics

Interaction Terms			
	N	**Mean**	**SD**
More urban			
i_moreurban*ager1	17979	0.18	0.38
i_moreurban*ager2	17979	0.27	0.44
i_moreurban*ager3	17979	0.12	0.33
i_moreurban*ager4	17979	0.09	0.29
i_moreurban*work/student	17979	0.54	0.49
i_moreurban*housework	17979	0.08	0.27
i_moreurban*didnotwork	17979	0.05	0.22
i_moreurban*chronic disease1 (0)	17555	0.19	0.39
i_moreurban*chronic disease2 (0/1)	17555	0.10	0.30
i_moreurban*chronic disease3 (1/2)	17555	0.21	0.41
i_moreurban*chronic disease4 (3+)	17555	0.16	0.37
i_moreurban*sefl-health1	16976	0.19	0.39
i_moreurban*sefl-health2	16976	0.11	0.31
i_moreurban*self-health3	16976	0.27	0.44
i_moreurban*self-health4	16976	0.10	0.30
i_moreurban*sickleave1	17898	0.47	0.49
i_moreurban*sickleave2	17898	0.09	0.29
i_moreurban*sickleave3	17898	0.09	0.29
i_moreurban*sickleave4	17898	0.10	0.10
i_moreurban*no.co-residents	17979	1.10	1.91
Male			
i_male*work/student	17979	0.435	0.49
i_male*housework	17979	0.004	0.06
i_male*didnotwork	17979	0.045	0.20
i_male*chronic diesease1 (0)	17555	0.14	0.35
i_male* chronic disease2 (0/1)	17555	0.07	0.26
i_male*chronic disease3 (1/2)	17555	0.19	0.39
i_male*chronic disease4 (3+)	17555	0.15	0.36
i_male*self-health1 (Good)	16976	0.13	0.33
i_male*self-health2 (Good/Fair)	16976	0.7	0.26
i_male*self-health3 (Fair/Poor)	16976	0.19	0.39
i_male*self-health4 (Poor)	16976	0.08	0.27
i_male*sickleave1	17898	0.34	0.47
i_male* sickleave2	17898	0.06	0.24
i_male* sickleave3	17898	0.06	0.24
i_male* sickleave4	17898	0.009	0.09

Table 3 Probit estimation of being a carer

Number of observations = 16555
Wald chi2(19) = 575.79
Prob > chi2 = 0.0000
Log pseudo-likelihood = -1351.0597
Pseudo R2 = 0.1830

	Coef.	Std. Err.	P>z
more urban	0.1780007	0.0586258	0.002*
Co-residents			
male	0.2297973	0.0575402	0.000*
Financial situation (reference=Good)			
financialsituation2 (Fair)	0.1815619	0.0751817	0.016
financialsituation3 (Bad)	0.2167159	0.0934497	0.020
Main activity (reference= formal employment and full time students)			
Housework	0.2819634	0.0654726	0.000*
Did not work	0.1965327	0.1086243	0.070
Sampled Respondent/Spouse			
Average number of chronic diseases (reference=0)			
chronic disease2 (0/1)	0.2327962	0.0984127	0.018
chronic disease3 (1/2)	0.2725922	0.0797981	0.001*
chronic disease4 (3+)	0.3538593	0.0828752	0.000*
Average self-reported health (ref=Good)			
self-health2 (Good/Fair)	0.3417273	0.1069639	0.001*
self-health3 (Fair/Poor)	0.3194842	0.0889942	0.000*
self-health4 (Poor)	0.5698113	0.0950321	0.000*
Sick Leave (Nr. days in bed, reference=0)			
sickleave2 (1-15)	0.2987668	0.0717238	0.000*
sickleave3 (16-30)	0.5597633	0.0615221	0.000*
sickleave4 (30+)	1.15662	0.1152686	0.000*
Age group of sampled respondent (reference=18-49)			
age_r2 (50/59)	0.0432411	0.1009779	0.668
age_r3 (60/69)	0.2390399	0.0958178	0.013
age_r4 (70+)	0.7379942	0.0924371	0.000*
Average nr. of co-residents	0.0544292	0.0145375	0.000*
_cons	-3.215185	0.1343248	0.000

* significant at 5% level

Table 4 Probit estimation with more urban interaction terms

Number of observations = 16555
Wald chi2(33) = 617.86
Prob > chi2 = 0.000
Log pseudo-likelihood = -1335.7529
Pseudo R2 = 0.1923

	Coeff	Std. Err.	P>z
Co-residents			
male	-0.2384857	0.0577681	0.000*
Financial situation (reference=Good)			
financialsituation2 (Fair)	0.1688086	0.0756253	0.026
financialsituation3 (Bad)	0.2068331	0.0939195	0.028
Main activity (reference= formal employment and full time students)			
Housework	0.1780419	0.1104706	0.107
Did not work	-0.3443067	0.2153436	0.110
Sampled Respondent/Spouse			
Average number of chronic diseases (reference=0)			
chronic disease2 (0/1)	0.2976177	0.160763	0.064
chronic disease3 (1/2)	0.1561501	0.1452685	0.282
chronic disease4 (3+)	0.2219947	0.1510658	0.142
Average self-reported health (ref=Good)			
self-health2 (Good/Fair)	0.0324465	0.2098967	0.877
self-health3 (Fair/Poor)	-0.0119976	0.1529695	0.937
self-health4 (Poor)	0.2643896	0.1687033	0.117
Sick Leave (Nr. days in bed, reference=0)			
sickleave2 (1-15)	0.4670423	0.1385455	0.001*
sickleave3 (16-30)	0.8509856	0.1153724	0.000*
sickleave4 (30+)	1.234271	0.2126399	0.000*
Age group of sampled respondent (reference=18-49)			
age_r2 (50/59)	0.5170776	0.1804772	0.004*
age_r3 (60/69)	0.6342481	0.1745771	0.000*
age_r4 (70+)	0.9829476	0.1637385	0.000*
Average nr. of coresidents	-0.1112806	0.0318466	0.000*
Interaction Terms			
i_moreurban*ager2	-0.6363011	0.191655	0.001*
i_moreurban*ager3	-0.5258672	0.1889095	0.005*
i_moreurban*ager4	-0.3205157	0.1748108	0.067
i_moreurban*housework	0.1422957	0.12791	0.266
i_moreurban*didnotwork	0.1788214	0.2465767	0.468
i_moreurban*chronic disease2 (0/1)	-0.0957299	0.2009392	0.634
i_moreurban*chronic disease3 (1/2)	0.1838112	0.174248	0.291
i_moreurban*chronic disease4 (3+)	0.1985463	0.1805825	0.272
i_moreurban*sefl-health2	0.4136228	0.2387533	0.083
i_moreurban*self-health3	0.430924	0.1800861	0.017
i_moreurban*self-health4	0.4095398	0.1991221	0.040
i_moreurban*sickleave2	-0.2382574	0.1630479	0.144
i_moreurban*sickleave3	-0.3964927	0.1358973	0.004
i_moreurban*sickleave4	-0.0608041	0.2545674	0.811
i_moreurban*no.co-residents	0.0736317	0.0351693	0.036
_cons	-3.084916	0.1248713	0.000

* significant at 5% level

Table 5 Probit estimation with gender (male=1) interaction effects

		Number of observations =	16555
		Wald chi2(29) =	613.26
		Prob > chi2 =	0.000
Log pseudo-likelihood = -1341.2219		Pseudo R2 =	0.189

	Coef.	SE	P>z
more urban	0.1791748	0.0587039	0.002*
Financial situation (reference=Good)			
financialsituation2 (Fair)	0.1803008	0.0752175	0.017
financialsituation3 (Bad)	0.2089735	0.0940097	0.026
Main activity (reference= formal employment and full time students)			
Housework	0.2998218	0.0676048	0.000*
Did not work	0.0539865	0.1423443	0.704
Sampled Respondent/Spouse			
Average number of chronic diseases (reference=0)			
chronic disease2 (0/1)	0.1250003	0.134953	0.354
chronic disease3 (1/2)	0.3954685	0.0989534	0.000*
chronic disease4 (3+)	0.4955152	0.1039593	0.000*
Average self-reported health (ref=Good)			
self-health2 (Good/Fair)	0.3367516	0.1296916	0.009
self-health3 (Fair/Poor)	0.3198988	0.1033982	0.002*
self-health4 (Poor)	0.4768401	0.1139387	0.000*
Sick Leave (Nr. days in bed, reference=0)			
sickleave2 (1-15)	0.3385772	0.0898455	0.000*
sickleave3 (16-30)	0.5915532	0.077113	0.000*
sickleave4 (30+)	1.185817	0.1499341	0.000*
Age group of sampled respondent (reference=18-49)			
age_r2 (50/59)	0.0413765	0.1003935	0.680
age_r3 (60/69)	0.2411866	0.0956524	0.012
age_r4 (70+)	0.7444382	0.092424	0.000*
Average nr. of co-residents	0.0558507	0.0146052	0.000*
Interaction Terms			
i_male*housework	0.2832435	0.2563582	0.269
i_male*didnotwork	0.3053927	0.2186748	0.163
i_male* chronic disease2 (0/1)	0.2002354	0.1803693	0.267
i_male*chronic disease3 (1/2)	0.3310786	0.151221	0.029
i_male*chronic disease4 (3+)	0.3923288	0.1569255	0.012
i_male*self-health2 (Good/Fair)	0.0057742	0.1829361	0.975
i_male*self-health3 (Fair/Poor)	0.0081478	0.1438657	0.955
i_male*self-health4 (Poor)	0.2521595	0.161561	0.119
i_male* sickleave2	0.1050608	0.1472811	0.476
i_male* sickleave3	0.0826478	0.1253136	0.510
i_male* sickleave4	0.1022766	0.2320348	0.659
_cons	-3.309142	0.1312494	0.000

* significant at 5% level

Table 6 Heckman selection model two-step estimation

Number of observations=16555
Censored observations=16216
Uncensored observations=339
Wald chi2(30)=273.65
Prob>chi2=0.000

	Coef.	Std. Err.	P>z
totalcare			
Co-residents			
Main activity (reference= formal employment and full time students)			
Housework	63.83369	26.44093	0.016
Did not work	11.40451	39.07446	0.770
Sampled Respondent/Spouse			
Average number of chronic diseases (reference=0)			
chronic disease2 (0/1)	-82.15679	38.82254	0.034
chronic disease3 (1/2)	-74.15119	32.40594	0.022
chronic disease4 (3+)	-77.07729	34.14896	0.024
Average self-reported health (ref=Good)			
self-health2 (Good/Fair)	-96.69138	44.90362	0.031
self-health3 (Fair/Poor)	-79.409	35.7928	0.027
self-health4 (Poor)	-39.84526	41.43552	0.336
Sick Leave (Nr. days in bed, reference=0)			
sickleave2 (1-15)	40.38132	29.21869	0.167
sickleave3 (16-30)	-7.748318	33.43956	0.817
sickleave4 (30+)	95.42056	59.80177	0.111
Age group of sampled respondent (reference=18-49)			
age_r2 (50/59)	64.62667	38.95528	0.097
age_r3 (60/69)	77.79304	39.03856	0.046
age_r4 (70+)	149.0677	48.75636	0.002
Average nr. of co-residents in the household	-17.4038	5.675215	0.002*
_cons	135.4715	189.5498	0.475
helps			
Co-residents			
male	0.2349922	0.0578709	0.000
Financial situation (reference=Good)			
financialsituation2 (Fair)	0.1710615	0.0757227	0.024
financialsituation3 (Bad)	0.2120837	0.0942361	0.024
Main activity (reference= formal employment and full time students)			
Housework	0.2817402	0.0660347	0.000
Did not work	0.2103869	0.1102436	0.056
Sampled Respondent/Spouse			
Average number of chronic diseases (reference=0)			
chronic disease2 (0/1)	0.2389208	0.1024402	0.020
chronic disease3 (1/2)	0.2838475	0.0818707	0.001*
chronic disease4 (3+)	0.3653174	0.083374	0.000
Average self-reported health (ref=Good)			
self-health2 (Good/Fair)	0.0211347	0.2012552	0.916
self-health3 (Fair/Poor)	-.0560918	0.1523046	0.713
self-health4 (Poor)	0.2118724	0.15449	0.170

Sick Leave (Nr. days in bed, reference=0)			
sickleave2 (1-15)	0.4784749	0.1387675	0.001*
sickleave3 (16-30)	0.8402654	0.1174421	0.000*
sickleave4 (30+)	1.211078	0.20962	0.000*
Age group of sampled respondent (reference=18-49)			
age_r2 (50/59)	0.4519674	0.1823009	0.013
age_r3 (60/69)	0.554684	0.1785227	0.002*
age_r4 (70+)	0.8989254	0.1734821	0.000*
Average nr. of co-residents in the household	0.1125572	0.0318054	0.000*
Interaction Terms			
i_moreurban*ager2	0.5476817	0.1928568	0.005*
i_moreurban*ager3	0.4193716	0.1855949	0.024
i_moreurban*ager4	0.2079503	0.176121	0.238
i_moreurban*sefl-health2	0.4271736	0.225589	0.058
i_moreurban*self-health3	0.492175	0.1735046	0.005
i_moreurban*self-health4	0.4827017	0.1783194	0.007
i_moreurban*sickleave2	0.2474845	0.1607518	0.124
i_moreurban*sickleave3	0.3789443	0.1374412	0.006
i_moreurban*sickleave4	0.0295302	0.2485427	0.905
i_moreurban*no.co-residents	0.075676	0.035094	0.031
_cons	-3.08344	0.1513973	0.000
mills lambda	25.95869	57.10292	0.649
rho	0.1688		
sigma	153.78236		
lambda	25.958685	57.10292	

* significant at 5% level

Table 7 Probit model with sample selection

Number of observations = 16555
Censored observations 16216
Uncensored observations 339
Log likelihood = -1533.599
Wald chi2(15) = 51.29
Prob>chi2 =0.000

	Coef.	Std. Err.	P>z
high care			
Co-residents			
Main activity (reference= formal employment and full time students)			
Housework	0.5372181	0.2482784	0.030
Did not work	0.3223094	0.3392825	0.342
Sampled Respondent/Spouse			
Average number of chronic diseases (reference=0)			
chronic disease2 (0/1)	0.9412542	0.3707104	0.011
chronic disease3 (1/2)	-0.372956	0.3021545	0.217
chronic disease4 (3+)	0.4414166	0.3223037	0.171
Average self-reported health (ref=Good)			
self-health2 (Good/Fair)	-1.237558	0.4411384	0.005*
self-health3 (Fair/Poor)	-0.853647	0.3434723	0.013
self-health4 (Poor)	0.5472115	0.4022621	0.174
Days in bed – Sick leave (ref=0)			
sick leave2 (1-15)	0.1967396	0.2707649	0.467
sick leave3 (16-30)	0.1751544	0.3224337	0.587
sick leave4 (30+)	0.7189447	0.5881204	0.222
Age group of sampled respondent (reference=18-49)			
age_r2 (50/59)	0.773018	0.4157626	0.063
age_r3 (60/69)	0.7918414	0.4046658	0.050
age_r4 (70+)	1.205319	0.4930606	0.015
Average nr. of co-residents in the household	0.1398993	0.0513964	0.006
_cons	0.2036644	1.908457	0.915
helps			
Co-residents			
male	0.2348624	0.0584087	0.000*
Financial situation (reference=Good)			
financialsituation2 (Fair)	0.1709187	0.0762132	0.025
financialsituation3 (Bad)	0.2120514	0.094253	0.024
Main activity			
Housework	0.28181	0.0661717	0.000
Did not work	0.2104121	0.110253	0.056
Sampled Respondent/Spouse			
Average number of chronic diseases (reference=0)			
chronic disease2 (0/1)	0.2389231	0.1024408	0.020
chronic disease3 (1/2)	0.2838549	0.0818719	0.001*
chronic disease4 (3+)	0.3653377	0.0833824	0.000*
Average self-reported health (ref=Good)			
self-health2 (Good/Fair)	0.0214785	0.2023314	0.915
self-health3 (Fair/Poor)	0.0560151	0.1524032	0.713
self-health4 (Poor)	0.2118768	0.1545128	0.170
Days in bed – Sick leave (ref=0)			

sick leave2 (1-15)	0.4785896	0.138953	0.001*
sick leave3 (16-30)	0.8406485	0.1196661	0.000*
sick leave4 (31+)	1.210997	0.2097006	0.000*
Age group of sampled respondent (reference=18-49)			
age_r2 (50/59)	0.4518935	0.182393	0.013
age_r3 (60/69)	0.5547141	0.1785595	0.002*
age_r4 (70+)	0.8993227	0.1751434	0.000*
Average nr. of co-residents	0.1127252	0.03338	0.001*
Interaction terms			
i_moreurban*ager2	0.5475448	0.1930666	0.005*
i_moreurban*ager3	0.4193769	0.1856182	0.024
i_moreurban*ager4	0.2084755	0.1789553	0.244
i_moreurban*sefl-health2	0.4266514	0.2277867	0.061
i_moreurban*self-health3	0.4920259	0.1737633	0.005*
i_moreurban*self-health4	0.4826066	0.1784327	0.007
i_moreurban*sickleave2	0.2476108	0.1609395	0.124
i_moreurban*sickleave3	0.3795016	0.1414433	0.007
i_moreurban*sickleave4	0.0293862	0.2487074	0.906
i_moreurban*no.co-residents	0.075887	0.037326	0.042
_cons	-3.083359	0.1514738	0.000*

* significant at 5% level

	Coef.	**Std. Err.**	**P>z**
athrho	0.0096069	0.5781702	0.987
rho	0.0096066	0.5781169	0.8154
LR test of	indep. eqns	(rho=0):	
chi2(1)	0.000	Prob>chi2	0.9867