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Hypertension dynamics in the elderly population

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Abstract

Chronic health diseases are the leading cause of mortality, not only in developed countries, but also in developing countries. However, due to misperception and limited resources, the elderly in developing countries, who most suffer from chronic health diseases, have not received much attention so far. This paper examines the prevalence of hypertension and its dynamics among the elderly, and attempts to identify its determinants, using Indonesian Family Life Survey. The findings suggest that childhood nutrition, risky behaviors, and other factors that are captured by individual fixed effects are important in driving the strong persistence. Conditioning on fixed effects, a history of having hypertension has a very little impact on current hypertension. The results also find that less educated people show more persistence of hypertension.

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1. Introduction

It is well documented that chronic health diseases are the most common cause of mortality in developed countries. However, it is little-known that these diseases also cause the most deaths in developing countries (WHO, 2011). Infectious diseases and starvation, commonly believed as the leading cause of deaths in low income countries, have become less serious in developing countries. Infectious diseases are more prevalent among children, as their immune systems and organs are not fully developed, whereas chronic diseases are more common among the elderly (NIA, 2011). Due to this misperception, the vast majority of research on health issues in developing countries has been focusing on early childhood, such as whether children could recover from the negative shocks incurred at earlier ages (eg. Habicht et. al, 1995; Adair, 1999; Mortorell, 1995, 1999; Hoddinott and Kinsey, 2001; Fedorov and Sahn, 2005; Alderman et.al, 2006; Mani, 2012). However, studies on elderly health issues in developing countries are very rare.

In this paper, we examine how strong the prevalence of hypertension persists over time among the elderly and attempt to identify its determinants, using Indonesian Family Life Survey (IFLS). Hypertension is a chronic medical condition of having elevated blood pressure and indicates the risk of coronary heart disease, including stroke, heart attacks, and heart failure. Hypertension is specifically chosen for this study since it is the most serious and common chronic disease in Indonesia.[1] Some might think that examining the persistence of chronic diseases is contradictory as chronic diseases are defined as long-lasting diseases that persist over 3 months. Hypertension in this paper, however, is constructed using the blood pressure measurements at each survey round and if the respondent had taken proper medications between surveys and lowered his blood pressure to the normal level, he is treated as being cured and no longer hypertensive in our results. Hence, the strong persistence in hypertension here can be interpreted as either the influence of a past history of hypertension with no proper intervention between surveys (a strong state dependence), the impact of nutrition and health status from childhood or early adulthood, the result of weak genetic endowments, or the impact of current health inputs and behaviors that can be captured by current socio-economic status (SES).

Although it is very rare to find health studies focusing on the elderly in developing countries, there have been several attempts to study this issue in developed countries. Current health can be expressed as a function of past health and current SES. For instance, Adams et al. (2003) use (ordered) probit models and examine the impact of past health and SES on the future onsets of several diseases among the American elderly. Smith (2007) also uses probit models and finds that the future onsets of disease are strongly associated with past self-assessed general health status and chronic health conditions. However, simple OLS regression or probit model would bias the result, as the past health on the right hand side will be correlated with unobserved factors such as genetic endowments. To address this issue, this paper uses the first difference two-step generalized method of moments (FD-GMM), proposed by Arellano-Bond (1991).

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[1] Witoelar et al. (2012) find that the prevalence of hypertension (over 50%) is much higher than that of other chronic diseases (lower or around 30%) in Indonesia.

2. Data and Methodology

This paper uses the 1997, 2000 and 2007 waves of the Indonesian Family Life Survey(IFLS). The IFLS is a large-scale socio-economic survey that collects extensive information at the individual, household, and community levels, including both economic and non-economic indicators. The attrition level is very low in IFLS because it has tracked individuals who had moved or split off from the origin households. In particular, of those individuals who were interviewed in IFLS1, 88% were followed up in IFLS4.

In order to focus on the elderly, respondents 50 years or older in 2007 (40 years or older in 1997) are chosen as our sample. For hypertension, we use the information on blood pressure measurements. Blood pressure was measured three times in 2007 and only once in the earlier waves by trained nurses. The average of last two measurements is used to construct hypertension 2007, as people tend to get nervous at first which causes false high blood pressure. Following the standard definition of the WHO, the dummy variable is constructed with 1 for hypertension (those whose systolic is greater than or equal to 140 or diastolic is greater than or equal to 90), and 0 otherwise.

Table 1: Summary Statistics1

	MEN				WOMEN			
	1997	2000	2007	Obs	1997	2000	2007	Obs
Hypertension	0.33	0.37	0.47	2158	0.38	0.41	0.55	2653
	(0.471)	(0.482)	(0.499)		(0.486)	(0.492)	(0.498)	

Standard deviations are reported in parenthesis.

To check if there is any persistence in hypertension, a simple transition matrix is presented below.

Table 2: Transition Matrix

2007

		Men		
		No	Yes	Total
2000	No	970 (70.8%)	400 (29.2%)	1,370
	Yes	175 (22.21%)	613 (77.79%)	788
	Total	1,145	1,013	2,158
	Corr(H_{07}, H_{00})	0.4688		

2000

		Men		
		No	Yes	Total
1997	No	1,139 (78.93%)	304 (21.07%)	1,443
	Yes	231 (32.31%)	484 (67.69%)	715
	Total	1,370	788	2,158
	Corr(H_{00}, H_{97})	0.4558		

2007

		Women		
		No	Yes	Total
2000	No	1000 (63.65%)	571 (36.35%)	1,571
	Yes	151 (18.21%)	931 (81.79%)	1,082
	Total	1,197	1,456	2,653
	Corr(H_{07}, H_{00})	0.5197		

2000

		Women		
		No	Yes	Total
1997	No	1,291 (78.72%)	349 (21.28%)	1,640
	Yes	280 (27.64%)	733 (72.36%)	1,013
	Total	1,571	1,082	2,653
	Corr(H_{00}, H_{97})	0.5049		

The covariances and correlations between past and current hypertension are computed as follows, given that hypertension is binary.[2]

$$
\begin{aligned}
Cov\left(Y_t, Y_{t-1}\right) &= P\left(Y_t = 1, Y_{t-1} = 1\right) - P\left(Y_t = 1\right) P\left(Y_{t-1} = 1\right) && (1) \\
&= \frac{n_{11}}{n_{11} + n_{01} + n_{10} + n_{00}} - \frac{n_{11} + n_{01}}{n_{11} + n_{01} + n_{10} + n_{00}} \frac{n_{11} + n_{10}}{n_{11} + n_{01} + n_{10} + n_{00}} && (2)
\end{aligned}
$$

where n_{ij} is the number of individuals whose $Y_{t-1} = i$ and $Y_t = j$. The matrix suggests a very strong persistence in the prevalence of hypertension; almost 80% of the elderly turn out to be still hypertensive even after 3 or 7 year later, when measured in the next survey round. The question is what are the factors driving this strong persistence in hypertension? To disentangle separate influences, this paper estimates the dynamic conditional health demand function.

$$H_{it}^* = \beta_H H_{it-1}^* + \sum_{j=1}^{S} \alpha_j X_{jit} + \sum_{j=1}^{R} \gamma_j Z_{ji} + \varepsilon_i + \varepsilon_h + \varepsilon_c + \varepsilon_{it} \tag{3}$$

H_{it}^* and H_{it-1}^* are the true health status of older adult i as measured by hypertension at time t and t-1, respectively. However, we observe $H_{it} = H_{it}^* + \eta_i$ instead, where η_i is measurement error.[3] After substituting H_{it} into equation (3), the health demand function becomes:

$$H_{it} = \beta_H H_{it-1} + \sum_{j=1}^{S} \alpha_j X_{jit} + \sum_{j=1}^{R} \gamma_j Z_{ji} + \varepsilon_i + \varepsilon_h + \varepsilon_c + \varepsilon_{it} - (1 - \beta)\eta_i \tag{4}$$

where Xs are time-varying regressors such as respondent's age and household incomes. Zs are time-invariant regressors which include respondent's gender and education.[4] Time-invariant unobservables are captured by ε_i, ε_h and ε_c; ε_i captures individual specific unobservables such as genetic endowment and childhood health/nutritional status, ε_h represents household specific unobservables, and ε_c captures community unobservables. ε_{it} captures time varying unobservables such as individual health shocks or income shocks that are not captured by per capita household expenditure (PCE) at time period t. Simply running OLS regression would bias our results as the one-period lagged health status on RHS is correlated with both time-invariant and time-varying unobservables as well as measurement errors. In order to address time-invariant unobservables, I take first-difference. The equation becomes as follows.

$$\Delta H_{it} = \beta_H \Delta H_{it-1} + \sum_{j=1}^{S} \alpha_j \Delta X_{jit} + \Delta \varepsilon_{it} \tag{5}$$

The time-invariant unobservables and measurement errors can be removed by first-differencing. However, the endogeneity issue is still a problem since taking first difference cannot remove

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[2] Corr(Y_t, Y_{t-1})=Cov(Y_t, Y_{t-1})/Std.Dev(Y_t)*Std.Dev(Y_{t-1})

[3] Measurement errors can be caused by false positives and this cannot be corrected in the 1997 and 2000 IFLS data. However, Measurement errors are assumed to be time-invariant in this paper. This assumption can be relaxed but it requires more survey rounds. When measurement errors are time-varying, H_{it-2} can no longer be a valid IV as it is correlated with error terms in the second stage regression. In such cases, further lagged endogenous regressors such as H_{it-3}, H_{it-4}.. can be used as IVs.

[4] Unlike other papers, the education level of the respondents is treated as time-invariant since the sample includes only the elderly who are 50 years and older.

time-varying unobservables. ΔH_{it-1} can still correlate with $\Delta\varepsilon_{it}$. Therefore, I use first-difference generalized method of moments(FD-GMM) to address both issues at once.

Following Arellano-Bond (1991), the two-period lagged hypertension is used as one of the instruments along with other IVs such as mother/father's education and health status and respondent's birth cohort. For parents' health status, dummy variables are constructed, one for each biological parent, for being dead in 2007, having difficulties with activities of daily living (ADLs), and poor general health status (GHS). The parents' death dummy variables are equal to 1 if the parent was dead at the time of the survey in 2007. Given that the respondents with the age of 50 and above are chosen in our sample, very few mother/father were still alive in 2007, so this dummy indicates a particularly healthy parent if it is 0. The GHS variable is equal to 1 if mother/father has poor GHS and 0 otherwise, and the difficulties with ADLs is 1 if mother/father has any problems with ADLs and 0 otherwise. The respondent's birth cohort is constructed by using respondent's age in 2007 to capture different experiences with respect to health, economic and social environments. To be valid, IVs should be strongly correlated with the endogenous regressor and uncorrelated with the first differenced error terms in the second stage regression. Ever since they were introduced by Arellano and Bond, further lagged endogenous regressors have been widely used as valid IVs for an endogenous regressor. With the assumption of error terms being serially uncorrelated[5], H_{it-2} is correlated only with ΔH_{it-1} but not with $\varepsilon_{it} - \varepsilon_{it-1}$. Biological mother/father's characteristics are also strongly correlated with the first-differenced lagged health status. Kim et al. (2011) show that having a biological mother with poor general health is correlated with the changes in prevalence of hypertension over time, specifically moving from no hypertension to having hypertension for elderly women. Respondent's birth cohort is also valid in the sense that younger respondents were more likely to have more opportunities for higher education and better health infrastructures due to the rapid development during the past few decades and therefore, they are expected to have better health outcomes.

3. Results

The results are estimated separately for elderly men and women since the impact of various factors or health transitions can be different depending on gender. The regression includes an interaction between the place of residence and survey year dummy variables to control for time-varying community characteristics such as changes in prices of consumption goods or environment/facitilties. It is reasonable to worry that the place of residence dummy variables after first-differencing might capture migrations. If someone decided to move closer to the hospital after getting hypertension, the previous unobserved health shock could be correlated with the current place of residence and in turn, cause endogeneity issues. Therefore this paper uses the one-period lagged information on the place of residence instead.[6]

The main results are summarized in Table 3. The first two columns show the estimation results from a standard OLS regression, without first-differencing. The coefficients on lagged hypertension, β_H, are 0.457 for men and 0.440 for women respectively. This can be inter-

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[5] This can be tested using the Hansen J statistics, a test of over-identifying restrictions and will be reported in the main result table.

[6] The equation is written as $\Delta H_{it} = \beta_H \Delta H_{it-1} + \sum_{j=1}^{S} \alpha_j \Delta X_{jit} + dist._{it-1} * Survey\, year + \Delta\varepsilon_{it}$.

Table 3: Estimation Results

	OLS		FD-OLS		FD-GMM	
	Men	Women	Men	Women	Men	Women
Lagged Hypertension	0.457***	0.440***	-0.434***	-0.462***	0.0894**	0.179***
	(0.0146)	(0.0128)	(0.0212)	(0.0193)	(0.0448)	(0.0449)
45-50 (lagged age)	0.0395*	0.0763***				
	(0.0206)	(0.0186)				
50-55	0.0700***	0.106***				
	(0.0252)	(0.0227)				
55-60	0.0897***	0.129***				
	(0.0307)	(0.0260)				
60-65	0.131***	0.192***				
	(0.0382)	(0.0339)				
65-	0.114**	0.251***				
	(0.0494)	(0.0438)				
At least some primary	-0.0101	0.0265				
	(0.0274)	(0.0220)				
Completed primary	0.0139	0.0709*				
	(0.0405)	(0.0385)				
Completed Jr. High	0.0494	0.0751				
	(0.0569)	(0.0563)				
Completed High & more	0.0943	0.118				
	(0.0740)	(0.0736)				
Yrs of edu * lagged age	-0.000101	-0.000219**	-0.000335	-0.00137	-0.00124	-0.00153
	(0.0000996)	(0.000105)	(0.000862)	(0.000886)	(0.000957)	(0.00101)
Duration	0.00589*	0.00161	0.00837*	-0.00514	0.00646	-0.00395
	(0.00315)	(0.00519)	(0.00489)	(0.00434)	(0.00564)	(0.00486)
Duration * lagged age	0.0000214	-0.0000297	0.0000323	-0.00000338	0.00000413	-0.0000146
	(0.0000248)	(0.0000219)	(0.0000215)	(0.0000194)	(0.0000234)	(0.0000222)
Lagged log (PCE)	0.00662	0.0146	0.0195	-0.00241	0.0103	-0.00261
	(0.00974)	(0.00901)	(0.0148)	(0.0128)	(0.0164)	(0.0160)
Lagged dist. * year dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	2158	2653	2158	2653	2158	2653
F stat on excluded IVs					26.581	29.580
Hansen J statistics					35.148	32.303
(p-value)					(0.166)	(0.307)

Source: IFLS 1997, 2000 and 2007 *** significant at 1%, ** significant at 5%, * significant at 10%

Robust standard errors adjusted for clustering at the community level are reported in parenthesis.

Hypertension: 1 for those whose systolic $\geq$ 140 or diastolic $\geq$ 90

Dummy variables are included to capture missing values for parent's education, GHS, ADL and household's PCE.

In FD-GMM, $hypertension_{t-2}$, respondent's edu, parents' health and edu, and birth cohort are used as IVs.

preted as the elderly men (women) being about 46 (44)percentage points more likely to be hypertensive in the next period if they were before, as compared to those without hypertension in the past. The OLS estimates imply a strong state dependence in hypertension, which is consistent with the transition matrix. However, the OLS regression before taking first-difference does not address any endogeneity problems and therefore, would bias our results.

First-differencing can partially address the endogeneity issue by removing time-invariant unobservables.The OLS estimates after taking first-difference are -0.434 for men and -0.462 for women, indicating that those with hypertension tend to have a smaller persistence of disease in the subsequent period. Compared to the standard OLS estimates, the magnitude of the coefficients after first-differencing becomes much lower and even the signs change. As discussed earlier, first-differencing only corrects for time-invariant unobservables, and hence the estimates are still biased in this case. Time-varying unobservables, ε_{it}, capture time-varying health shocks or income shocks that are not explained by PCE. For instance, if there were educational or awareness campaigns or news regarding the seriousness of chronic diseases including hypertension (that were not observed by researchers), people would pay more attention to their health and would be more likely to get diagnosed and cured. This would cause a downward bias in our coefficients on past hypertension.

In order to deal with both time-invariant and time-varying omitted variables, I adopt the first-difference two-step generalized method of moments (FD-GMM).[7] The column 5 and 6 report the estimate results from FD-GMM. The coefficients on lagged hypertension are estimated at 0.0894 for men and 0.179 for women. This suggests that compared to those who did not have hypertension in the past, men with a history of hypertension are only about 9 percentage points more likely to have hypertension in the subsequent period and for women, it is 18 percentage points more likely. Given that β_H becomes much lower in FD-GMM estimation, a history of hypertension seems to have a very little impact on current hypertension, once conditioning on individual fixed effects. This also implies that time-invariant unobservables removed by first-differecing play very important roles in determining current health. The β_H from the standard OLS regression was upward biased because a history of hypertension is most likely to be correlated with time-invariant unobservables such as genetic endowments, childhood nutrition, risky behaviors that were formed at earlier ages and continued for decades consistently, etc. For instance, Klatsky et al. (1977) and Marmot et al. (1994) demonstrate the positive relationship between alcohol consumption and blood pressure elevation. The association between malnutrition/weak genetic endowment (e.g. low birth weight) and hypertension in later life has also been well documented (Huxley et al. 2000; Mi et al. 2000). After netting these influences out, there is very little correlation left between past and current hypertension.

To check the validity of IVs, Hansen J-statistics and F-statistics on excluded IVs are reported in Table 3. The specification test for lack of serial correlation in the first-difference residual proposed by Arellano-Bond (1991) cannot be used here because it needs at least five survey rounds. In such cases, Arellano and Bond propose the Hansen J statistic, a test for over-identifying restrictions as an alternative test. Therefore this is a joint test to

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[7] Two-step GMM uses the optimal weighting matrix and hence, it is more efficient than 2SLS. Unlike 2SLS, two-step GMM accounts for the case with error terms being heteroskedastic.

check both serial correlation of the error term and the correlations between instruments and error-terms. The p-values are reported as 0.166 for men and 0.307 for women, suggesting that all instruments are orthogonal to the error term and that no serial correlations between error-terms exist. F-statistics on the excluded IVs are 26.581 and 29.580 for men and women respectively, indicating strong correlations between the set of IVs and the endogenous regressor.[8]

The regressions include the set of individual and household characteristics such as respondent's age and the levels of education.[9] They are controlled as categorized dummy variables to capture potential non linearities. In the standard OLS regression, one's age is significantly related to the current hypertension but education is not.[10] The interaction between age and the years of education captures the differential impact of education among age groups. The coefficient is negative for women in the standard OLS specification, indicating that the higher the education, the lower the chance of having hypertension in the subsequent period among older cohorts. However, it becomes insignificant in the FD-GMM specification. IFLS is not conducted annually and the gaps between consecutive surveys are not even. Following Hoddinot and Kinsey (2001), duration, the period lengths in months between two consecutive surveys is included in the regression and it turns out to be insignificant in all specifications.

Unfortunately, this paper cannot provide precise information on what channel or factors affect current hypertension, since many time-invariant variables are captured by fixed effects and are swept away after first-differencing. In an effort to disentagle the fixed effect, I disaggregate our sample by the levels of education. The results are reported in Table 4.

Table 4: Disaggreated Groups by Education

	Men		Women	
	Coeff.	N	Coeff.	N
Education year < 9	0.088**	1597	0.174***	2264
	(0.052)		(0.048)	
Education year ≥ 9	-0.238	561	0.332	389
	(0.151)		(0.669)	

*** significant at 1%, ** significant at 5%, * significant at 10%

Interestingly, the results find that the less educated group (less than 9 years of schooling) shows a stronger persistence in hypertension (9 percentage points more likely for men, 17 for women) while those with higher education (more than or equal to 9 years of schooling) have no differences compared to those with no history of hypertension. The less educated group might not be as knowledgable as the higher educated group in terms of the benefit of healthy diet and exercise, may not visit doctors often, or may not even be aware that they have hypertension and should be treated.

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[8] F-statistics are larger than 10, the rule of thumb values suggested by Staiger and Stock

[9] The summary statics are reported in the appendix table A1.

[10] Age dummy variables are dropped in the other specifications as the information is overlapped with the duration after taking first difference.

4. Robustness Check

One of the challenges of using panel data is sample attrition. In our case, if the attrition is the result of respondent's sickness (i.e. if a respondent had to go to see a doctor because of his hypertension at the time of survey or is too ill to be interviewed), our sample would include only healthy elders. To check if the attrition correlates with respondents' previous hypertension status, I use a linear probability model proposed by Fitzgerald et al.(1998). The results are presented in the appendix table A2. The dependent variable is attrition, coded as 1 if respondents attrit in the further waves and 0 otherwise. For both men and women, the results suggest no correlation between hypertension and attrition, indicating there is no systematic pattern in attrition in this study.

5. Conclusion

This paper attempts to shed light on a disregarded, yet important issue in developing countries; elderly health. Due to limited resources and misperception, the elderly's well-being in developing countries has not received much attention so far. Research on elderly health can contribute to better policy implications and improvements of well-being among older adults, especially when resources are limited. This study can be a good start. Although the study cannot exactly point out which factors drive the persistence in hypertension, the findings suggest that individual fixed effects capturing childhood nutrition, risky behaviors, etc play important roles. The results also show that hypertension is more likely to persist in the less educated group. These findings together suggest that the policy on elderly health should be targeted towards the group with lower education and should be addressed especially at earlier stages of their lives. Witoelar et al. (2012) show that there is serious under-diagnosis in hypertension in Indonesia, which is strongly correlated with SES. The public health system in Indonesia has been set up to focus mainly on mother/child and infectious diseases and has not been able to keep up with the rapid increase in the elderly population. Given that this study considers those whose blood pressure gets back to normal after medication as being cured and no longer hypertensive, and a stronger persistence exists among the less educated group, it is very likely that not seeing a doctor and not being diagnosed is an important component of the individual fixed effects here. As a future extension, I plan to include community specific characteristics such as the number of hospitals, health posts, the number of visits of nurses at the community level, etc. This should provide support to this hypothesis. Another possible extension would be to consider other health measures, such as body mass index (overweight, underweight), lung capacity, general health status, hemoglobin level and see if the same patterns exist.

However, even without being able to disentangle the components of individual fixed effects, we believe our results are important and suggestive of the true dynamics of health transition for the elderly in developing countries.

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Appendix

Table A.1: Summary Statistics2

Variables	Description	MEN		WOMEN	
		Mean	Std. Dev	Mean	Std. Dev
Respondent's Edu	At least some primary	0.30	(0.458)	0.30	(0.458)
	Completed primary	0.29	(0.455)	0.18	(0.388)
	Completed Jr. H	0.09	(0.291)	0.07	(0.247)
	Completed High and more	0.16	(0.367)	0.08	(0.277)
Resp's yrs of Edu		5.58	(4.459)	3.56	(4.133)
Father's Education	At least some primary school	0.09	(0.284)	0.07	(0.252)
	Completed primary school	0.25	(0.43)	0.24	(0.428)
	Completed junior high school and more	0.06	(0.229)	0.05	(0.22)
Mother's Education	At least some primary school	0.07	(0.252)	0.05	(0.227)
	Completed primary school	0.17	(0.374)	0.16	(0.365)
	Completed junior high school and more	0.02	(0.14)	0.02	(0.143)
Father's Health	Death =1 if dead in 2007	0.95	(0.221)	0.94	(0.233)
	ADL problem = 1 if need help with basic personal needs now or before death	0.23	(0.421)	0.23	(0.422)
	GHS = 1 if Somewhat unhealthy or very unhealthy now or before death	0.50	(0.5)	0.47	(0.499)
Mother's Health	Death =1 if dead in 2007	0.83	(0.377)	0.83	(0.376)
	ADL problem = 1 if need help with basic personal needs now or before death	0.25	(0.432)	0.25	(0.434)
	GHS = 1 if Somewhat unhealthy or very unhealthy now or before death	0.47	(0.499)	0.44	(0.496)
Birth Cohorts	born before 1932	0.12	(0.323)	0.11	(0.318)
	born between 1932 and 1936	0.11	(0.314)	0.10	(0.302)
	born between 1937 and 1941	0.15	(0.359)	0.16	(0.37)
	born between 1942 and 1946	0.15	(0.355)	0.16	(0.366)
	born between 1947 and 1951	0.22	(0.415)	0.20	(0.396)
Observations		2351		2768	

Source: IFLS 1997, 2000 and 2007

Table A.2: Sample Attrition

		Attrition = 1	
		Men	Women
Respondent	Hypertension 1997	0.000212	0.00346
		(0.00851)	(0.00630)
	Age 1997	-0.000346	-0.000233
		(0.000535)	(0.000389)
	Years of Edu	-0.00159	0.000604
		(0.00132)	(0.00123)
Mother	At least some primary	0.00951	-0.0160
		(0.0180)	(0.0145)
	Completed primary	0.0130	-0.0150
		(0.0137)	(0.0106)
	Completed Jr. H or more	0.0793**	0.0460*
		(0.0334)	(0.0259)
	Poor GHS	0.0253**	-0.0111
		(0.0106)	(0.00793)
	Difficulties with ADLs	0.00658	0.00632
		(0.0119)	(0.00872)
	Dead in 2007	-0.00383	0.00551
		(0.0118)	(0.00865)
Father	At least some primary	0.00381	0.0146
		(0.0162)	(0.0132)
	Completed primary	0.00807	0.0104
		(0.0123)	(0.00942)
	Completed Jr. H or more	0.0323	0.0150
		(0.0218)	(0.0178)
	Poor GHS	-0.00389	0.00787
		(0.0105)	(0.00795)
		0.000755	-0.00565
	Difficulties with ADLs	(0.0122)	(0.00900)
		-0.0282	-0.00437
		(0.0181)	(0.0132)
	Dead in 2007	-0.00323	0.00930**
		(0.00541)	(0.00402)
	Rural	-0.00238	0.00735
		(0.00854)	(0.00644)
	Sample Size	2258	2776

Source: IFLS 1997, 2000 and 2007

*** significant at 1%, ** significant at 5%, * significant at 10%