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Socioeconomic Success and Health in Later Life

Evidence from the Indonesia Family Life Survey

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Socioeconomic Success and Health in Later Life:

Evidence from the Indonesia Family Life Survey

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Abstract

Indonesia has been undergoing a major health and nutrition transition over the past twenty or more years and there has begun a significant aging of the population as well. In this paper we focus on documenting major changes in the health of the population aged 45 years and older, since 1993. We use the Indonesia Family Life Survey (IFLS), a large-scale, broad-based panel survey of households and individuals, covering 4 full waves from 1993 to 2007/8. Much of the changes can be seen as improvements in health, such as the movement out of undernutrition and communicable disease as well as the increasing levels of hemoglobin. On the other hand, other changes such as the increase in overweight and waist circumference, especially among women, and continuing high levels of hypertension that seems to be inadequately addressed by the health system, indicate that the elderly population in Indonesia is increasingly exposed to higher risk factors that are correlated with chronic problems such as cardiovascular diseases and diabetes.

In addition to documenting long-run changes in health and its distribution among the elderly Indonesian population, we examine correlations between socio-economic status, principally education and percapita expenditure, and numerous health outcome and behavioral variables. We find generally strong correlations between our health variables and SES and find in particular, the schooling plays a role in reducing the adverse health effects of aging. We also find that for hypertension in particular, that there is a very large degree of underdiagnosis in this population, one that is weakly correlated with SES. This result raises serious questions regarding the ability of the health system in Indonesia to cope with the rapid aging of the population and the transition from infectious to chronic diseases.

1. Introduction

Indonesia has been undergoing a health and nutrition transition over the past 20 years and more. Overall, health of the population has been improving, as indicated by a continuing rise in attained adult heights for men and women over the entire 20th century (heights of both men and women have been increasing by about 1 cm per decade over this period, Strauss and Thomas, 1995; Strauss et al, 2004a). In Indonesia, infectious diseases caused 72 percent of all deaths in 1980; by 1992, just over half of the country's deaths were caused by non-infectious conditions (Indonesian Public Health Association, 1993). As part of the reason for the increase in deaths from chronic conditions, body mass indices (BMI) have been rising for middle aged people and the elderly, as has been noted more generally in Asia (see for example, Popkin, 1994; Monteiro et al., 2004; Strauss et al., 2004; and Strauss and Thomas, 2008). In Indonesia, body mass among the aged population has been rising rapidly, especially for women; so too has waist circumference. On the other hand, hemoglobin levels have also been rising and from low levels, leading to improved health. Yet other health measures have been fairly steady in IFLS, including the prevalence of hypertension, the degree to which older Indonesians have difficulties with activities of daily living (ADLs) and a measure of self-reported general health. So in terms of measures of health outcomes, while some trends seem upwards, specifically the movement out of undernutrition and communicable diseases, there seems at the same time to have been to have been a movement towards more risk factors that are likely to lead to future chronic problems, but not universally so. Related to this, for men, is the extremely high rate of current smoking, which is not showing a downwards trend as yet.

In this paper we document the health and nutrition transition that the elderly population in Indonesia has undergone in the fifteen years between 1993 and 2008, using the four full waves of the Indonesia Family Life Survey (IFLS).[1] This period spans a period of rapid economic growth from 1993 to 1997, a major financial crisis starting at the end of 2007 going thru 1998 and 1999, and a major economic expansion starting in 2000, continuing through early 2008. IFLS is uniquely suited to look at changes over time, both for age groups and for birth cohorts in Indonesia, as it is a panel survey covering most of the country. Indonesia, like other developing countries in Asia and Latin America has been aging rapidly. In 1980 only 3.4% of the population was 65 or older, by 2010 it is projected to be 6.1% and by 2040 14.7% (Kinsella and He, 2009). The population 65 and older is projected to double between 2000 and 2020 and again by 2040. We examine the IFLS sample 45 years and older in each of the four waves, pretending that we have a series of independent cross-sections. Forty-five years is chosen because it corresponds to early retirement age in Indonesia and is the age cutoff used in the new Health and Retirement Study type surveys that are being done in Asia.[2]

We focus in this paper on examining changes over time for a series of health outcomes and behaviors: using both biomarkers and self-reported measures. The health outcomes that we focus on are body mass index (BMI), waist circumference (a measure of body fat, given BMI), blood hemoglobin, hypertension, ADLs, IADLs, cognition measured by word recall, an index of depression (the short CES-D), and a measure of general health. This is a much broader set of health indicators than is usually analyzed, in large part because such a rich set of health data are not usually available in broad-purposed socio-economic surveys. We also examine current smoking and two measures of physical activity.

[1] IFLS1 was fielded in 1993, IFLS2 in 1997, IFLS3 in 2000 and IFLS4 in 2007/8.

[2] These are the China Health and Retirement Longitudinal Study (CHARLS), the Korean Longitudinal Study of Aging (KLoSA) and the Longitudinal Study of Aging in India (LASI).

In addition to looking at trends in IFLS, we examine the correlations between these health outcomes and behaviors, and a series of socio-economic status (SES) variables: own education and log of percapita expenditure (pce). In all cases we examine the data separately for men and women and include age, period and cohort effects (normalized).

We find that the nutrition transition has progressed strongly in Indonesia over the fifteen year period, 1993-2008. Large increases in overweight have occurred for both men and women over 45 years. For women a full 33% are now overweight, for men 10 percentage points less. The other side of the coin, underweight has dramatically decreased, although among the current older population it is still a problem. Related to nutrition, blood hemoglobin has improved over this period, especially since 2000. This is very good since low hemoglobin has long been a major problem in the country. On the other hand, hypertension has been constant over the period since 1997, since IFLS has been measuring it. The number of ADLs that respondents have difficulty in doing has stayed roughly constant since 1993, with some ups and downs. Finally self-assessed general health has stayed roughly constant over this period. This may mean that respondents are not yet feeling ill effects from becoming overweight.

We find strong, positive correlations between SES and good health outcomes, in every case but hypertension. We recognize that causality runs both ways. We allow for interactions between one such SES variable, education, and age, and find that education tends to suppress the negative impact of age on many health outcomes, suggesting that part of the correlation we find between SES and health is causal, running from SES to health. This is perhaps one of the strongest results in this paper. This result is reinforced by the interactions between schooling and age in correlations with health inputs and behaviors, like smoking and physical activity.

For hypertension we have data not only on measured prevalence, but also on doctor diagnosis. We find a very high level of underdiagnosis of hypertension, which is weakly, negatively associated with SES. Even among those who have been diagnosed, a large proportion claim not to be taking medications. We speculate that for other chronic health conditions the degree of underdiagnosis is likely to also be quite high, suggesting the need for major health campaigns directed both at the general population, but very specifically at doctors and other health providers.

2. Data

The Indonesia Family Life Survey is a general purpose survey designed to provide data for studying many different behaviors and outcomes. The survey contains a wealth of information collected at the individual and household levels, including indicators of economic and non-economic well-being: consumption, income, assets, education, migration, labor market outcomes, marriage, fertility, contraceptive use, use of health care and health insurance, relationships among co-resident and non- resident family members, processes underlying household decision-making, transfers among family members and participation in community activities. In particular, for this paper, IFLS collects a rich set of information on health outcomes, including both biomarkers and self-reports.

IFLS is an ongoing longitudinal survey. The first wave, IFLS1, was conducted in 1993–1994. The survey sample represented about 83% of the Indonesian population living in 13 of the country's 26 provinces.[3] IFLS2 followed up with the same sample four years later, in 1997.

[3] Public-use files from IFLS1 are documented in six volumes under the series title *The 1993 Indonesian Family Life Survey*, DRU-1195/1–6-NICHD/AID, The RAND Corporation, December 1995. IFLS2 public use files are

IFLS2 ended in December 2007, just as the financial crisis was beginning, so that it serves as an immediate baseline. IFLS3 was fielded on the full sample in 2000, three years after the crisis and IFLS4 in 2007-2008, some ten years after. So IFLS from 1993 to 2008 provides a period of still strong economic growth, followed by a major economic crash and recovery.

In this paper for some purposes we treat each year as though it were an independent cross-section, in order to explore how prevalence of different measures have evolved cross-sectionally for a particular age group, those over 45 years. For the regressions, though, we test pooling across years and then pool with some interactions after we fail to reject that SES coefficients are the same over the 4 waves. We do not employ dynamic models in this paper and so do not use the panel nature directly, that is for another paper.

One potential worry in a study like this over a fifteen year period is sample attrition. However, the attrition in IFLS is quite low. In IFLS1 7,224 households were interviewed, and detailed individual-level data were collected from over 22,000 individuals. In IFLS2, 94.4% of IFLS1 households were re-contacted (interviewed or died). In IFLS3 the re-contact rate was 95.3% of IFLS1 dynasty households (any part of the original IFLS1 households).[4] In IFLS4 the recontact rate of original IFLS1 dynasties was 93.6% (of course the period between waves was 7 years, not 3). For the individual target households (including splitoff households as separate) the re-contact rate was a little lower, 90.6%. Among IFLS1 dynasties, 90.3% were either interviewed

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documented in seven volumes under the series *The Indonesia Family Life Survey*, DRU-2238/1-7-NIA/NICHD, RAND, 2000. IFLS3 public use files are documented in six volumes under the series *The Third Wave of the Indonesia Family Life Survey (IFLS3), WR*-144/1-NIA/NICHD. IFLS4 public use files are documented in the six volumes under the series *The Fourth Wave of the Indonesia Family Life Survey (IFLS4),* WR-675/1-NIA/NICHD.

[4] Households in which all members died are counted as contacted.

in all 4 waves, or died, some 6,523 households, of which 6,329, or 87.6% are actually interviewed in all 4 waves.[5] These re-contact rates are as high as or higher than most longitudinal surveys in the United States and Europe. For the regressions we do not weight, but for the tables we do weight, both for the sampling procedures (which oversampled urban areas and some outer provinces) and for attrition (see Strauss et al. 2009, Volume 2, for details of weighting). The weights provide the inverse probability that a household and individual were sampled and appeared in IFLS in each wave.

To look at the associations of SES and health outcomes under a multivariate context we run a set of regressions. The specification, which is used for all health outcomes and inputs analyzed in this paper, is as follows. In results not shown, we first test for pooling across waves, for those health outcomes that we have data for multiple waves. We find that the age, schooling and pce coefficients are not significantly different across years, though the province/rural-urban dummies are.[6] Consequently we pool the data across rounds of the survey (IFLS1, 2, 3, and 4), but allow for interactions between year dummies and the province/rural-urban dummies. These interactions will capture community/time differences in prices, health care availability and quality and health conditions. The sample for each regression consists of adults who are 45 or above at the time of the survey, and for whom the physical measurements (or other measures) are

[5] See Strauss et al. (2009) for a more detailed discussion of IFLS attrition rates.

[6] We test for pooling across waves by including in our specifications the interactions of year dummy variables with all of the covariates. We then look to see whether the interaction between year and age variables, education variables, pce, and province /rural dummy variables are each jointly significant. Jointly significant interactions between year and the SES variables would persuade us against pooling the four years. It turns out that for all health outcomes and inputs we analyze in this paper, almost all of the interactions between year and the SES variables are not jointly significant, while the interactions between year and province and rural dummy variables are always jointly significant. For example, the education dummy interaction with year dummies are only jointly significant for hypertension and then only for men, and for ADLs and general health both for women only (results are available upon request)..

available. Estimation for males and females are done separately. We use ordinary least squares for continuous dependent variables and linear probability model (LP) for binary dependent variables. LP model estimates are consistent for estimating average partial effects of the regressors, which is what we are interested in. Robust standard errors of the regression coefficients are computed, that also allow for clustering at the community level. By using robust standard errors for the linear probability regressions we ensure that these standard error estimates are consistent.

We create dummy variables for age indicating whether an individual is 55 or older, 65 or older, and 75 older. In this way, the coefficients on the dummy variables indicate the marginal change from the next lowest age group of being in the reference group. Similarly, for education we use a dummy variable for having at least some primary education, completed primary school or more, and completed junior high school or more. For per capita expenditures (*pce)*, we take logs and then use a linear spline with a knot at the median of log pce.[7] For health measures that we have data on from more than one wave, we include dummy variables if the observations are from 1997 and after (if 1993 observations are available), 2000 and after, or 2007; and as stated, interaction of these period effects with province and province-rural dummies. For the few health variables that we only have data for 2007/8 we just include the province and province-rural dummies. Also for measures that data exist for multiple waves we use 5-year birth cohort dummy variables.[8] [9] It is, of course, not possible to separately identify age, cohort and period

[7] The coefficient on the second log pce variable we report is the change in the coefficient from the slope to the left of the knot point.

[8] The birth year cohort dummy variables included are: -1928, 1929-1933, 1934-1938, 1939-1943, 1944-1948, 1949-1953, 1954-1958, with 1959-1963 omitted as the base.

effects without untestable assumptions being made. In our case, we aggregate ages into ten year intervals and birth cohorts into five year groups.[10][11] Because we are pooling the four waves for each age group, we have several birth year cohorts, helping identification. Nevertheless, we are not so interested in the age, cohort or year effects as we are in the SES coefficients. However, if we left out age and/or birth cohort variables we would bias the education coefficients positively, as the estimated education impacts would then also capture cohort effects. This would arise because younger birth cohorts have more schooling and also faced better health conditions when they were babies and in the fetus, compared to older cohorts. There is an accumulation of evidence now that better health conditions when young are associated with better health in old age (for instance Barker, 1994; Gluckman and Hanson, 2005; and Strauss and Thomas, 2008, for an economist's perspective).

We have to be careful not to interpret the SES coefficients from these regressions as causal (Strauss and Thomas, 1995, 1998, 2008). Causality runs in both directions between SES and health outcomes. However, we add one variable that can help some in this regard, an interaction of years of education and age. What we are looking for is whether education mitigates the

[9] For health measures that we only have data from 2007, of course we do not use either year or birth cohort dummies, but we still use the age dummies. For these cases the age dummies must be interpreted with even more caution, since it is not possible to disentangle age, from birth cohort from time effects.

[10] The year dummy variables are: 55 or older, 65 or older, 75 or older, with 45 or older omitted as the base.

[11] For all health outcomes and inputs with multiple waves of data, we also run multivariate regressions where we use 5-year age groups instead of 10-year for the age dummy variables in addition to the 5-year birth cohorts. The results are very similar, the very few exceptions being: for male GHS, and male vigorous physical activities regressions, the cohort dummy variables were jointly significant at 5 percent confidence level for male IADL, when we use the 10 year age groups, but not when we use 5 year age groups. Age dummy variables in the male IADL were not jointly significant when we use the 10-year age groups; but they are when we use the 5-year age groups. For female, age variables are not jointly significant, but they are significant when we use the 5 year age group dummy variables.

powerful negative influence of aging on our health outcomes. If it does, this is consistent with a causal interpretation of our education coefficients.[12][13] Studies of child height have shown that mother's education has its largest impact on heights when the child is less than 3 years (Barrera, 1990; Thomas, Strauss and Henriques, 1990). This is thought to be the period during which children are most vulnerable to infection from dirty water and ill-prepared food, so that mother's schooling might well have its biggest impact during that period. Among the mechanisms for this enhanced impact is thought to be an allocative efficiency effect of mother's schooling, knowing what inputs are better and safer for children, such as boiling water. A similar argument might be applied to our measures of health, which are largely general; that at older ages, people are more susceptible to have problems, hence own schooling in this case, may have a larger allocative impact at these ages (though possibly from affecting health inputs and behaviors from years earlier).

3. Results

Physical measurement: anthropometry, hemoglobin level and hypertension

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[12] While this interaction coefficient could also represent a nonlinear effect of schooling, the fact that we enter schooling with level dummies protects us in part against this potential confounding effect.

[13] Another empirical strategy we could have taken would be to include household fixed effects. That would have captured all factors at the household level, but still would not have addressed the issue of unobserved individual factors. Household fixed effects would have required there to be multiple men aged 45 and older within the same household and likewise for adult women. We examined the cell sizes for our samples, using as our definition of household, the "dynastic" 1993 households (that is combining all households that split from a given 1993 household into one household). We found that an average dynastic household contained 1.1 adult male or adult female members over 45 years. In the case of CES-D, for example, we had 3,900 individual men in our sample and 3,683 dynasties. That means we only had 217 individuals from multiple member households, and it is this group that would be used to estimate the SES coefficients. We judged that this was too small a group to reliably get estimates from. This case is typical. For health outcomes that we measure over time, like BMI, we have numerous persons for whom we have multiple measures over waves. We thus could have used individual fixed effects in that case, but that should be part of a dynamic analysis, which is a different research exercise from this paper.

BMI

We first look at a number of biomarkers: body mass index (BMI), waist circumference, blood hemoglobin levels, and hypertension.[14] BMI, which is weight (in kg) divided by height (in m) squared, provides a convenient summary of height and weight of adults. We use World Health Organization standards whereby adults whose BMI is under 18.5 are considered undernourished, and those with BMI is 25 or greater are considered overweight. Extreme values of BMI are associated with elevated hypertension, diabetes and other causes of mortality.

Figure 1 plots the cumulative distribution function (CDF) of BMI for adult male and female age 45 and above using data from IFLS1, 2, 3, and 4. The CDFs are shifted down for each year after 1993 for both men and women. The shift for 2007 from 2000 is especially large. The fact that the CDFs do not cross means that there each successive year first order stochastically dominates the last. In the case of BMI, unlike income, stochastic dominance across the entire distribution does not have a clear welfare implication. On the one hand, undernourishment is unambiguously dropping, but on the other hand, overweight is unambiguously increasing. Table 1 show these changes over the four survey rounds. The percentage of adult males who are undernourished has gone down from around 28.3 in 1993 to 23.5 in 2000, and decreased further to around 17.5 in 2007. The numbers are similar for women, with around 17.4 percent who were undernourished in 2007, compared to 29.7 percent in 1993. But what is more interesting in this table has to do with the proportion of those overweight. In 2007, around 31 percent of elderly women have BMI

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[14] Heights were measured using a lightweight SECA aluminum height board, the SECA 214 portable stadiometer. Weights were measured using a portable digital scale, the CAMRY EB6171. Hemoglobin was measured using a small, hand-held meter, the Hemocue Hb301 analyzer. A finger prick was made using a lancet and a drop of blood inserted into the Hemocue microcuvette. Blood pressure was taken with a digital meter, the Omron HEM 712c meter.

25 or over, more than double the fraction it was in 1993. Among elderly men in 2007, 17 percent are overweight, compared to 8.5 percent in 1993. Among the different age groups, it is the 45-54 years old that have both the lowest fraction of undernourished and the largest fraction of overweight.

The increase over the years and the substantial degree of overweight suggests that overnutrition and health conditions associated with it have become increasingly important in Indonesia. At the same time, undernutrition has not entirely disappeared, though its magnitude among the aged has sharply dropped. What is interesting, but beyond the scope of this paper is the small increase in undernutrition between 1997 and 2000 for some age/sex groups, and the large decline in all groups between 2000 and 2007. It could be that BMI is not increasing much or even declining for some age/sex groups, because of adjustments in eating due to the financial crisis, whereas economic growth was solid between 2000 and 2007, which is consistent with the large increase of BMI during that period. The former is consistent with the findings of Thomas, Frankenberg and Beegle, 1999, using IFLS2 and 2+.

Holding BMI constant, greater waist circumference increases the risks of various cardiovascular diseases. For people who are overweight or obese the risk of future mortality is higher if their waist circumference is greater than 120cm for men or 88 cm for women. Figure 2 shows that the CDF of waist circumference for both men and women have shifted to the right between 2000 and 2007. Around 30 percent of women age 45 or older in 2007 have waist circumference that is greater than 88 cm compared to around 20 percent in 2000. This CDF does not control for BMI changes, so a lot of the increase in waist circumference may simply be due to an increase in BMI, but not all. Figure 3 plots waist circumference against BMI for men and women in 2000 and 2007. For men at higher BMI levels, there is not much change in waist circumference, so that the upwards shift in waist circumference for men between 2000 and 2007 is largely a result of increasing BMI. Not so for women, however, they have a shift up in mean waist circumference by BMI. In 2007 being over 188cm in waist size is associated with a BMI of 26, instead of 28, which was the case in 2000.

In Figure 4, we plot average BMI against years of education for men and women for all years the data are available. The figures for both male and female show the positive relationship between BMI and years of education, although for males the figure is convex while for women it is concave, with the slope decreasing for higher levels of schooling. Other studies have found similar results: BMI tend to increase as education increases and income rises; the distribution shift to the right as development proceeds.

Table 3 shows the regression results for BMI. Men with completed junior high or more are likely to have higher BMI than those with less schooling. For women, BMI seems to increase with education and this is true for those with some primary education compared to no schooling at all, and for those with completed primary or more compared to some primary. However, having completed junior high or more does not have any additional effect (the marginal coefficient is slightly negative, but not significant). Thus the BMI-education gradient flattens out for women with junior high school (9 years) or more schooling; very similar to the effect found by Strauss and Thomas (2008). Education variables are jointly significant for both men and women. *PCE* variables turn out to be statistically significant and positive, similar to findings in previous studies that have found BMI is positively correlated with income. For both men and women, the results show that BMI decreases at old ages. In results not shown, BMIs are also lower for successively older birth cohorts.

One important result from this table is that the effect of education (as well as its interaction with age in the case of men) and *pce* are still significant even after we control for province, province-urban interactions, as well as province-urban-year interactions. The province-urban-year interactions are themselves also jointly statistically significant. This is an important finding that suggests that there is a degree of inequality of health outcomes among the elderly population even after we control for some region characteristics, a theme that we will see again some of other health biomarkers.

The positive interaction coefficient on the age-schooling interaction can be interpreted as meaning that better educated men loose less BMI as they age compared to the less educated. Since for men, more schooling, at the junior high level and above is positively correlated with BMI, it may be that better educated men are worried about low BMI, because in the recent past undernourishment was the bigger problem compared to overnutrition, and so try to undertake actions to avoid that. Note that for women, the interaction is close to zero and not significant, consistent with the flattening out of the BMI education gradient for women compared to men.

Hemoglobin

Levels of hemoglobin in blood are of interest because low levels indicate problems of anemia, which can have various negative consequences. Iron deficiency is associated for instance with lower endurance for physical activity.[15] For some types of employment, this deficiency may affect productivity significantly (see Thomas et al., 2008).

Figure 5 displays the CDF of blood hemoglobin levels for elderly for 1997, 2000, and 2007 (blood hemoglobin level was not collected in 1993). The vertical lines at 13.0 dL for males and 12.0 g/dL for females in Figure 5 show the thresholds that are used in previous studies below which work capacity is believed to be reduced.[16] The figure shows the shift to the right from previous rounds for both men and women, indicating higher levels of blood hemoglobin levels in the population, and lower proportion of elderly below that are below the thresholds. Indeed Table 2 shows that the proportion of elderly men with blood hemoglobin levels lower than the threshold of 13.0 g/dL has gone down from 40.6 in 1997 to 27.12 in 2007. For women the proportion below the threshold of 12.0 g/dL has decreased from 41.9 to 33.8.Given what we know about what blood hemoglobin levels can tell us, this change shows an improvement in one dimension of health in Indonesia over the years.

The regressions presented in Table 3 shows that older age has a strong impact on lowering blood hemoglobin levels for both and women. There are no significant cohort effects for women, though there are for men, with older cohorts having lower hemoglobin levels. For men, having completed junior high school or more education is associated with higher levels of hemoglobin compared to those with less schooling. For women having primary schooling seems to have a

[15] Hemoglobin levels may also be low if a person has an infection, or for other reasons.

[16] Studies have also shown that the relationship between hemoglobin level and work capacity is non-linear;higher level above the thresholds has no impact on work capacity, see for instance, Thomas et al. (2008).

positive correlation. Log pce has a strongly positive correlation with hemoglobin at low levels of income. Interestingly the education-age interaction has no effect.

Hypertension

Along with BMI and waist circumference, blood pressure is a useful indicator of risk of coronary heart diseases. Blood pressure measures are available from IFLS2, 3 and 4.[17] Figure 6 plots the proportion of those who are hypertensive (those whose systolic is greater than or equal to 140 or diastolic is greater than or equal to 90) against age. For both men and women there is a strong positive relationship between age and being hypertensive.

Looking at the levels of hypertension over the years in Table 4, there seems to be little change. Among men 45 years and above, around 44 percent have hypertension in 2007, the same percentage as it was in 1997. Similarly among women, 53 percent were hypertensive and the number does not change much over the years. However, it is important to note that the percentage of those with hypertension is substantial, so that clearly hypertension is a major health issue for the elderly.

A major public health issue given the nutrition and health transitions that Indonesians are undergoing is whether the health system, which is set up to focus on young children and mothers and infectious diseases can adequately care for chronic disease among the elderly. Are they being diagnosed and treated? In IFLS4 2007, the respondents were asked whether or not they have ever been diagnosed by a modern medical provider that they have hypertension. We add those who answer yes to those whom we measured to have hypertension (of course there is an

[17] In IFLS2 1997 and IFLS3 2000, blood pressure was measured only once. In IFLS4 2007, blood pressure was measured three times. For 2007 we use the average of the three measures for our analysis.

overlap) to arrive at a sum of persons who have hypertension. We then tabulate the fraction of those who have hypertension who say they have been diagnosed in Table 5. Table 5 shows that among the 4,044 elderly males in 2007, 44.2 percent were hypertensive. Of those who are hypertensive, only about 26 percent reported that they have ever been diagnosed with hypertension. This means a degree of underdiagnoses of around 74 percent for men; the comparabale figure is 62 percent for women. Table 6 then shows that of those who are hypertensive, less than 5 percent take any medication for hypertension.[18]

The multivariate regressions presented in Table 7 confirm what we saw in Figure 7 that the probability of having hypertension increases with age, although the increase with birth cohort is even larger. However, neither education nor *pce* are jointly significant, after controlling for province-urban-year interactions.[19] For underdiagnosis of hypertension, the regression results suggest that among women with hypertension, having some primary education reduces the probability of being underdiagnosed compared to those with no schooling, although having higher levels of schooling undoes this. The education variables are jointly significant for both women and men. As for hypertension, the age-schooling interaction is not significant, though the sign is negative. On the other hand, *pce* is significant, at 10% for men and under 1% for women. In both cases, the higher *percapita* expenditure the lower is underdiagnosis, so underdiagnosis is larger for lower income persons, particularly women. While SES and

[18] In China, the same analysis can be done with the CHARLS pilot data. There the underdiagnosis rate is 45%. The fraction of those who are diagnosed who take medications is much higher, 75-80%. Clearly the health system in Indonesia has a major problem of health care for the elderly.

[19] This is also found in China.

particularly *pce* do not have significant effect on hypertension, *pce* does have an effect on who get diagnosed and presumable treated.

Cognition: word recall

Cognition has been found to be an important issue among the elderly (see McArdle, Fisher and Kadlec, 2007). We use immediate and delayed word recall as one of the cognitive measures, namely the episodic memory measure. In IFLS4, like HRS, respondents are read a list of ten simple nouns and they are immediately asked to repeat as many as they can, in any order. After answering unrelated questions on morbidity, maybe ten minutes later, the respondents are then asked again to repeat as many words as they can. We use the average number of correctly immediate and delayed recalled words as our memory measure (McArdle, Smith and Willis, 2009).

Table 8 shows the average number of words recalled by age group and sex. On average, elderly men are able to recall 2.9 words, and elderly women are able to recall 3.2 words. Figure 8 shows a strong negative binary relationship between the number of words recalled and age and a strong positive relationship with years of education. Note that in the top panel, the line for men is higher than that of women. This is partly due to the fact that at any given age, men on average are better educated than women. Along the same lines, part of the reason that the lines coincide is that for any given years of education, men are typically older than women. The multivariate analysis, presented in Table 9, sheds more light on these associations.

The multivariate regression results presented in Table 9 show a strong negative relationship between age and memory for men and women. A strong, positive relationship between education and memory is also evident, with strong, positive coefficients on the age-schooling interaction terms, suggesting that education counters the negative effects of aging on memory. The *pce* variables are jointly significant, positively correlated with word recall.

Self-reported measurements: ADL, IADL, mental health, and general health status

Physical functioning assessment, ADLs, and IADLs

The self-assessment of basic physical functioning and activities of daily living (ADLs) provide useful information about a person's functional status and have been shown to be correlated with SES measures (see for instance, Strauss et al., 1993).[20] We plot the average number of ADLs that an elderly had difficulties with against age and education in Figures 9 and 10. The figures show that the number of ADLs a person had difficulties with rises with age for both men and women, although for women the relationship seems to be stronger. In contrast there does not seem to be a strong binary relationship between education and the number of ADLs with difficulty. Table 10 shows that the proportion of elderly with any difficulty with physical functioning/ADL did not change much between 1997, 2000, and 2007.

In addition to ADLs, in 2007 the survey also collects self-assessed information about instrumental activities of daily living (IADL), which includes activities not necessary for fundamental functioning, but required to be able to live independently. Activities included are: to shop for personal needs, to prepare one's own meal, to take a medicine, to visit a neighbor, and to travel. Similar to ADL, for IADL we also see that the number of difficulties increase with

[20] Our physical activities and ADL assessments include: carrying a heavy load for 20 meters, walking for 5 kilometers, to bow, squat, or kneel, sweeping the house floor yard, to draw a pail of water from a well, to stand from sitting from the floor without help, to stand from sitting position without help, to go the bathroom without help, and to dress without help.

age and the number is higher for women than men (Figure 11). Education seems to be negatively associated with IADL if only slightly.

The regressions reported in Table 12 confirm the positive association between the number of ADLs or IADLs a person had difficulty with and age. For difficulty with IADLs there are significant negative interactions between years of schooling and age. Apparently schooling does help to mitigate the impact of aging on having difficulties with IADLs, for both men and women. *PCE* seems to be negatively correlated with both ADLs and IADLs, but more important for men.

CES-D 10 score

As a measure of mental health the respondents were administered self-reported depression scale from the short version of the CES-D Scale, one of the major international scales of depression used in general populations. Higher scores on the CES-D scale indicates a higher likelihood of having major depression .[21] Some recent studies have failed to find a relationship between depression and education or income (see Das, Do, Friedman, McKenzie and Scott, 2007, for example), however other studies have found such correlations (Patel and Kleinman, 2003, survey several studies that do find negative correlations between depression and SES). For Indonesia, Friedman and Thomas (2008) find that the economic crisis fueled depression indicators, especially for the more vulnerable population.[22]

[21] The answers for CES-D are on a four-scale metric, from rarely, to some days (1-2 days), to occasionally (3-4 days) to most of the time (5-7 days). We score these answers in the way suggested by the Stanford group that created the CES-D, using numbers from 0 for rarely to 3 for most of the time, for negative questions such as do you feel sad. For positive questions do you feel happy, the scoring is reversed from 0 for most of the time to 3 for rarely.

[22] They also use IFLS data, from 1993 and 2000. Unfortunately the depression scale that IFLS had been using was not as widely used as the CES-D scale and so we switched scales in 2007 to be more comparable to other

Figure 12 displays the relationship between CES-D scores and age (top panel) and with years of education (bottom). For both elderly men and elderly women, CES-D scores increase with age, and decrease with years of education. On average women have higher CES-D scores than men. The mean CES-D scores among 45 years old and older are 3.3 for men and 3.8 for women.

The regressions using CES-D as dependent variable show that the education variables are not jointly statistically significant by themselves, but are highly negatively so for both men and women when interacted with age. So again, schooling seems to mitigate the aging process. On the other hand, the expenditure variables are not significant. So our results do support previous studies that show negative correlations between schooling and depression, though not with *pce*.[23]

General Health Status

In all four waves of the survey, respondents were asked to assess their own health status. They were asked to answer the question "*In general how is your health"* with the following options: *very healthy, somewhat healthy, somewhat unhealthy,* and *unhealthy.* We code those who answered "*somewhat unhealthy"* and "*unhealthy"* as reporting to have "poor health". General health status is very widely used as a health indicator. There is a worry that how one reports their health may be affected with how often they see doctors, or other, more general views of the world (Strauss and Thomas, 1995, 1998), but it is the case that perceptions of general health do predict subsequent mortality in surveys such as the HRS and ELSA (for example, Banks et al., 2009).

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international surveys, especially the HRS-type surveys. This means that in this paper we can only use the CES-D scale for one year, 2007.

[23] Similar results are again found in the CHARLS data for China.

Figure 13 plots the proportions of men and women reporting to have "poor" health by age, showing that the proportions increase with age. Table 14 shows the proportion by age group for all four survey years. It is interesting to see that for both elderly men and women, the proportion of those reporting they are in "poor health" does not seem to have changed that much over time, and if anything, there is a slight increase among elderly women.   Interpreting this result requires further work especially in the light of the remarkable changes that we have seen in other biomarkers such as BMI, and blood hemoglobin levels

Multivariate regressions reported in Table 15 show that education by itself is not jointly significant, again, however, there are strong negative interactions between years of schooling and age, for both men and women. PCE is negatively correlated with poor health for men, but not for women.

Smoking

We now move to smoking as one of important inputs for elderly health we are analyzing in his paper. Tobacco use have been linked with cancer, cardiovascular disease, respiratory disease, and other health complications (CDC 2009). A recent study using a longitudinal health and ageing survey in Europe shows that smoking and low physical activities are consistently linked with deterioration of health among elderly (Borch-Supan et al. 2008). In addition, among poor households, smoking could also divert expenditures from important health inputs such high quality food (see for example Block and Webb 2009). Smoking among adult males is prevalent in Asia and is very prevalent in Indonesia. The incidence of smoking among men 15 years and older is about 70 percent, and most smokers started smoking at fairly young age (Witoelar et al 2006; Barber et al 2008). The prevalence among women is less than 5%. Figure 14 plots the proportion of elderly men who currently smoking in each survey year against age. The figure shows that the incidence decreases with age.

Table 15 shows that indeed the proportion currently smoking decreases with age and this is true for every survey year. The table also shows the proportion of individuals who have ever smoked. The numbers suggest that most who ever smoked do not quit especially when they are relatively younger. But even among the 65 and over, of those 80 percent who have ever smoked, more than 60 percent do not quit.

The multivariate regression results indicate that incidence of smoking decreases with age (there are no significant cohort effects), and increases with education. However, there exists a significant negative interaction between age and schooling, so that higher schooling apparently is correlated with a stronger decline of smoking with age. *PCE* variables suggest that increases in income for higher income households, reduces the likelihood of currently smoking .

Physical activities

Lastly, we look at time spent on physical activities, which is based on new questions added in IFLS4 2007. The questions asked whether and how much time respondents engaged in vigorous and moderate physical activities, walking, and sitting in the past week. We focus on vigorous and moderate physical activities.[24] Other studies have suggested that time spent on energy-intensive

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[24] The question for vigorous physical activities is: "*Now, think about all the vigorous activities which take hard physical effort that you did in the last 7 days. Vigorous activities make you breathe much harder than normal and may include heavy lifting, digging, plowing, aerobics, fast bicycling, cycling with loads. Think only about those physical activities that you did for at least 10 minutes at a time".* The question for moderate physical activities is: "*Now think about activities which take moderate physical effort that you did in the last 7 days. Moderate physical activities make you breathe somewhat harder than normal and may include carrying light loads, bicycling at a regular pace, or mopping the floor. Again, think about only those physical activitiesthat you did for at least 10 minutes at a time."*

activities may be able to explain the rising rate of obesity (Cutler and Glaeser, 2003) and explain cross-country differences in obesity among older Americans and Europeans (Michaud, van Soest, Andreyeva 2007). Low physical activities is linked to deterioration of health among elderly in Europe (Borch-Supan et al 2008).

Figure 15 shows that the proportion of 45 and older men who carry out vigorous physical activities to be much higher than women and it is decreasing with years of education. The proportion of men and women who do moderate physical activities are more similar. Table 18 shows that around 48 percent of men 45 and above reported to have been engaged in vigorous activities compared to 18 percent of women.

Regressions show that the likelihood of engaging in vigorous physical activities get smaller as one gets older. For men, the education variables are jointly significant. Men with some primary school education but who did not complete junior high school are more likely to carry out vigorous physical activities than either those who have no schooling, but the marginal schooling effects at higher levels are negative. As men age, the decline in vigorous activities is stronger if they have higher schooling. Men with higher income are also less likely to engage in vigorous physical activities. For women engaging in moderate activities, more education has a positive impact, which is reduced with greater age.

4. Conclusions

Indonesia has undergone major changes in multiple dimensions since the Indonesia Family Life Survey (IFLS) was first fielded in 1993. Among these changes has been moving along the health and nutrition transition. IFLS is very well-suited to examine those changes.

Overall there have been significant changes in health outcomes among elderly Indonesians over the 15 year period of the IFLS. Much of the change can be seen as improvements such as the movement out of undernutrition and communicable disease as well as the increasing levels of hemoglobin. On the other hand, other changes such as the increase in overweight and waist circumference, especially among women, and continuing high levels of hypertension that seems to be inadequately addressed by the health system, indicate that the elderly population in Indonesia is increasingly exposed to higher risk factors that are correlated with chronic problems such as cardiovascular diseases and diabetes.

And yet with these changes, other health risk factors have shown little change over this fifteen year period, including prevalence of hypertension, the number of ADLs that respondents say they have difficulty in performing and a measure of self-reported general health. This is quite interesting because this period has seen major gyrations in economic activity, including strong growth from 1993 to 1996, a major economic collapse from late 1997 to 1998 and a strong recovery from 2000 to 2007. The financial crisis may have slowed the nutrition transition, and some of our evidence is consistent with that conjecture. Overall, apart from the health and nutrition transitions, it is not apparent from this evidence that some parts of health, especially self-assessed measures, have changed much with the strong economic movements over this time frame. Yet other measures, especially nutrition-based measures do seem to have evolved.

The relationship between health and SES at different stages in the life cycle is always difficult to disentangle. IFLS enables us to provide some important findings that contribute to our understanding of the relationships.

In this paper we examine correlations between SES and many health outcomes and behaviors for the elderly. Past work has usually been limited to just a small number of health outcomes and has not usually examined the elderly. To the extent that controlling for time, community, and their interactions account for differences in prices, health care availability and quality in the communities over time, the significant correlations that still exist between SES and many of the health outcomes indicate that there is a substantial degree of inequality of health among the elderly population. Furthermore, the positive correlations that we find between SES and most of the good health outcomes, and the fact that education tends to suppress the negative impacts of age on many health outcomes suggests that part of the correlations is causal, running from SES to health. These findings are indicative of some pathways through which health outcomes could be affected by changes in policy or external shocks that influence SES. Investigating these pathways further is a challenge for future research.

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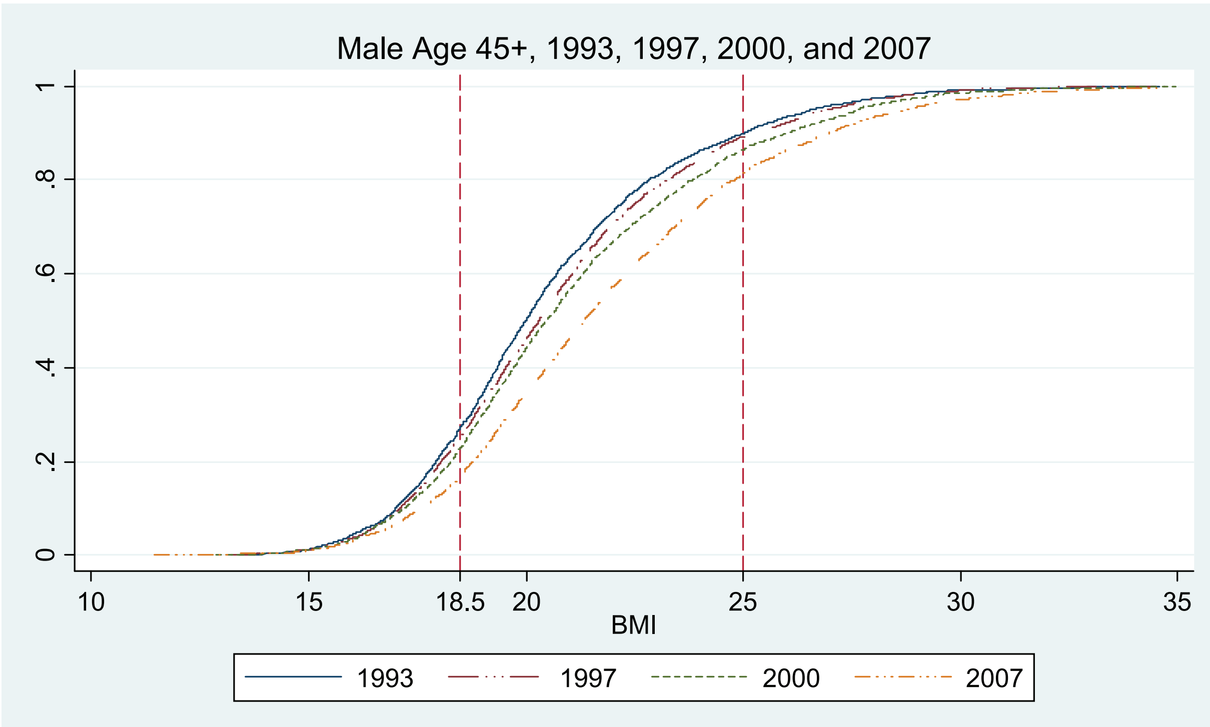
Figure 1. CDF of Body Mass Index, Adult 45+ in 1993, 1997, 2000, and 2007



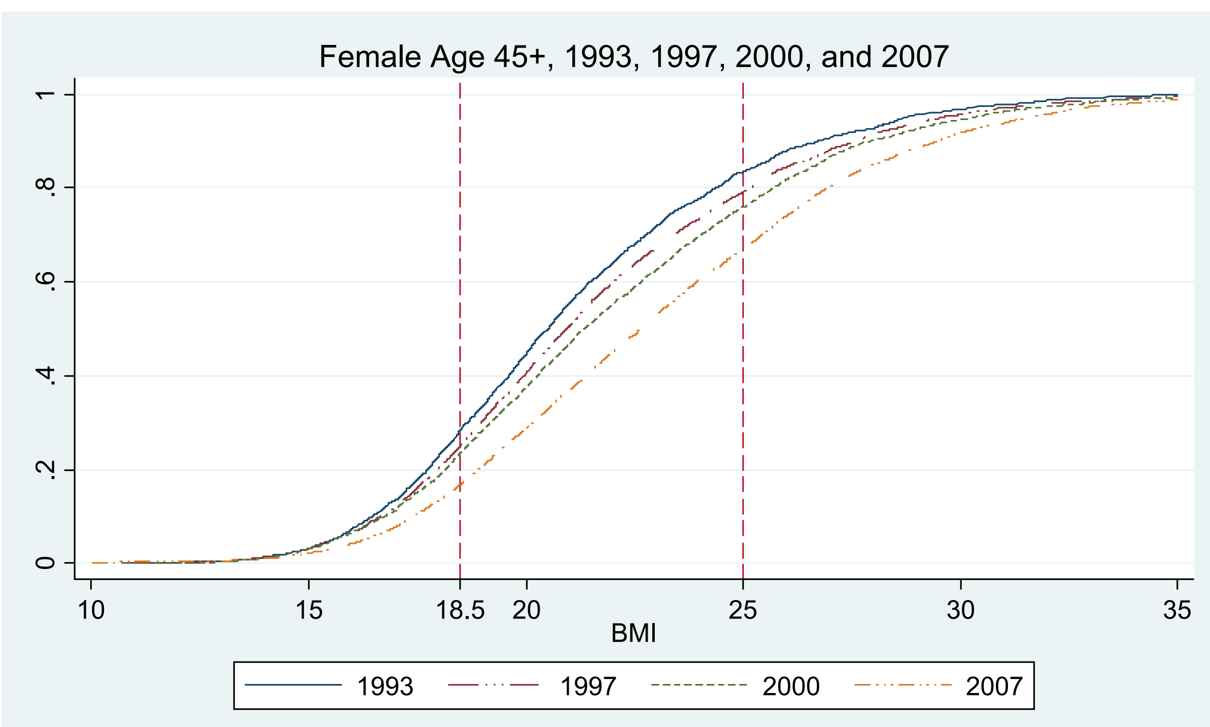
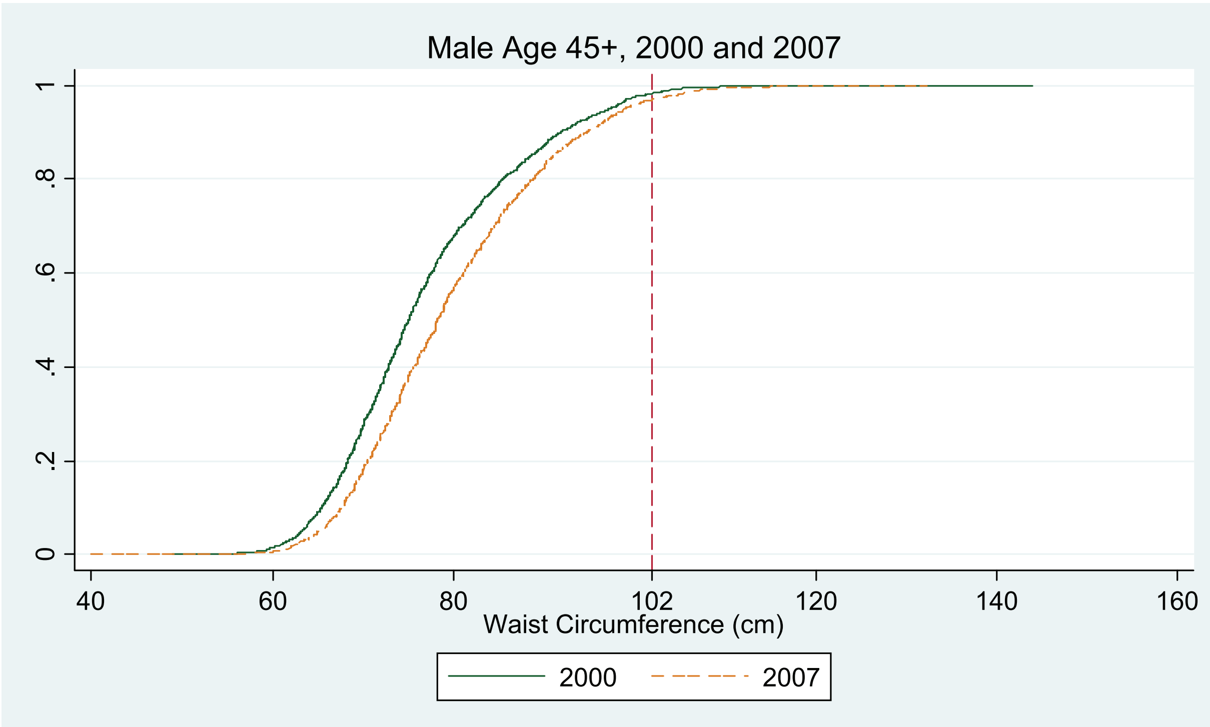


Figure 2. CDF of Waist Circumference, Adult 45+, 2000 and 2007



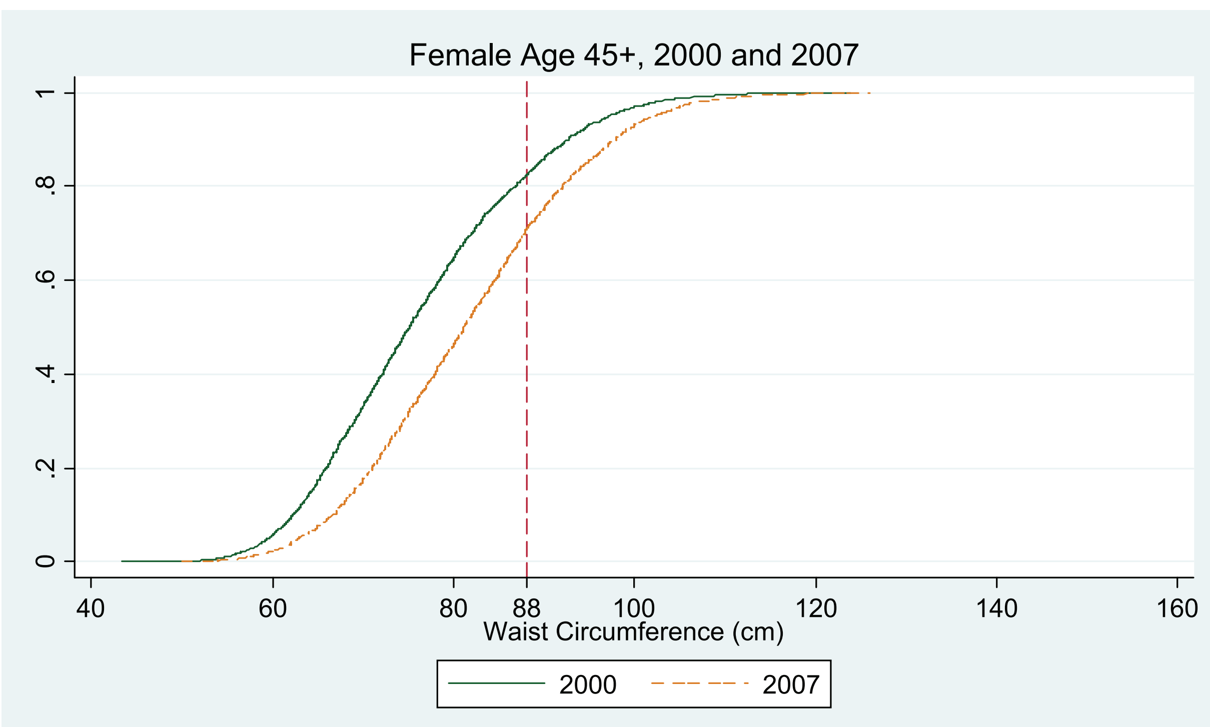
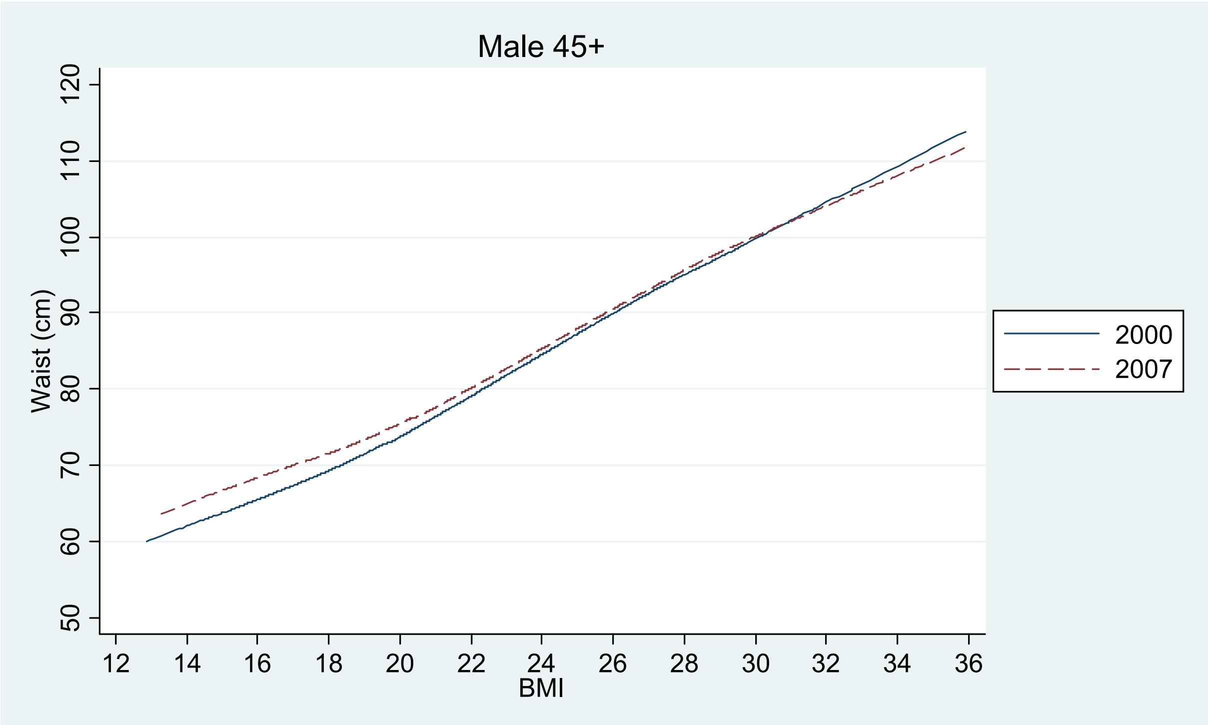


Figure 3. Waist Circumference against BMI: Adult 45+, 2000 and 2007



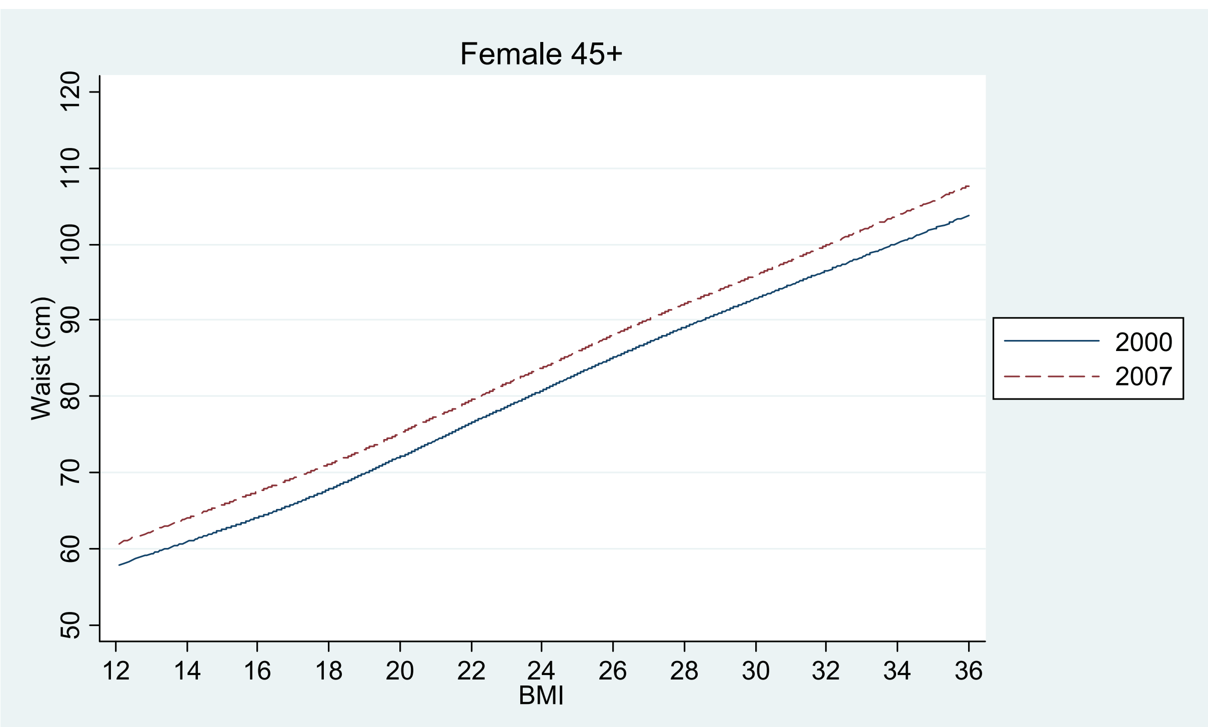


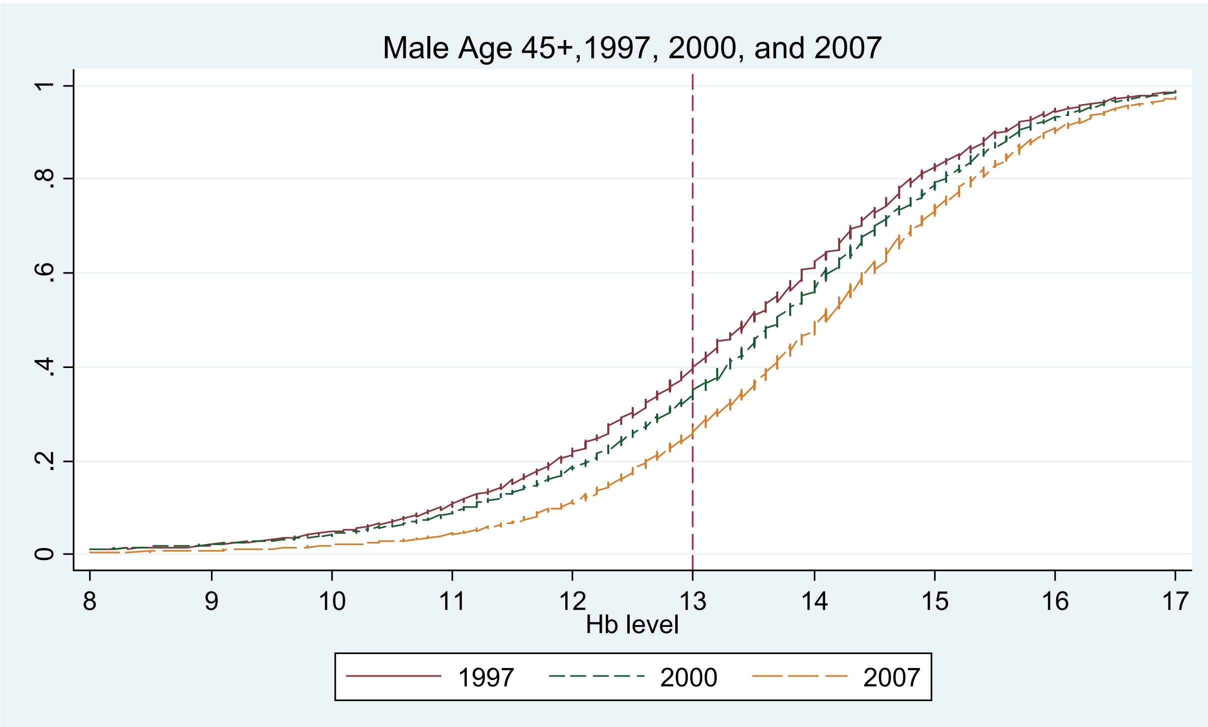
Table 1. Percentage of Adults 25+ Undernourished or Overweight, 1993 1997, 2000, and 2007

	Men				Women			
Age groups	**1993**	**1997**	**2000**	**2007**	**1993**	**1997**	**2000**	**2007**
25-44 years								
% Undernourished (BMI <18.5)	10.94	12.61	13.81	11.58	12.15	10.46	10.25	7.88
% Overweight (BMI >=25.0)	9.53	10.91	12.81	19.15	19.64	22.24	25.44	35.05
Observations	*2,825*	*3,444*	*5,006*	*6,492*	*3,608*	*4,558*	*5,601*	*6,914*
45-54 years								
% Undernourished (BMI <18.5)	17.02	16.34	12.49	9.46	22.28	16.52	12.98	9.39
% Overweight (BMI >=25.0)	11.25	13.32	17.00	22.65	17.04	24.46	30.83	40.18
Observations	*1,042*	*1,187*	*1,467*	*1,870*	*1,232*	*1,333*	*1,561*	*2,106*
55-64 years								
% Undernourished (BMI <18.5)	29.88	27.07	24.22	18.22	31.96	28.15	27.14	16.64
% Overweight (BMI >=25.0)	8.11	9.06	12.68	17.26	14.24	17.82	21.19	30.57
Observations	*819*	*923*	*1,035*	*1,096*	*942*	*1,132*	*1,261*	*1,211*
65-74 years								
% Undernourished (BMI <18.5)	42.50	39.46	35.66	27.95	36.86	33.89	34.26	29.57
% Overweight (BMI >=25.0)	4.65	6.28	7.37	8.59	10.70	12.29	15.44	18.82
Observations	*481*	*512*	*639*	*713*	*485*	*581*	*763*	*878*
75+ years								
% Undernourished (BMI <18.5)	48.68	50.36	48.39	38.05	50.09	46.35	44.65	33.60
% Overweight (BMI >=25.0)	4.33	2.49	3.05	6.31	4.25	8.30	8.98	13.96
Observations	*172*	*218*	*306*	*338*	*184*	*241*	*359*	*438*
45+ years								
Mean BMI	20.30	20.69	21.06	21.75	20.86	21.43	21.88	22.90
% Undernourished (<18.5)	28.25	26.60	23.50	17.54	29.77	25.78	24.51	17.40
% Overweight (BMI >=25.0)	8.49	9.83	12.68	17.31	14.20	18.84	22.78	31.14
Observations	*2,514*	*2,840*	*3,447*	*4,017*	*2,843*	*3,287*	*3,944*	*4,633*

Source: IFLS1, IFLS2, IFLS3, and IFLS4
Observations are weighted using individual sampling weights.

Figure 4. BMI and Years of Education, Adult 45+, 2000 and 2007

Figure 5. CDF of Hemoglobin Levels, Adult 45+, 1997, 2000 and 2007



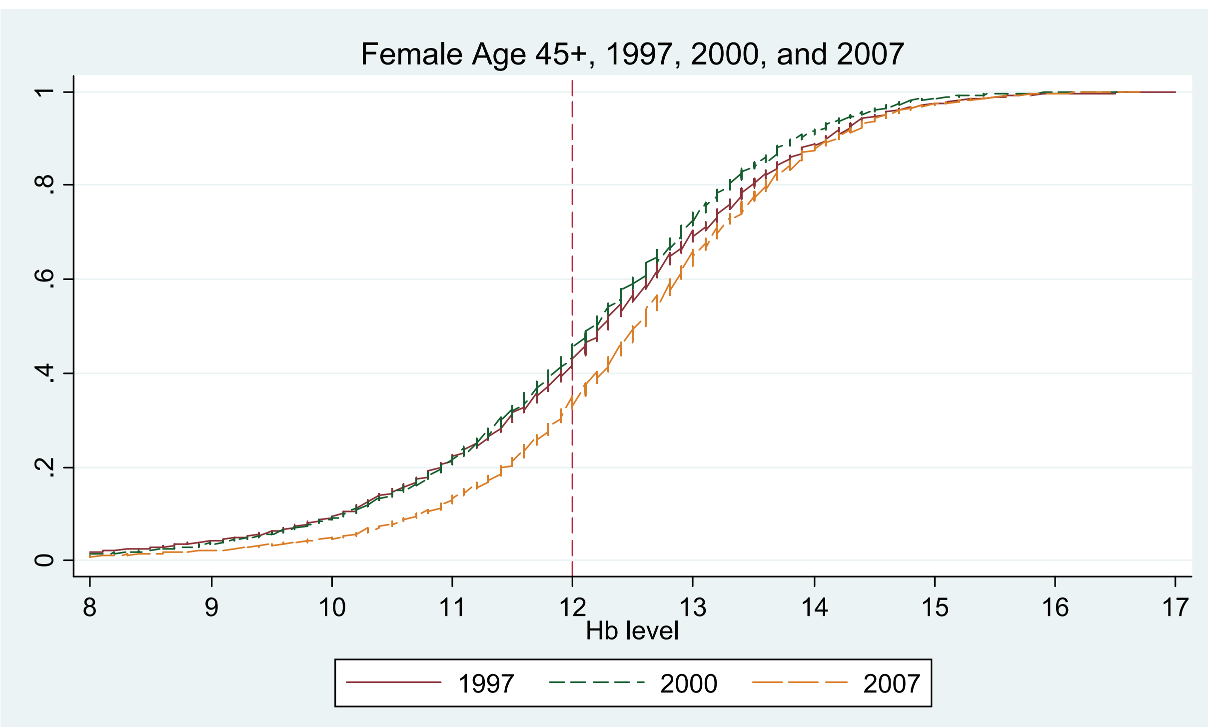


Table 2. Percentage of adults 25+ with blood hemoglobin level below 13.0 g/dL (men) or 12.0 g/dL (women), 1997, 2000 and 2007

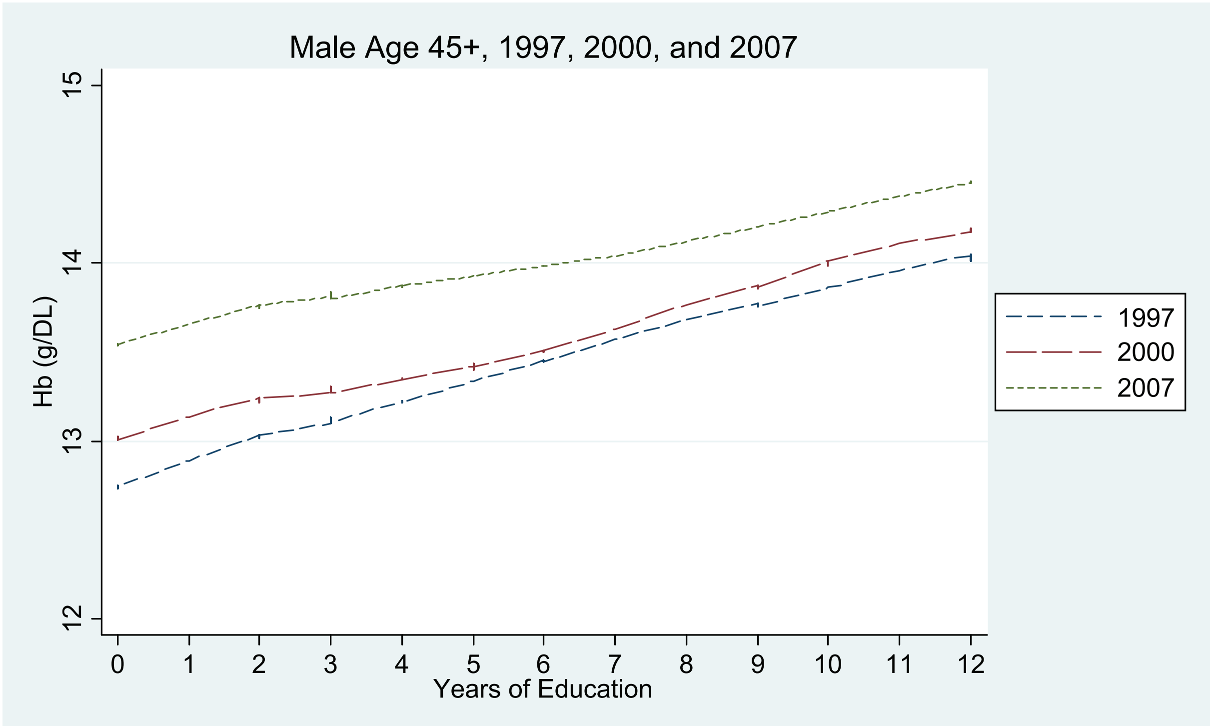
	Men			Women		
Age groups	**1997**	**2000**	**2007**	**1997**	**2000**	**2007**
25-44 years						
% <12.0/13.0	22.01	15.45	9.69	36.07	38.62	26.58
Observations	*3,397*	*4,961*	*6,485*	*4,478*	*5,555*	*6,904*
45-54 years						
% <12.0/13.0	32.22	22.09	17.72	39.49	39.96	28.08
Observations	*1,167*	*1,460*	*1,869*	*1,298*	*1,553*	*2,091*
55-64 years						
% <12.0/13.0	41.57	37.32	26.01	40.16	41.96	32.82
Observations	*911*	*1,039*	*1,093*	*1,122*	*1,260*	*1,212*
65-74 years						
% <12.0/13.0	48.53	46.58	40.86	46.00	48.93	40.25
Observations	*513*	*645*	*728*	*575*	*774*	*886*
75+ years						
% <12.0/13.0	62.81	53.60	52.24	53.52	53.49	50.06
Observations	*220*	*312*	*350*	*237*	*387*	*461*
45+ years						
Mean HB level	13.29	13.51	13.99	12.10	12.03	12.42
%<12.0/13.0	40.62	34.08	27.12	41.91	43.66	33.81
Observations	*2,811*	*3,456*	*4,040*	*3,232*	*3,974*	*4,650*

Source: IFLS2, IFLS3, IFLS4

Observations are weighted using individual sampling weights.

The thresholds are12.0 g/dL for women and 13.0 g/dL for men.

Figure 6. Hemoglobin Levels and Years of Education, Adult 45+, 1997, 2000 and 2007



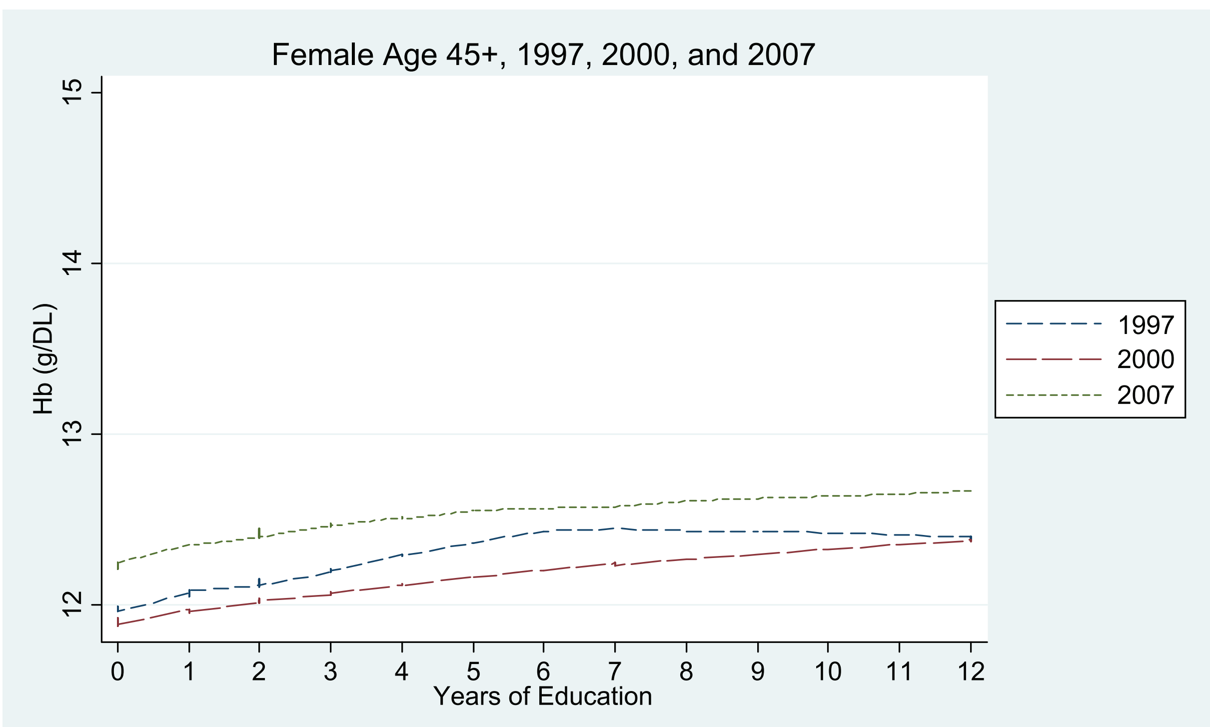
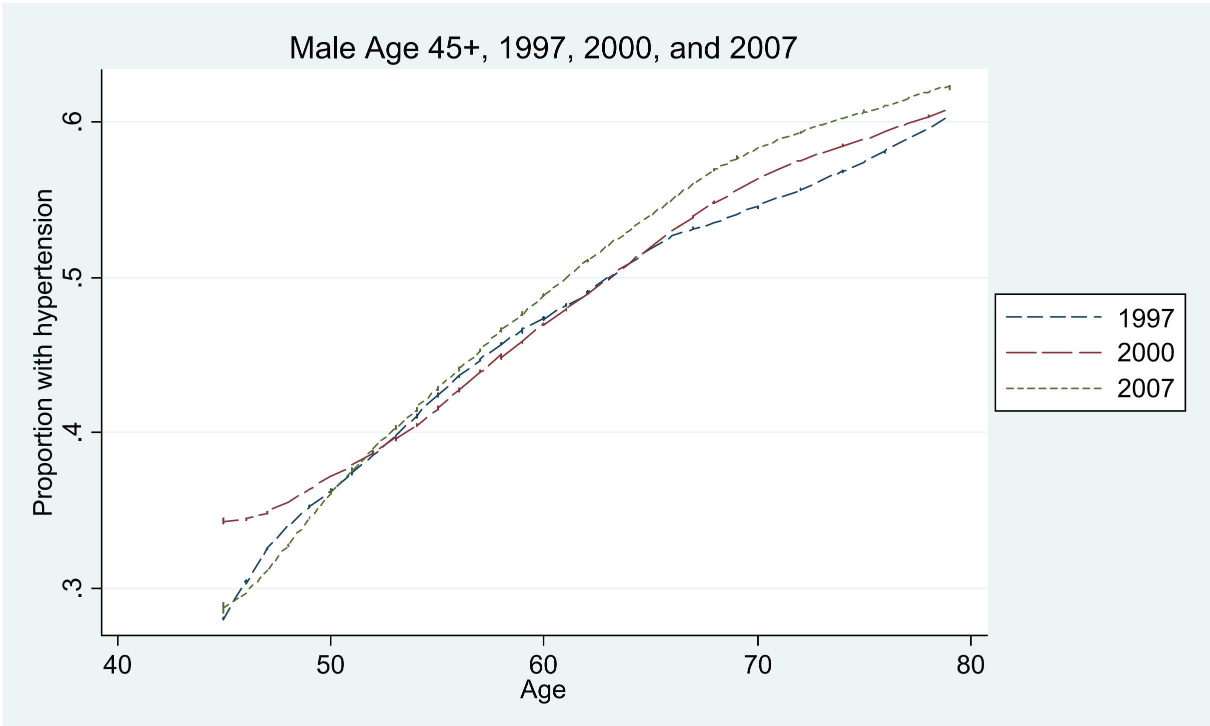


Table 3. Multivariate regressions: BMI and Hemoglobin Levels

	BMI				Hemoglobin			
	Male		Female		Male		Female	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Age group (dummy variables)								
55 or older	-0.0611	[0.594]	0.1519	[1.288]	-0.2755***	[2.790]	-0.0242	[0.435]
65 or older	-0.3300***	[2.919]	-0.0377	[0.273]	-0.2461***	[2.640]	-0.1390*	[1.687]
75 or older	-0.4208***	[2.926]	-0.6792***	[4.120]	-0.3387***	[2.810]	-0.2965***	[3.636]
Years of education (dummy variables)								
At least some primary	-0.1288	[1.013]	0.5536***	[3.048]	0.0837	[0.963]	0.0710	[1.104]
Completed primary school or more	-0.0063	[0.049]	0.3883**	[2.002]	-0.0125	[0.159]	0.0665	[1.001]
Completed junior high or more	0.5712***	[3.172]	-0.1946	[0.753]	0.2193**	[2.410]	-0.1317	[1.522]
Education X age interaction								
Years of education X age	0.0018***	[3.817]	0.0012*	[1.707]	0.0001	[0.594]	0.0003	[1.285]
Per capita expenditures (splines) [a]								
0 - median pce	0.6927***	[7.844]	0.8041***	[7.001]	0.2713***	[4.413]	0.1223**	[2.376]
>= median pce	0.0416	[0.285]	0.0210	[0.126]	-0.0655	[0.753]	-0.0608	[0.820]
Year dummy variables								
1997 and after	-0.5370**	[2.267]	-0.0833	[0.271]				
2000 and after	-0.1500	[0.708]	-0.4314*	[1.681]	0.2679**	[2.199]	0.1645	[1.002]
2007	-0.3336	[1.030]	-0.3490	[1.214]	-0.4882***	[3.013]	0.0879	[0.571]
Constant	14.8422***	[15.400]	15.7249***	[12.237]	10.9485***	[15.709]	10.5401***	[18.070]
Observations	12836		14735		10305		11853	
R-squared	0.228		0.222		0.123		0.056	
Cohort dummy variables	**Yes**		**Yes**		**Yes**		**Yes**	
Province X rural dummy variables + province X rural X year interactions	**Yes**		**Yes**		**Yes**		**Yes**	
F-tests for joint significance:	F-stat	p(values)	F-stat	p(values)	F-stat	p(values)	F-stat	p(values)
Age group dummy variables	5.796	0.001	7.817	0.000	4.031	0.008	5.412	0.001
Education variables	6.194	0.000	6.245	0.000	2.083	0.102	2.099	0.099
Educ. vars + educ. age interactions	40.29	0.000	22.00	0.000	8.541	0.000	5.151	0.000
Cohort dummy variables	8.822	0.000	13.89	0.000	2.294	0.026	1.308	0.245
Per capita expenditures	79.31	0.000	75.89	0.000	30.93	0.000	5.960	0.003
Year dummy variables	3.073	0.028	1.631	0.181	5.171	0.006	1.000	0.369
Province x rural dummy variables	4.653	0.000	6.799	0.000	5.139	0.000	3.779	0.000
Year x prov x rural variables interactions	2.090	0.000	2.790	0.000	4.199	0.000	2.523	0.000

The dependent variable for BMI regressions is the BMI for hemoglobin the hemoglobin level (g/dL). Blood hemoglobin level was not collected in 1993. t-statistics (in brackets) are based on standard errors that are robust to clustering at the community level. * significant at 10%; ** significant at 5%; *** significant at 1%. The omitted group for age dummy variable is 45 and older, for education, "no schooling", and for province, Jakarta. Birth year cohort dummy variables included are: -1928, 1929-1933, 1934-1938, 1939-1943, 1944-1948, 1949-1953, 1954-1958, with 1959-1963 omitted. [a)] knot point is at the median pce, coefficient represent change in the slope.

Figure 7. Proportion with Hypertension by Age, 1997, 2000 and 2007



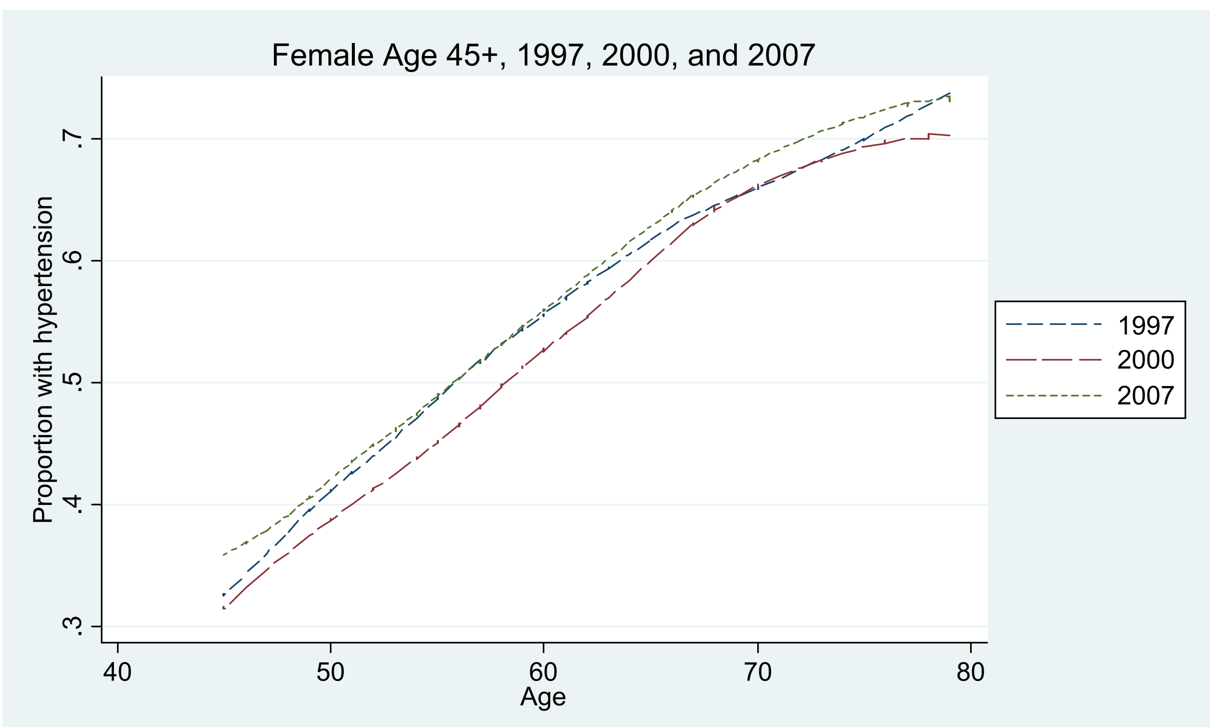


Table 4. Hypertension among adults 25+, 1997, 2000, and 2007

	Male			Female		
Age groups	1997	2000	2007	1997	2000	2007
25-44 years						
% hypertensive	21.40	20.01	18.67	19.87	20.01	18.14
observations	*3,447*	*5,032*	*6,524*	*4,526*	*5,574*	*6,603*
45-54 years						
% hypertensive	35.16	36.06	34.72	41.11	36.95	41.15
observations	*1,189*	*1,472*	*1,876*	*1,330*	*1,565*	*2,101*
55-64 years						
% hypertensive	47.17	46.23	48.76	54.69	50.94	53.79
observations	*926*	*1,044*	*1,098*	*1,140*	*1,272*	*1,216*
65-74 years						
% hypertensive	52.86	55.01	56.02	65.69	67.07	68.74
observations	*519*	*646*	*723*	*585*	*783*	*892*
75+ years						
% hypertensive	63.57	62.52	61.90	79.52	72.87	76.32
observations	*222*	*313*	*347*	*252*	*391*	*464*
45+ years						
Mean systolic	137.47	136.96	139.76	143.55	141.2	144.52
Mean diastolic	82.19	83.39	82.62	82.95	83.51	83.22
% hypertensive	43.78	44.21	44.19	52.61	49.63	52.70
observations	*2,856*	*3,475*	*4,044*	*3,307*	*4,011*	*4,673*

Source: IFLS2, IFLS3, IFLS4

* Hypertensive if systolic >= 140 or diastolic >= 90

Observations are weighted using individual sampling weights.

Table 5. Underdiagnosis of hypertension, adult 45+, 2007

Adult 45 + years	**Men**	**Women**
Observations	4,044	4,676
% hypertensive	44.2	52.8
% diagnosed [a)]	26.4	37.9

Underdiagnosis of hypertension by education, adult 45+

highest completed level of education	% underdiagnosed [a)]	
no schooling	79.0	69.4
primary schooling	74.4	58.1
junior high	73.2	52.1
senior high +	68.0	62.3
all adult 45+	73.6	62.1

Source: IFLS4
Observations are weighted using individual sampling weights.
a) "Diagnosed" if answered *"Yes"* to the question "*Has a doctor/nurse/paramedic ever told you that you have hypertension?".*
Percentages are out of individuals 45+ whose systolic>=140 or diastolic >=90.

Table 6. Hypertension and medication, adult 45+, 2000 and 2007

Adult 45 + years	**Men**		**Women**	
	2000	**2007**	**2000**	**2007**
Observations	3,477	4,044	3,631	4,674
% hypertensive	44.2	44.2	49.6	52.8
% taking medication for hypertension [a)]	2.6	4.7	2.5	4.7

a) Percentages are out of individuals 45+ whose systolic >=140 or diastolic >=90

Hypertensive and not taking medication, by completed education [a)]

	Men		Women	
Highest completed level of education	2000	2007	2000	2007
no schooling	98.7	97.6	98.7	97.3
primary schooling	99.1	96.7	96.9	94.9
junior high	95.4	91.2	96.7	88.1
senior high +	93.9	92.5	92.3	94.1
all adult 45+	97.4	95.3	97.5	95.4

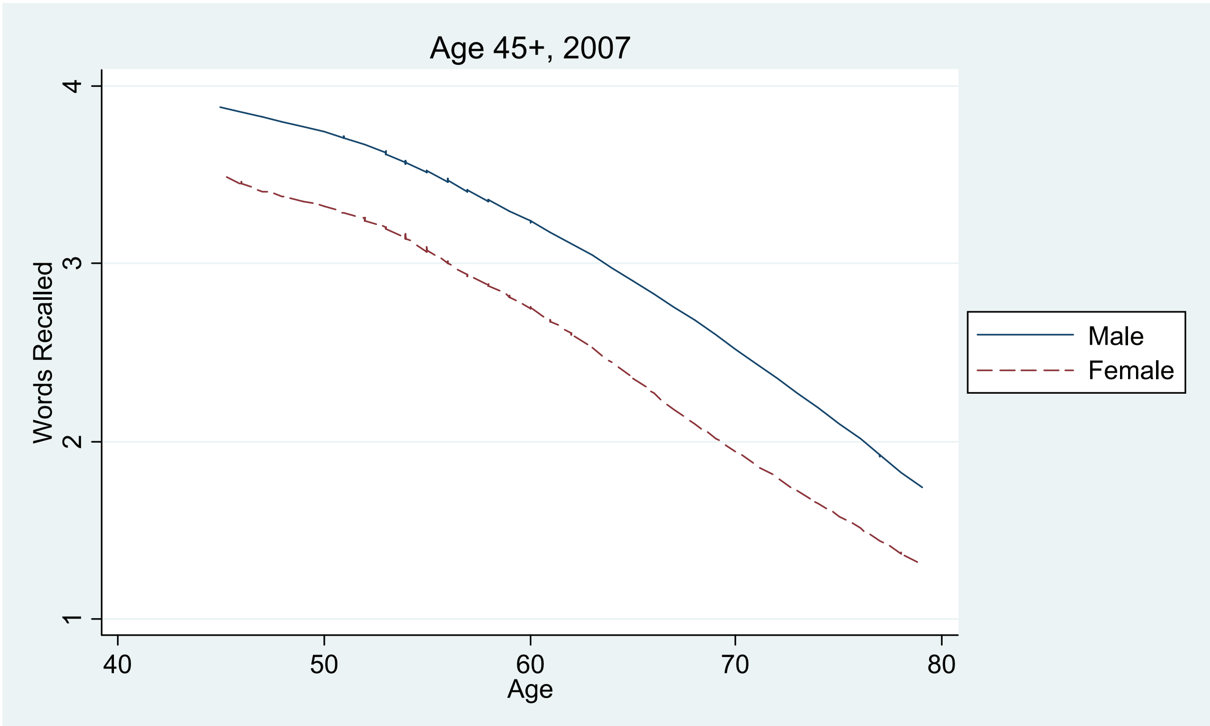
Source: IFLS3 and IFLS4
a) Percentages are out of individuals 45+ whose systolic >=140 or diastolic >=90.
Observations are weighted using individual sampling weights.

Table 7. Hypertension and underdiagnoses of hypertension: linear probability models

	Hypertension				Underdiagnoses of hypertension			
	Male		Female		Male		Female	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Age group (dummy variables)								
55 or older	0.0422**	[2.138]	0.0442**	[2.413]	-0.0827***	[-2.981]	-0.0145	[-0.554]
65 or older	0.0220	[1.051]	0.0565***	[3.143]	-0.0460	[-1.565]	0.0058	[0.199]
75 or older	0.0700***	[2.661]	0.0285	[1.298]	-0.0496	[-1.325]	-0.0349	[-1.094]
Years of education (dummy variables)								
At least some primary	-0.0380*	[1.890]	0.0094	[0.501]	0.0071	[0.175]	-0.0941***	[-2.745]
Completed primary school or more	-0.0052	[0.263]	-0.0117	[0.555]	-0.0281	[-0.852]	0.0615	[1.624]
Completed junior high or more	-0.0096	[0.419]	-0.0286	[1.036]	-0.0037	[-0.078]	0.0804	[1.538]
Education X age interaction								
Years of education X age	0.0002**	[2.516]	0.0000	[0.447]	-0.0001	[-1.001]	-0.0002	[-1.144]
Per capita expenditures (splines) [a]								
0 - median pce	0.0175	[1.116]	0.0366**	[2.505]	-0.0594	[-1.625]	-0.1292***	[-4.044]
>= median pce	-0.0034	[0.145]	-0.0283	[1.387]	0.0323	[0.604]	0.1188**	[2.490]
Year dummy variables								
2000 and after	0.0556	[1.536]	0.0414	[1.152]				
2007	0.1061**	[2.419]	0.0727*	[1.675]				
Constant	0.0052	[0.029]	-0.1329	[0.798]	1.5638***	[3.388]	2.1785***	[5.378]
Observations	10376		11994		1813		2473	
R-squared	0.064		0.087		0.061		0.068	
Cohort dummy variables	**Yes**		**Yes**		**No**		**No**	
Province X rural dummy variables + province X rural X year interactions	**Yes**		**Yes**		**Province X rural**		**Province X rural**	
F-tests for joint significance:	F-stat	p(values)	F-stat	p(values)	F-stat	p(values)	F-stat	p(values)
Age group dummy variables	3.140	0.025	3.881	0.009	8.796	0.000	0.608	0.610
Education variables	1.280	0.280	0.701	0.552	0.247	0.864	7.010	0.000
Educ. vars + educ. age interactions	4.942	0.000	0.543	0.704	2.741	0.028	5.791	0.000
Cohort dummy variables	7.054	0.000	6.071	0.000				
Per capita expenditures	1.782	0.169	4.260	0.015	2.580	0.077	10.47	0.000
Year dummy variables	3.998	0.019	2.627	0.073				
Province x rural dummy variables	2.775	0.000	3.043	0.000	2.182	0.001	5.096	0.000
Year x prov x rural variables interactions	1.789	0.001	2.998	0.000				

The dependent variable for the hypertension regressions is whether the individual is hypertensive=1, 0 otherwise; and for the underdiagnoses of hypertension the dependent variable is 1 if the individual has ever been diagnosed with hypertension, 0 otherwise, conditional of being hypertensive. Blood pressure measurement was not collected in 1993, and question about diagnosis was only asked in 2007. t-statistics (in brackets) are based on standard errors that are robust to clustering at the community level. Significance at 10%(*), 5%(**), and 1%(***) indicated. The omitted group for age dummy variable is 45 and older, for education, "no schooling", and for province, Jakarta. Birth year cohort dummy variables included are: -1928, 1929-1933, 1934-1938, 1939-1943, 1944-1948, 1949-1953, 1954-1958, with 1959-1963 omitted. [a)] knot point is at the median pce, coefficient represent change in the slope.

Figure 8. Number of Words Recalled out of Ten Words by Age and Years of Education, Age 45+, 2007



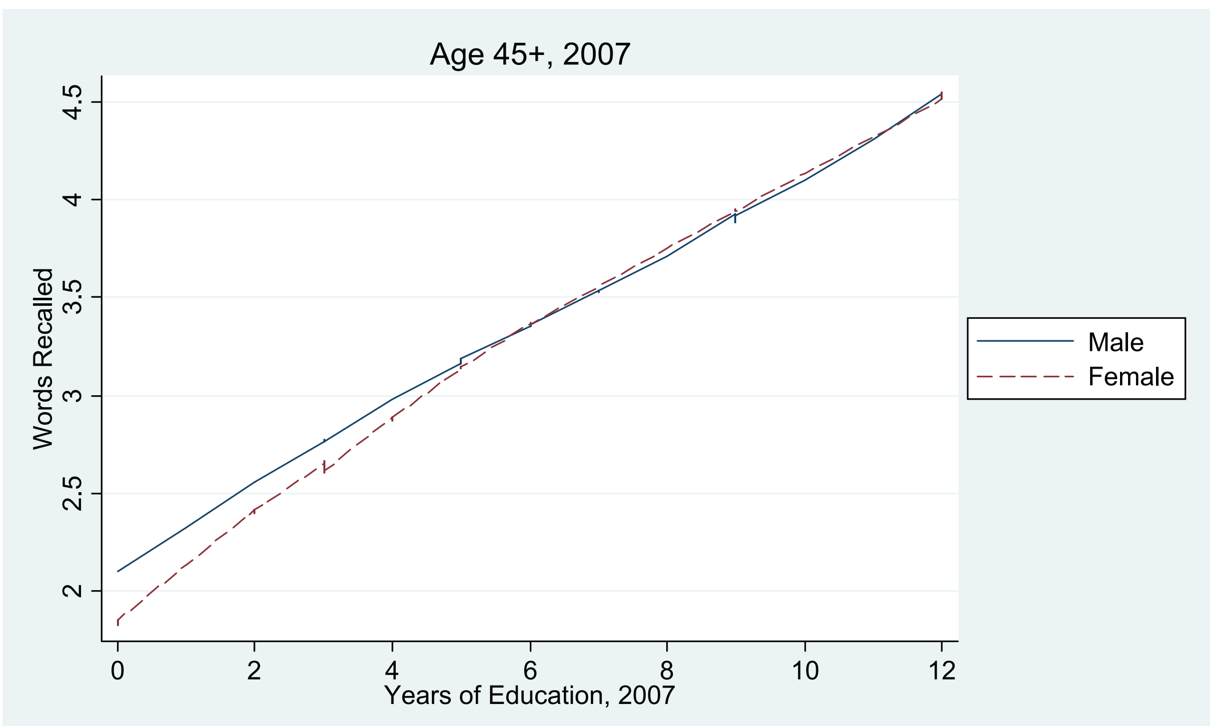


Table 8. Number of words recalled out of 10 words, by adult 25+, 2007

Age groups	Male	Female
25-44 years		
# words recalled out of 10	4.4	4.7
Observations	*6,851*	*6,389*
45-54 years		
# words recalled out of 10	3.3	3.8
Observations	*2,048*	*1,825*
55-64 years		
# words recalled out of 10	2.8	3.2
Observations	*1,092*	*1,045*
65-74 years		
# words recalled out of 10	1.9	2.6
Observations	*659*	*624*
75+ years		
# words recalled out of 10	1.4	1.7
Observations	*226*	*208*
45+ years		
# words recalled out of 10	2.86	3.31
Observations	*4,025*	*3,702*

Source:IFLS4

The numbers are average of two word recalls (immediate and delayed)

Table 9. Multivariate regressions: number of words recalled

	Words recalled			
	Male		Female	
	Coeff.	t-stat	Coeff.	t-stat
Age group (dummy variables)				
55 or older	-0.4707***	[-7.535]	-0.4114***	[-7.227]
65 or older	-0.5912***	[-7.393]	-0.5472***	[-7.841]
75 or older	-0.6218***	[-5.902]	-0.3448***	[-3.289]
Years of education (dummy variables)				
At least some primary	0.1324	[1.234]	0.1928**	[2.273]
Completed primary school or more	0.2938***	[3.194]	0.3129***	[3.325]
Completed junior high or more	0.1301	[1.220]	-0.0462	[-0.394]
Education X age interaction				
Years of education X age	0.0016***	[6.145]	0.0022***	[6.493]
Per capita expenditures (splines) [a]				
0 - median pce	0.1926**	[2.431]	0.0439	[0.609]
>= median pce	-0.0467	[-0.410]	0.1255	[1.200]
Constant	0.4911	[0.491]	2.1932**	[2.408]
Observations	3748		4063	
R-squared	0.289		0.324	
Cohort dummy variables	**No**		**No**	
Province X rural dummy variables + province X rural X year interactions	**Province X rural**		**Province X rural**	
F-tests for joint significance:	F-stat	p(values)	F-stat	p(values)
Age group dummy variables	134.956	0.000	96.255	0.000
Education variables	3.816	0.010	6.257	0.000
Educ. vars + educ. age interactions	103.8	0.000	137.5	0.000
Per capita expenditures	8.312	0.000	5.198	0.006
Province x rural dummy variables	4.976	0.000	5.476	0.000

The dependent variable is the average number of the words recalled from the immediate and delayed recalls. Word recall question module was only administered in 2007. t-statistics (in brackets) are based on standard errors that are robust to clustering at the community level. Significance at 10%(*), 5%(**), and 1%(***) indicated. The omitted group for age dummy variable is 45 and older, for education, "no schooling", and for province, Jakarta. [a)] knot point is at the median pce, coefficient represent change in the slope.

Figure 9. Average Number of Difficulties with ADL by Age, Age 45+, 1993, 1997, 2000, and 2007

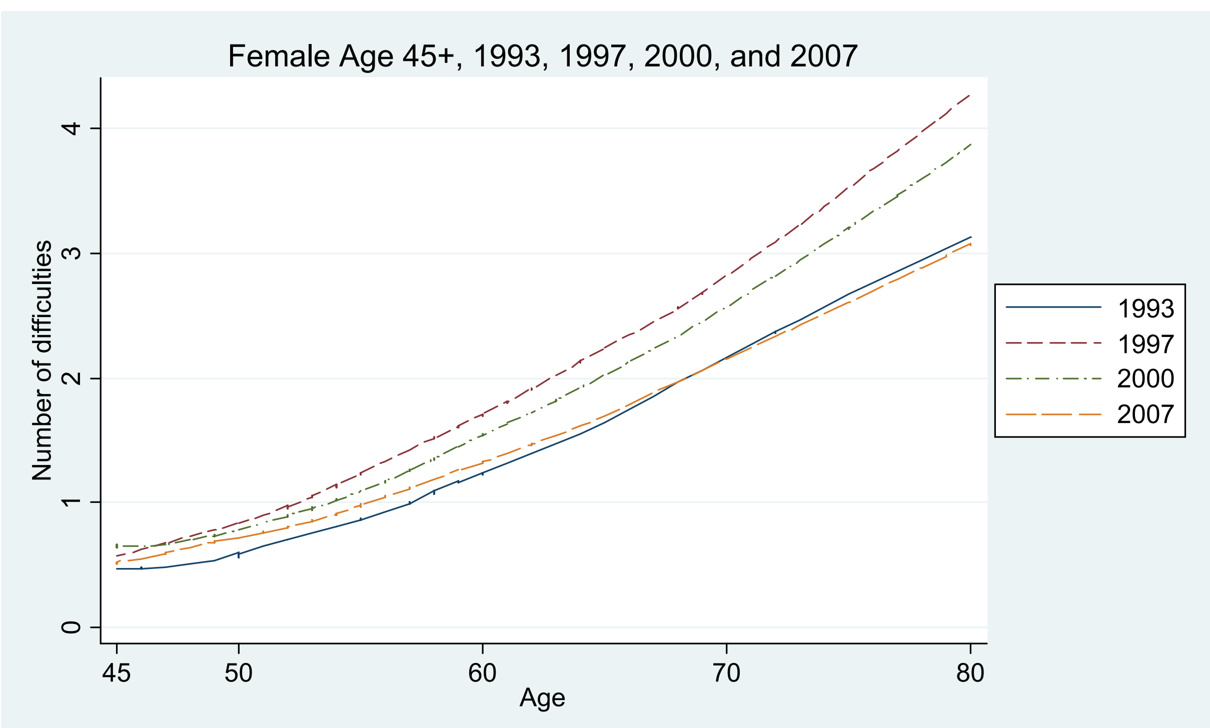


Figure 10. Average Number of Difficulties with ADL by Years of Education, Age 45+, 1993, 1997, 2000, and 2007

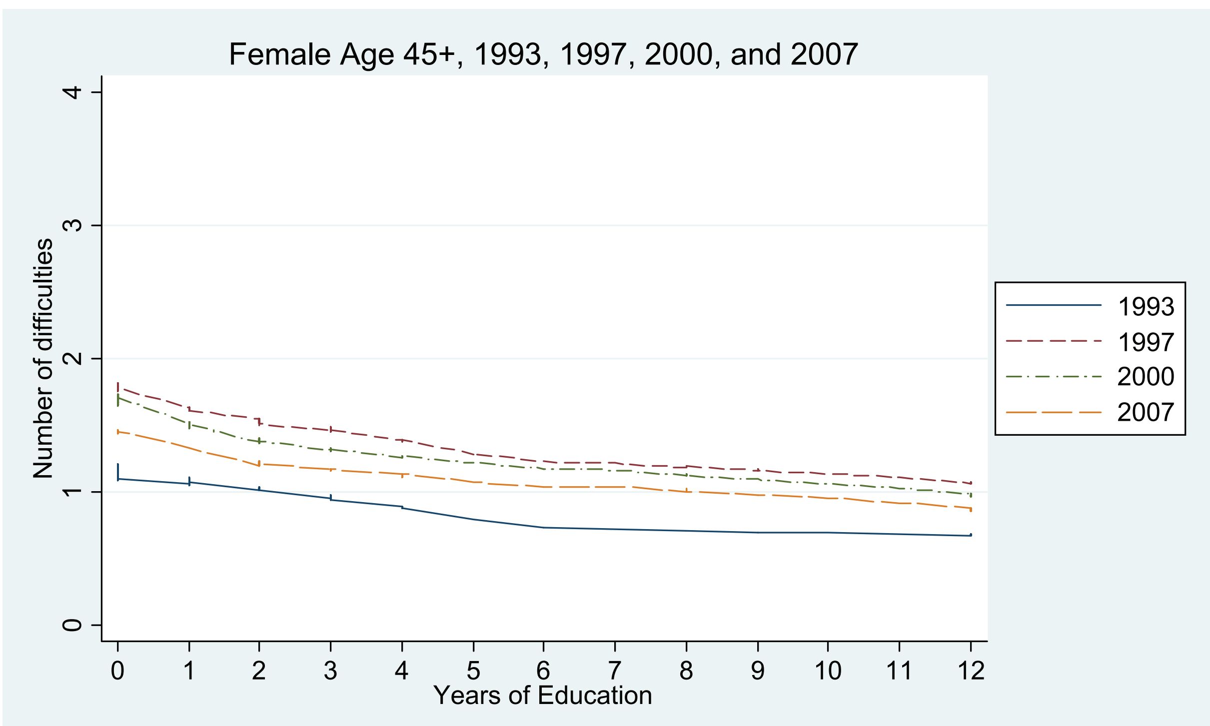


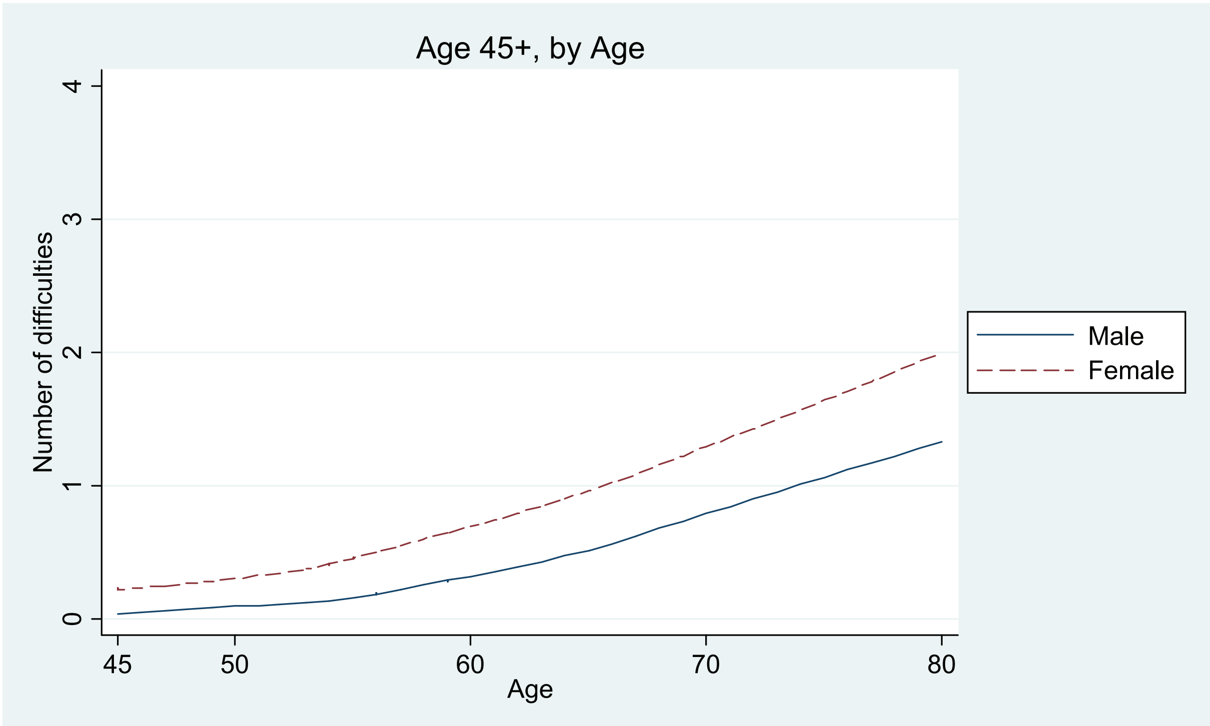
Table 10. Percentage of adults 25+ with any difficulty with ADL, 1993, 1997, 2000, and 2007

	Men				Women			
Age groups	**1993**	**1997**	**2000**	**2007**	**1993**	**1997**	**2000**	**2007**
25-44 years								
% with any difficulty	3.94	5.30	8.20	10.65	13.80	26.22	35.33	28.38
Observations	*2,896*	*3,288*	*4,980*	*1,175*	*3,657*	*4,466*	*5,574*	*1,295*
45-54 years								
% with any difficulty	9.58	13.30	13.33	16.82	24.48	41.17	41.73	39.55
Observations	*1,061*	*1,152*	*1,460*	*1,856*	*1,225*	*1,283*	*1,559*	*2,095*
55-64 years								
% with any difficulty	22.82	32.28	27.50	27.95	38.98	61.90	63.05	57.86
Observations	*821*	*889*	*1,026*	*1,070*	*878*	*1,075*	*1,251*	*1,181*
65-74 years								
% with any difficulty	35.45	55.56	50.81	53.07	60.82	76.85	77.01	76.73
Observations	*450*	*476*	*615*	*674*	*396*	*511*	*718*	*778*
75+ years								
% with any difficulty	59.47	69.26	71.39	69.78	79.21	92.27	89.62	89.55
Observations	*128*	*188*	*273*	*249*	*99*	*175*	*277*	*302*
45+ years								
% with any difficulty	21.33	30.86	29.17	29.69	37.00	57.42	58.88	54.62
Observations	*2,460*	*2,705*	*3,374*	*3,849*	*2,598*	*3,044*	*3,805*	*4,356*

Source: IFLS1, IFLS2, IFLS3, and IFLS4

Observations are weighted using individual sampling weights.

Figure 11. Average Number of Difficulties with IADL by Age and Years of Education, Age 45+, 1993, 1997, 2000, and 2007



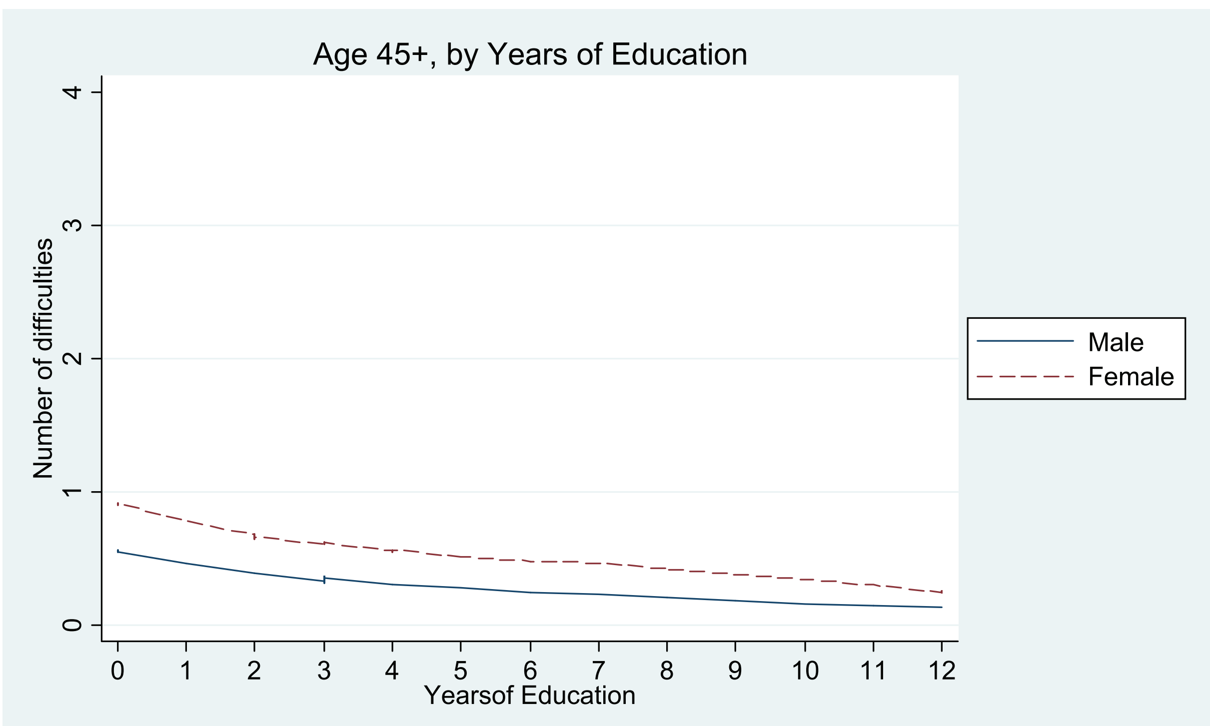


Table 11. Percentage of adults 25+ with any difficulty with IADL, 2007

Age groups	Male	Female
25-44 years		
% with any difficulty	3.25	16.32
Observations	*1,175*	*1,295*
45-54 years		
% with any difficulty	5.21	24.24
Observations	*1,856*	*2,095*
55-64 years		
% with any difficulty	12.64	45.19
Observations	*1,070*	*1,181*
65-74 years		
% with any difficulty	37.61	67.49
Observations	*674*	*778*
75+ years		
% with any difficulty	56.23	85.03
Observations	*249*	*302*
45+ years		
% with any difficulty	16.25	41.86
Observations	*3,849*	*4,356*

Source IFLS4

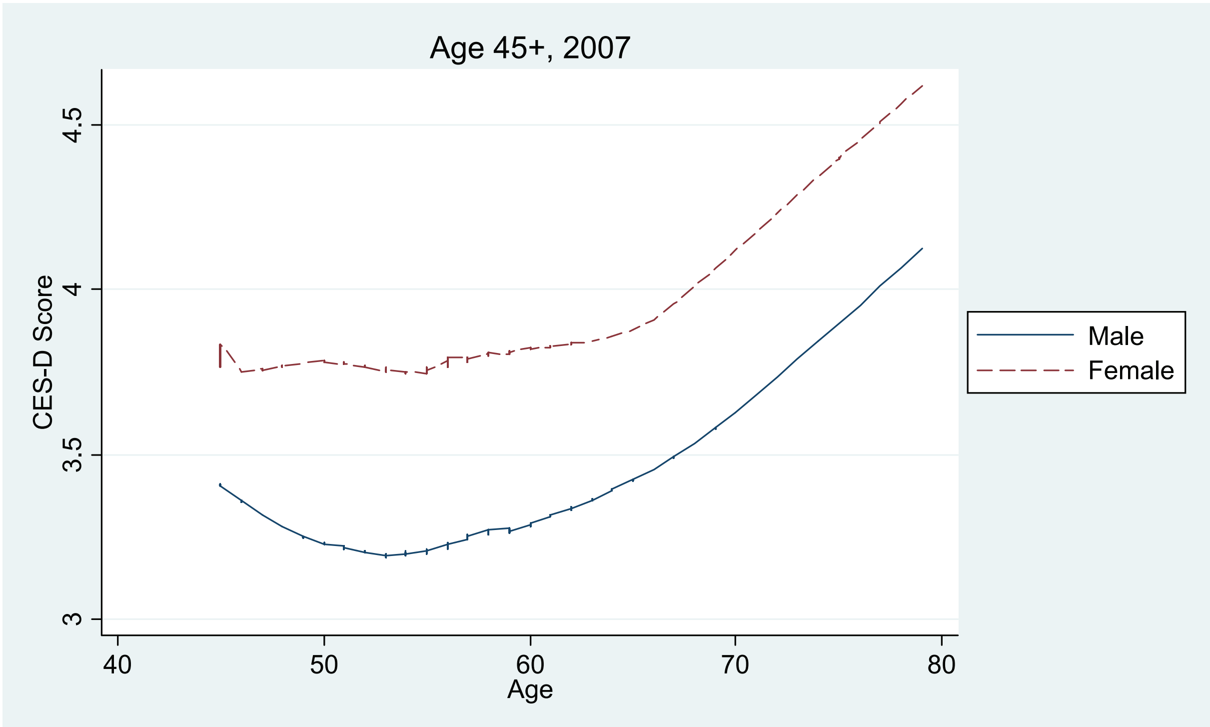
Observations are weighted using individual sampling weights.

Table 12. Multivariate regressions: number of difficulties with ADL/IADL

	ADL				IADL			
	Male		Female		Male		Female	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Age group (dummy variables)								
55 or older	-0.0022	[0.047]	0.1594***	[3.253]	-0.0256	[0.516]	0.0354	[0.662]
65 or older	0.3169***	[4.759]	0.2397***	[3.401]	0.2154*	[1.714]	-0.1814*	[1.870]
75 or older	0.7629***	[6.647]	0.8863***	[7.676]	0.0554	[0.249]	0.1456	[0.795]
Years of education (dummy variables)								
At least some primary	-0.1023*	[1.918]	-0.0045	[0.085]	-0.0926	[1.452]	-0.0218	[0.510]
Completed primary school or more	-0.0334	[0.717]	0.0092	[0.170]	0.0601*	[1.666]	0.0601	[1.483]
Completed junior high or more	-0.0414	[0.703]	-0.0006	[0.008]	0.0758	[1.629]	0.0099	[0.166]
Education X age interaction								
Years of education X age	0.0000	[0.035]	-0.0002	[0.954]	-0.0004***	[3.282]	-0.0004***	[2.645]
Per capita expenditures (splines) [a]								
0 - median pce	-0.1344**	[2.508]	-0.0823*	[1.839]	-0.1041**	[2.090]	-0.0624	[1.582]
>= median pce	0.1786**	[2.514]	0.1344**	[2.082]	0.0717	[1.049]	0.0330	[0.599]
Year dummy variables								
1997 and after	0.2841**	[2.205]	0.9291***	[6.067]				
2000 and after	0.2581***	[2.669]	-0.0007	[0.004]				
2007	0.3910***	[2.990]	0.3405**	[2.169]				
Constant	1.2791**	[2.257]	0.7112	[1.478]	1.6087**	[2.550]	1.3724***	[2.719]
Observations	12711		14095		3902		4401	
R-squared	0.194		0.243		0.192		0.246	
Cohort dummy variables	**Yes**		**Yes**		**No**		**No**	
Province X rural dummy variables + province X rural X year interactions	**Yes**		**Yes**		**Province X rural**		**Province X rural**	
F-tests for joint significance:	F-stat	p(values)	F-stat	p(values)	F-stat	p(values)	F-stat	p(values)
Age group dummy variables	24.047	0.000	21.528	0.000	1.206	0.307	196.605	0.000
Education variables	1.405	0.241	0.014	0.998	2.827	0.038	1.052	0.369
Educ. vars + educ. age interactions	2.640	0.033	1.404	0.232	5.188	0.000	7.629	0.000
Cohort dummy variables	12.85	0.000	25.74	0.000				
Per capita expenditures	3.284	0.038	2.169	0.115	3.659	0.027	2.488	0.0842
Year dummy variables	9.201	0.000	20.99	0.000				
Province x rural dummy variables	2.831	0.000	4.512	0.000	3.982	0.000	3.234	0.000
Year x prov x rural variables interactions	4.521	0.000	6.458	0.000				

The dependent variable is the number of difficulties with ADL/IADL. IADL questions were only asked in 2007. t-statistics (in brackets) are based on standard errors that are robust to clustering at the community level. Significance at 10%(*), 5%(**), and 1%(***) indicated. The omitted group for age dummy variable is 45 and older, for education, "no schooling", and for province, Jakarta. Birth year cohort dummy variables included are: -1928, 1929-1933, 1934-1938, 1939-1943, 1944-1948, 1949-1953, 1954-1958, with 1959-1963 omitted. [a)] knot point is at the median pce, coefficient represent change in the slope.

Figure 12. CES-D 10 Scores by Age and Years of Education, Age 45+, 2007



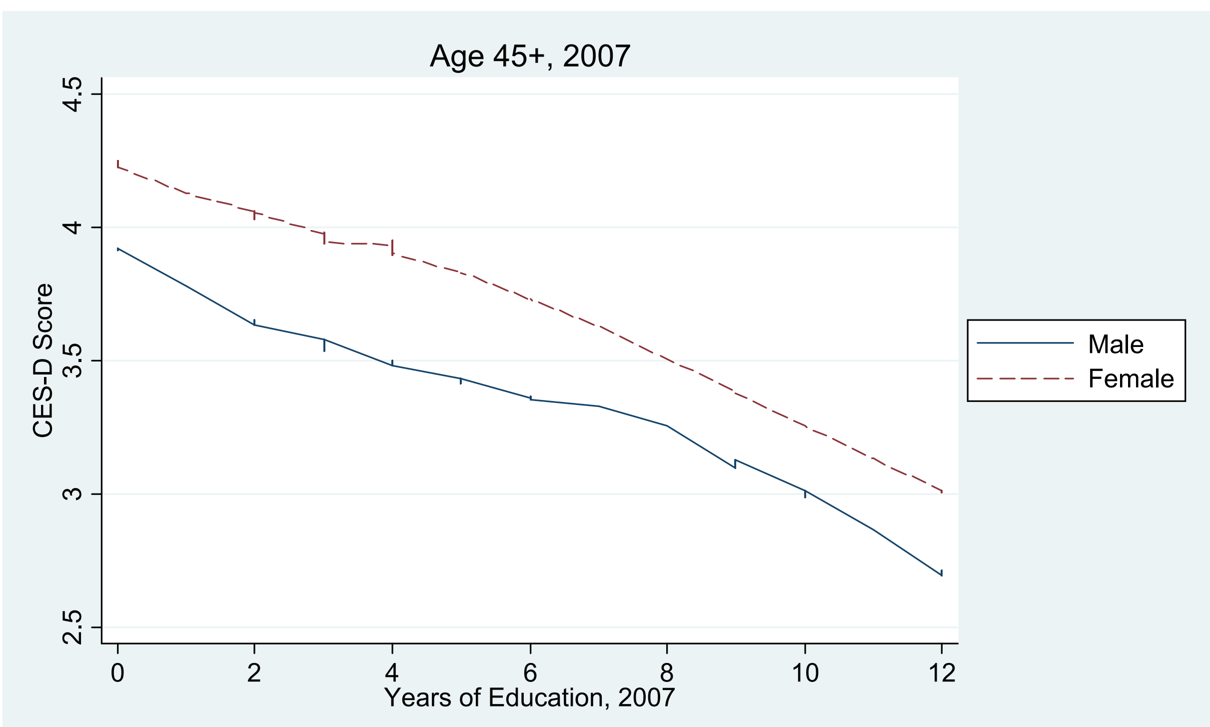


Table 13. Means and Standard Deviations of CES-D 10 Scores of Adult 25+

Age groups	CES-D score	Men	Women
25-44 years	Mean	3.90	3.81
	Standard deviation	3.40	3.54
	Observations	*6,630*	*6,986*
45-54 years	Mean	3.52	4.15
	Standard deviation	3.10	3.45
	Observations	*1,882*	*2,119*
55-64 years	Mean	3.65	4.29
	Standard deviation	3.02	3.28
	Observations	*1,086*	*1,191*
65-74 years	Mean	4.13	4.74
	Standard deviation	2.98	3.67
	Observations	*677*	*778*
75+ years	Mean	4.74	5.34
	Standard deviation	3.36	3.56
	Observations	*255*	*301*
45+ years	Mean	3.73	4.36
	Standard deviation	3.10	3.46
	Observations	*3,911*	*4,409*

Source IFLS4
Observations are weighted using individual sampling weights.

Table 14. Multivariate regressions: CES-D 10 Score

	CES-D 10 Score			
	Male		**Female**	
	Coeff.	**t-stat**	**Coeff.**	**t-stat**
Age group (dummy variables)				
55 or older	0.0079	[0.072]	-0.0339	[-0.267]
65 or older	0.3820***	[2.764]	0.2343	[1.466]
75 or older	0.3821*	[1.786]	0.4508**	[2.106]
Education X age interaction				
At least some primary	0.0168	[0.087]	0.0855	[0.523]
Completed primary school or more	0.2515*	[1.659]	-0.0564	[-0.309]
Completed junior high or more	0.0476	[0.228]	-0.1116	[-0.463]
Education X age interaction				
Years of education X age	-0.0017***	[-3.522]	-0.0014**	[-2.272]
Per capita expenditures (splines) [a]				
0 - median pce	-0.2129	[-1.305]	-0.0994	[-0.583]
>= median pce	0.0791	[0.336]	-0.0002	[-0.001]
Constant	6.8351***	[3.307]	5.5654**	[2.575]
Observations	3901		4402	
R-squared	0.054		0.055	
Cohort dummy variables	**No**		**No**	
Province X rural dummy variables + province X rural X year interactions	**Province X rural**		**Province X rural**	
F-tests for joint significance:	F-stat	p(values)	F-stat	p(values)
Age group dummy variables	6.164	0.000	4.205	0.006
Education variables	0.943	0.420	0.361	0.781
Educ. vars + educ. age interactions	10.97	0.000	12.87	0.000
Per capita expenditures	2.147	0.118	0.653	0.521
Province x rural dummy variables	5.337	0.000	9.435	0.000

The dependent variable is the CES-D10 score. The score is computed in the way suggested by the Stanford group that created the CES-D, using numbers from 0 for rarely to 3 for most of the time, for negative questions such as *do you feel sad*. For positive questions such as *do you feel happy*, the scoring is reversed from 0 for most of the time to 3 for rarely (see text). CESD-10 module was only asked in 2007. t-statistics (in brackets) are based on standard errors that are robust to clustering at the community level. Significance at 10%(*), 5%(**), and 1%(***) indicated. The omitted group for age dummy variable is 45 and older, for education, "no schooling", and for province, Jakarta. [a)] knot point is at the median pce, coefficient represent change in the slope.

Figure 13. Proportion Reporting “Poor” Health by Age, 1993, 1997, 2000, and 2007

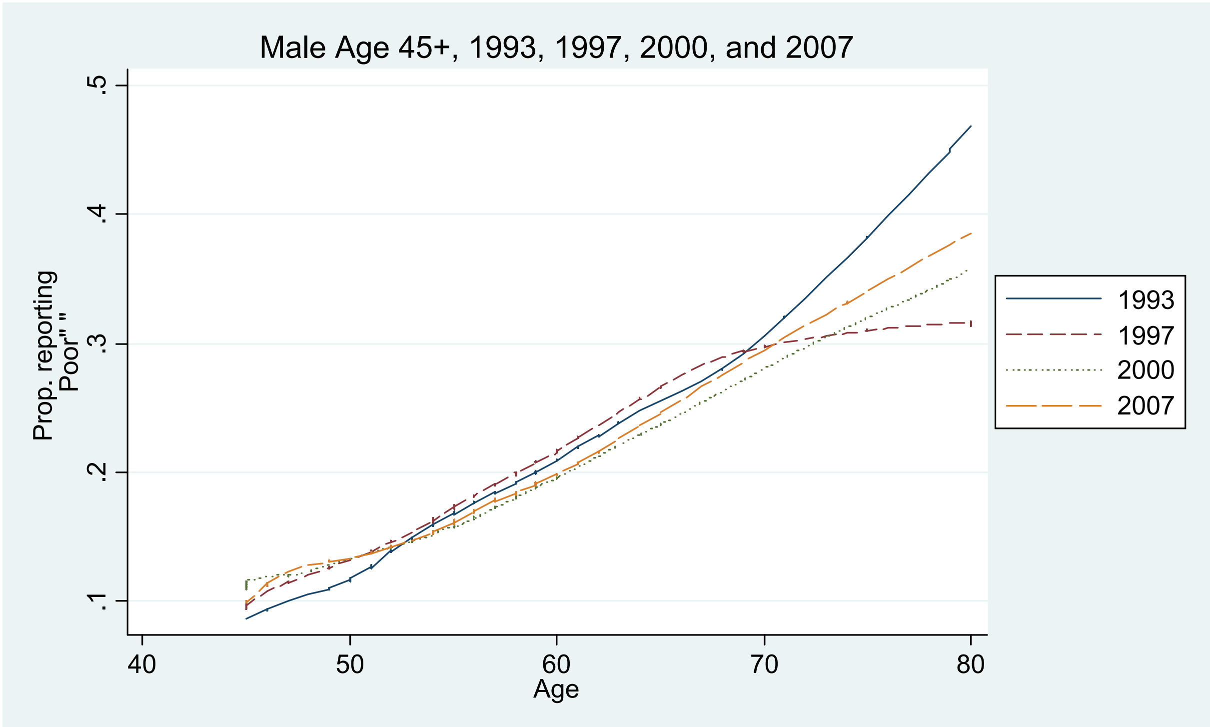


Table 15. Proportion reporting "somewhat unhealthy" or "unhealthy" to a GHS question, 1993, 1997, 2000, and 2007

	Men				Women			
Age groups	**1993**	**1997**	**2000**	**2007**	**1993**	**1997**	**2000**	**2007**
25-44 years								
% reporting "poor" health	6.89	6.65	8.71	10.06	8.62	9.52	11.39	13.17
Observations	*2,918*	*3,667*	*5,189*	*6,641*	*3,679*	*4,664*	*5,661*	*7,000*
45-54 years								
% reporting "poor" health	10.93	12.43	12.98	13.06	14.79	16.32	17.84	20.08
Observations	*1,070*	*1,231*	*1,487*	*1,883*	*1,237*	*1,342*	*1,575*	*2,122*
55-64 years								
% reporting "poor" health	21.26	20.88	18.16	18.20	23.62	21.75	22.33	24.71
Observations	*823*	*953*	*1,052*	*1,088*	*885*	*1,122*	*1,272*	*1,194*
65-74 years								
% reporting "poor" health	27.49	31.50	27.55	28.34	31.19	26.82	29.14	27.64
Observations	*451*	*508*	*628*	*681*	*404*	*548*	*731*	*785*
75+ years								
% reporting "poor" health	38.28	30.77	36.10	35.04	35.64	45.41	31.49	32.24
Observations	*128*	*195*	*277*	*254*	*101*	*185*	*289*	*304*
45+ years								
% reporting "poor" health	18.81	19.81	19.08	18.59	21.09	21.71	22.47	23.52
Observations	*2,472*	*2,887*	*3,444*	*3,906*	*2,627*	*3,197*	*3,867*	*4,405*

Source: IFLS1, IFLS2, IFLS3, and IFLS4

Observations are weighted using individual sampling weights.

Table 16. General Health Status

	General Health Status			
	Male		Female	
	Coeff.	t-stat	Coeff.	t-stat
Age group (dummy variables)				
55 or older	0.0310**	[2.452]	0.0107	[0.797]
65 or older	0.0660***	[4.206]	-0.0193	[1.218]
75 or older	0.0455**	[2.141]	0.0065	[0.311]
Years of education (dummy variables)				
At least some primary	0.0115	[0.825]	0.0391***	[2.969]
Completed primary school or more	0.0098	[0.774]	0.0139	[0.940]
Completed junior high or more	0.0012	[0.078]	0.0115	[0.554]
Education X age interaction				
Years of education X age	-0.0001***	[2.683]	-0.0002***	[2.979]
Per capita expenditures (splines) [a]		-0.0342***		-0.0110
0 - median pce	-0.0342***	[2.753]	-0.0110	[0.896]
>= median pce	0.0259	[1.518]	0.0232	[1.390]
Year dummy variables				
1997 and after	0.1297***	[4.100]	0.1251***	[3.538]
2000 and after	0.0586**	[2.011]	0.0114	[0.291]
2007	0.0387	[1.095]	0.1378***	[3.720]
Constant	0.4254***	[3.129]	0.1616	[1.212]
Observations	12705		14094	
R-squared	0.081		0.064	
Cohort dummy variables	**Yes**		**Yes**	
Province X rural dummy variables + province X rural X year interactions	**Yes**		**Yes**	
F-tests for joint significance:	F-stat	p(values)	F-stat	p(values)
Age group dummy variables	7.493	0.014	0.989	0.398
Education variables	0.494	0.687	3.360	0.019
Educ. vars + educ. age interactions	6.254	0.014	5.095	0.001
Cohort dummy variables	2.639	0.011	7.259	0.014
Per capita expenditures	5.913	0.003	1.215	0.298
Year dummy variables	10.71	0.014	15.03	0.014
Province x rural dummy variables	4.102	0.014	5.608	0.000
Year x prov x rural variables interactions	3.650	0.000	4.181	0.000

The dependent variable is a binary variable equals to 1 when an individual answers "*somewhat unhealthy*" and "*unhealthy"* to the question "*In general how is your health*" (see text), and 0 otherwise. t-statistics (in brackets) are based on standard errors that are robust to clustering at the community level. Significance at 10%(*), 5%(**), and 1%(***) indicated. The omitted group for age dummy variable is 45 and older, for education, "no schooling", and for province, Jakarta. Birth year cohort dummy variables included are: -1928, 1929-1933, 1934-1938, 1939-1943, 1944-1948, 1949-1953, 1954-1958, with 1959-1963 omitted. [a)] knot point is at the median pce, coefficient represent change in the slope.

Figure 14. Currently Smoking, Male 45+, 1993, 1997, 2000, and 2007

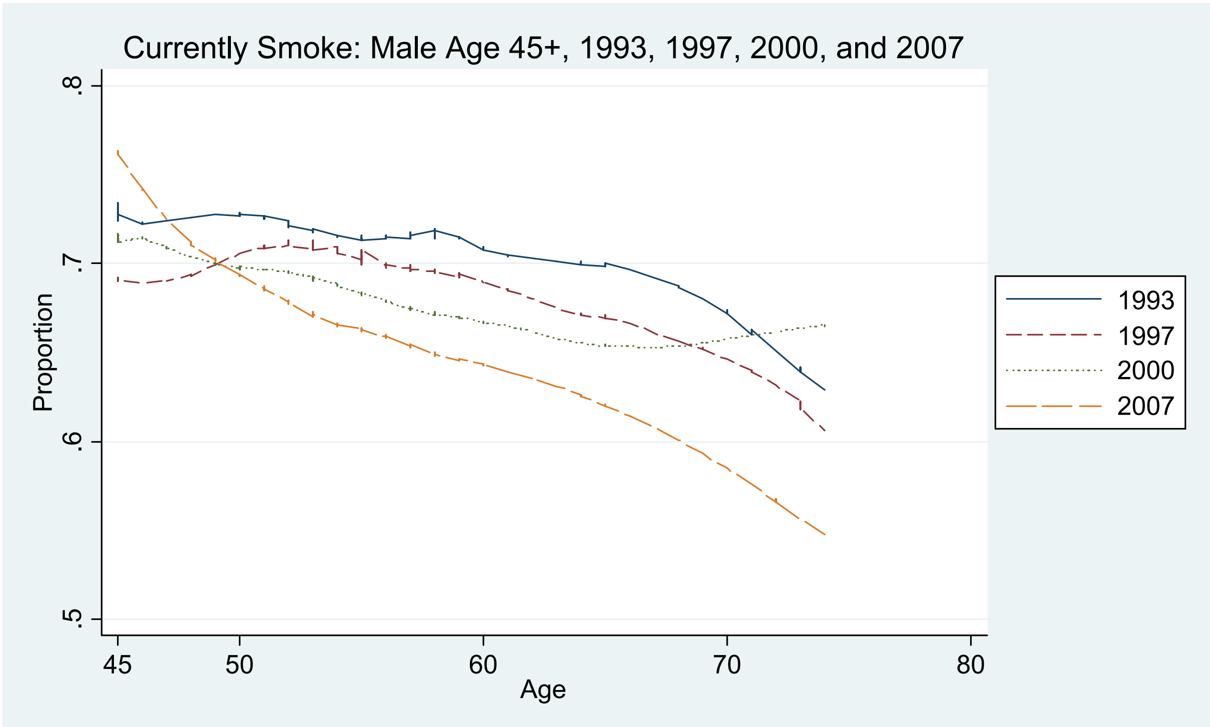


Table 17. Percentage of adults 25+ ever and currently smoke cigarettes or cigars 1993, 1997, 2000, and 2007

	Men				Women			
Age groups	**1993**	**1997**	**2000**	**2007**	**1993**	**1997**	**2000**	**2007**
25-44 years								
% ever smoked	75.12	76.78	75.05	73.97	3.15	2.68	2.26	1.75
% currently smoke	70.92	73.34	70.50	70.68	2.63	2.22	2.05	1.42
Observations	*3,202*	*3,288*	*4,980*	*6,447*	*3,749*	*4,466*	*5,574*	*6,904*
45-54 years								
% ever smoked	82.84	79.37	75.65	77.82	7.71	5.70	5.05	3.69
% currently smoke	77.75	72.99	70.10	71.19	7.45	5.33	4.59	3.29
Observations	*1,182*	*1,152*	*1,460*	*1,856*	*1,313*	*1,283*	*1,559*	*2,097*
55-64 years								
% ever smoked	83.45	81.59	81.94	75.21	10.88	7.72	7.96	4.15
% currently smoke	74.40	72.44	70.28	66.43	8.99	6.74	6.90	3.07
Observations	*900*	*889*	*1,026*	*1,070*	*1,017*	*1,075*	*1,251*	*1,181*
65-74 years								
% ever smoked	82.74	85.27	82.95	80.04	8.74	7.63	7.54	8.21
% currently smoke	72.52	68.15	67.43	63.92	6.26	6.97	5.40	6.27
Observations	*530*	*476*	*615*	*674*	*560*	*511*	*718*	*778*
75+ years								
% ever smoked	81.90	81.97	79.31	81.16	6.44	8.34	7.12	5.59
% currently smoke	65.61	69.84	60.90	66.50	4.14	7.76	5.95	4.70
Observations	*197*	*188*	*273*	*249*	*252*	*175*	*277*	*302*
45+ years								
% ever smoked	82.95	81.32	79.19	77.70	8.82	6.89	6.63	4.75
% currently smoke	74.84	71.74	68.92	68.29	7.47	6.24	.60	3.86
Observations	*2,809*	*2,705*	*3,374*	*3,849*	*3,142*	*3,044*	*3,805*	*4,358*

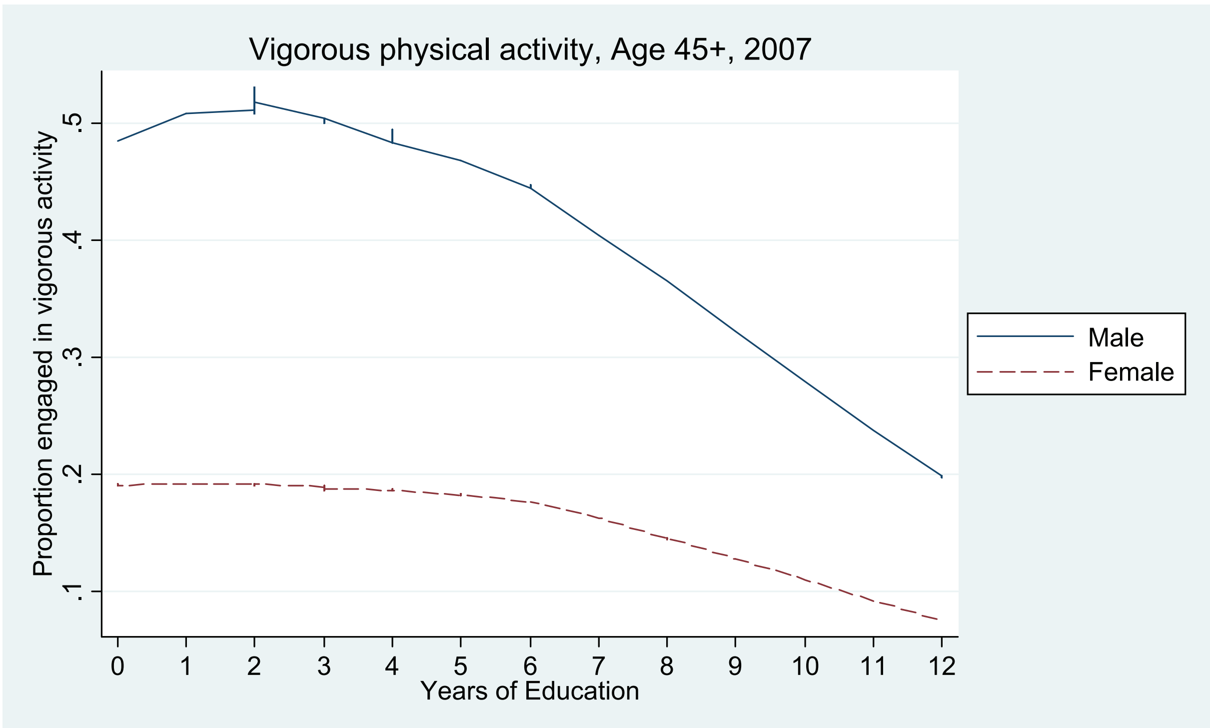
Source: IFLS1, IFLS2, IFLS3, and IFLS4
Observations are weighted using individual sampling weights.

Table 18. Currently smoking: linear probability model

	Smoking	
	Male	
	Coeff.	t-stat
Age group (dummy variables)		
55 or older	-0.0359**	[2.295]
65 or older	-0.0457**	[2.491]
75 or older	-0.0551**	[2.435]
Years of education (dummy variables)		
At least some primary	0.0672***	[3.631]
Completed primary school or more	0.0142	[0.797]
Completed junior high or more	-0.0149	[0.662]
Education X age interaction		
Years of education X age	-0.0003***	[6.040]
Per capita expenditures (splines) [a]		
0 - median pce	0.0133	[0.866]
>= median pce	-0.0442**	[1.977]
Year dummy variables		
1997 and after	-0.0106	[0.295]
2000 and after	0.0114	[0.401]
2007	-0.0005	[0.013]
Constant	0.5972***	[3.497]
Observations	13067	
R-squared	0.095	
Cohort dummy variables	**Yes**	
Province X rural dummy variables + province X rural X year interactions	**Yes**	
F-tests for joint significance:	F-stat	p(values)
Age group dummy variables	4.029	0.008
Education variables	5.427	0.001
Educ. vars + educ. age interactions	36.91	0.000
Cohort dummy variables	1.335	0.232
Per capita expenditures	3.219	0.041
Year dummy variables	0.075	0.974
Province x rural dummy variables	7.144	0.000
Year x prov x rural variables interactions	2.613	0.000

The dependent variable is a binary variable equals to 1 if the individual was currently smoking, 0 otherwise. t-statistics (in brackets) are based on standard errors that are robust to clustering at the community level. Significance at 10%(*), 5%(**), and 1%(***) indicated. The omitted group for age dummy variable is 45 and older, for education, "no schooling", and for province, Jakarta. Birth year cohort dummy variables included are: -1928, 1929-1933, 1934-1938, 1939-1943, 1944-1948, 1949-1953, 1954-1958, with 1959-1963 omitted. [a)] knot point is at the median pce, coefficient represent change in the slope.

Figure 15. Proportion of Age 45+ Engaging in Continuous Vigorous and Moderate Physical Activity for at Least 10 Minutes in the Last Week, by Education



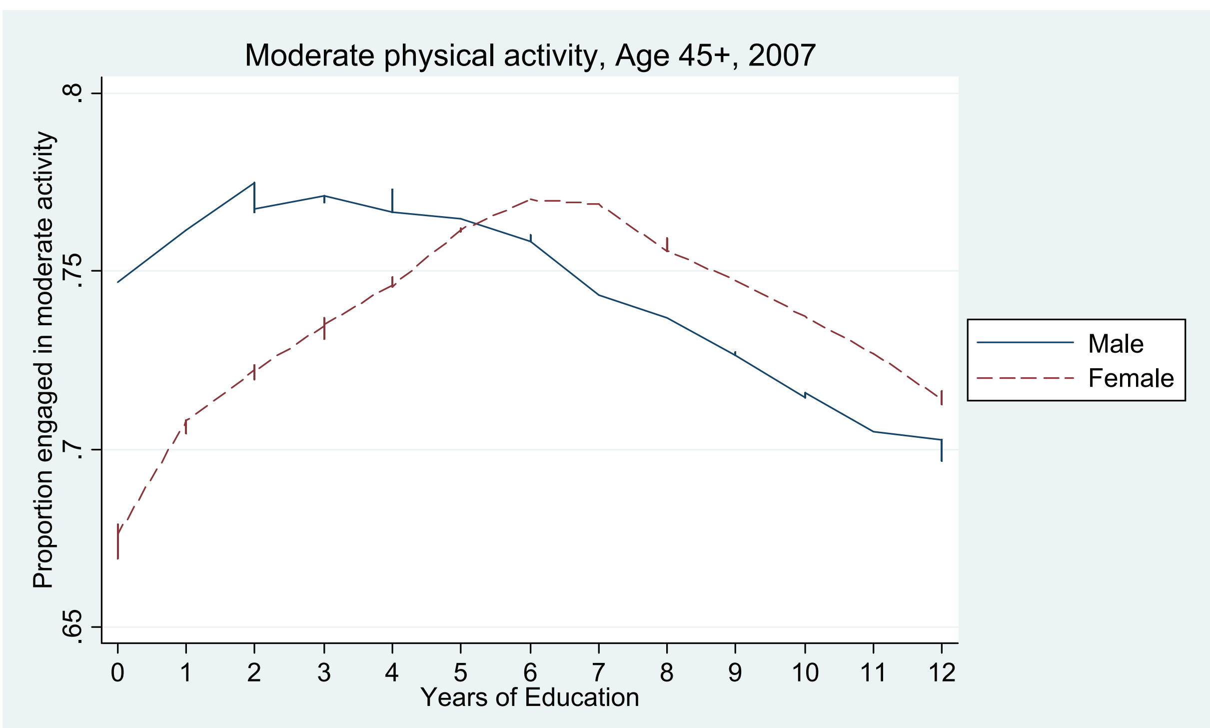


Table 19. Proportion of adult 25+ engaging in vigorous or moderate physical activity continuously for at least 10 minutes in previous week, 2007

	Vigorous		Moderate	
Age groups	**Male**	**Female**	**Male**	**Female**
25-44 years				
% engaged in physical activity	52.58	17.57	83.09	83.31
Observations	*6,447*	*6,904*	*6,447*	*6,904*
45-54 years				
% engaged in physical activity	48.21	22.66	80.40	82.49
Observations	*1,856*	*2,097*	*1,856*	*2,097*
55-64 years				
% engaged in physical activity	44.68	17.27	78.17	72.29
Observations	*1,070*	*1,181*	*1,070*	*1,181*
65-74 years				
% engaged in physical activity	35.15	13.32	69.37	65.68
Observations	*674*	*778*	*674*	*778*
75+ years				
% engaged in physical activity	24.19	5.43	53.04	41.33
Observations	*249*	*302*	*249*	*302*
45+ years				
% with any difficulty	43.39	18.34	76.08	73.87
Observations	*3,849*	*4,358*	*3,849*	*4,358*

Source: IFLS4
Observations are weighted using individual sampling weights.

Table 20. Physical activities: linear probability models

	Vigorous Physical Activity				Moderate Physical Activity			
	Male		Female		Male		Female	
	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat	Coeff.	t-stat
Age group (dummy variables)								
55 or older	-0.0386**	[-2.126]	-0.0717***	[-5.056]	-0.0251	[-1.626]	-0.0962***	[-6.369]
65 or older	-0.1070***	[-4.928]	-0.0646***	[-4.102]	-0.1104***	[-5.204]	-0.0597***	[-2.744]
75 or older	-0.1702***	[-5.157]	-0.0811***	[-5.246]	-0.2005***	[-5.563]	-0.2549***	[-7.919]
Years of education (dummy variables)								
At least some primary	0.0958***	[3.461]	-0.0318	[-1.472]	0.0285	[1.096]	0.0484**	[2.267]
Completed primary school or more	-0.0260	[-1.042]	-0.0127	[-0.621]	0.0082	[0.364]	0.0487**	[2.127]
Completed junior high or more	-0.0514*	[-1.679]	-0.0463*	[-1.872]	-0.0160	[-0.554]	0.0225	[0.743]
Education X age interaction								
Years of education X age	-0.0003***	[-4.795]	-0.0000	[-0.736]	-0.0001	[-0.893]	-0.0002*	[-1.840]
Per capita expenditures (splines) [a]								
0 - median pce	-0.0631**	[-2.539]	-0.0188	[-0.887]	-0.0551***	[-2.664]	-0.0155	[-0.739]
>= median pce	0.0132	[0.378]	0.0153	[0.515]	0.0475	[1.368]	0.0036	[0.116]
Constant	1.1808***	[3.745]	0.4743*	[1.755]	1.3481***	[4.933]	1.0155***	[3.806]
Observations	3902		4403		3902		4403	
R-squared	0.153		0.076		0.092		0.127	
Cohort dummy variables	**No**		**No**		**No**		**No**	
Province X rural dummy variables + province X rural X year interactions	**Province X rural**		**Province X rural**		**Province X rural**		**Province X rural**	
F-tests for joint significance:	F-stat	p(values)	F-stat	p(values)	F-stat	p(values)	F-stat	p(values)
Age group dummy variables	39.938	0.000	55.739	0.000	37.555	0.000	62.699	0.000
Education variables	6.968	0.000	1.426	0.234	0.873	0.455	3.114	0.0260
Educ. vars + educ. age interactions	36.00	0.000	9.960	0.000	1.243	0.292	2.476	0.0436
Per capita expenditures	10.07	0.000	0.606	0.546	4.732	0.00924	0.794	0.453
Province x rural dummy variables	6.138	0.000	6.276	0.000	7.707	0.000	10.15	0.000

The dependent variable is a binary variable equals to 1 if the individual engaged in vigorous (moderate) physical activities in the past week, and 0 otherwise (see text). Questions about physical activities were only asked in 2007. t-statistics (in brackets) are based on standard errors that are robust to clustering at the community level. Significance at 10%(*), 5%(**), and 1%(***) indicated. The omitted group for age dummy variable is 45 and older, for education, "no schooling", and for province, Jakarta. [a)] knot point is at the median pce, coefficient represent change in the slope.