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Assessing heterogeneity in the health effects of social pensions among the poor elderly: evidence from Peru*

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Abstract

This paper exploits the discontinuity around a welfare index of eligibility to assess the heterogeneous health impacts of Peru's social pension program *Pension 65,* which focuses on elderly poor individuals. The heterogeneity is analysed with regards to the treatment exposure (short vs long run), the accessibility to health care infrastructure (near vs distant facilities), and gender. Overall, we find improvements in anaemia, mortality risk markers, cognitive functioning, mental health, and self-reported health among eligible individuals; yet there is an increase in the risk of obesity among women, as well as an increase in reported chronic diseases. The program improves the quality of nutrition and health care access, but reduces the frequency or intensity of physical activities. About half of the effects on the analysed outcomes persist in the longer run and living in a district with good access to facilities stands out as the most relevant characteristic enhancing the beneficial program effects. Overall thus, the resulting health benefits in areas of under-nutrition are at most modestly compensated by deterioration in over-nutrition related conditions. As the program evolves further, policymakers need to confront the challenge of continuing to ensure the health benefits in terms of reducing nutritional deficits and the lack of health infrastructure while avoiding potential undesirable side effects in terms of over-nutrition in a geographically diverse country like Peru.

Key words: social pensions, health, nutrition, poverty, ageing

JEL-classification: H55, I12, I31

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1 Introduction

In many ways, the ageing of societies is a global success story, in that it reflects major achievements in terms of declining fertility and mortality. Such success, however, has also come with challenges. While today's high income countries have undergone a comparatively slow process of ageing, giving governments and populations time to build and develop the infrastructure and institutions to deal with the growing numbers and proportions of elderly people, many low and middle income countries (LMICs) have been undergoing the 'demographic transition' more recently and at a much faster speed. Such trends are associated with challenges in terms of fast rising healthcare and social assistance needs. Most Latin American countries (LACs) have been (and will be) particularly exposed to the extra-burden posed by the fast ageing process (Cotlear (2010)). The exceptionally high levels of income inequality in LACs and the low coverage of social protection systems in the region (Altamirano et al. (2018); Bosch et al. (2013)) add a particular socioeconomic dimension to the challenge, underlining the need to adapt social protection systems at a faster rate – and possibly in different ways – than in high income countries. This need has been all but reinforced via the current COVID-19 pandemic, which is likely to further exacerbate inequalities, underlining the key role of social protection systems in providing support to individuals during the crisis (UN (2020)).

Over recent years, 15 Latin American countries have implemented Non-Contributory Pension (NCP) programs, with the primary objective to reduce poverty among the vulnerable, often uninsured elderly population. The schemes typically offer a regular transfer to elderly individuals who are not entitled to receive any other pension and live in poverty. While transfer generosity, coverage (targeted or universal) and access conditions vary in the region, the reforms do represent a step-change in the strategy to deal with social protection and poverty in old-age, in light of the popularity and inherent long-term fiscal commitment of these programs. This change may be seen as a response to the privatization of pensions that had occurred during the 1990's and 2000's, which had improved the financial sustainability of pension systems across Latin America, but failed to lift the low coverage rates (Rofman and Oliveri (2011)). NCP programs have then been implemented to offer a 'quick fix' to increase the pension coverage, if with still generally low transfer amounts.[1]

Despite the promise raised by the new schemes, it is important to rigorously assess their impacts on different dimensions of the well-being of the recipients. The vast majority of the existing research has focused on assessing the impact of the programs on the economic welfare of the individuals and households (Lloyd-Sherlock and Agrawal (2014)), showing that many of them have achieved their stated objective of poverty reduction with remarkable success (Barrientos (2012); Long and Pfau (2009)). There has been far less attention to other relevant welfare

[1] In Figure A.1 of the Appendix we show the main features of NCP programs in Latin America as of 2018, i.e. the annual cost and the coverage rate of the elderly population. We observe that Peru is one of the countries reporting one of the lowest costs (0.1% of GDP) and one of the lowest coverage rates of the population aged 60 and over (16%).

outcomes, most notably health.

The focus on economic outcomes might be legitimate, if it could be assumed that, by meeting pensioners' economic needs, income support for the elderly would also improve other aspects of well-being, including health and nutrition. While intuitive, this hypothesized link is by no means automatic and will depend on several factors. The relationship between pension income and health may be particularly nuanced (and indeed even negative) in the context of nutritional health outcomes, given that individuals make food choices based on preferences, and those preferences may or may not align with maximizing the nutritional quality of the food intake (Variyam (2003)). The capacity to convert pension income into better health also depends on the availability of suitable health services, which is often very limited, particularly in rural and remote areas (WHO (2008)). The existing health systems were developed around a set of demographic and epidemiological conditions dominated by infectious diseases and malnutrition, and are thus less fitting to address the needs and priorities of a fast-growing older population often affected by chronic conditions and functional limitations (Beard et al. (2012)). While no single best strategy of improving the health of the elderly appears to be known yet, it is becoming increasingly clear that a broader public health approach (focused not only on economic outcomes) should be an integral part of an effective policy (WHO (2015); PAHO (2019)).

In this paper, we assess the heterogeneous impact of *Pension 65*, a non-contributory pension program in Peru, on the health of the elderly, measured via a uniquely broad battery of health indicators, allowing a particular focus on nutrition-related health outcomes. In particular, we obtain the heterogeneous effects of receiving the program over time, by gender, and by accessibility to health care facilities. The variation around a welfare index as a natural experiment that randomly assigns eligibility of the individual to the program also affords a rare opportunity to evaluate its effects using a rigorous Regression Discontinuity Design (RDD). We exploit a survey that includes rich health information and has been explicitly designed to account for the discontinuity around eligibility, which allows estimating intention-to-treat (ITT) effects. The ESBAM survey (*Encuesta de Salud y Bienestar del Adulto Mayor*) contains matched administrative information of the welfare index (the IFH index) that we treat as the running variable for the RDD. Individuals scoring just below their regional IFH threshold of extreme poverty are eligible to the program, while individuals scoring just above the threshold are ineligible and act as the control group.

In addition, we explore three potential transmission channels that may account for the link between *Pension 65* and the health effects (or the absence thereof): nutritional outcomes and food choices, activities as a proxy of sedentary or active lifestyle, and health care utilization. First, the nutritional channel is important given the complex nutritional health situation in Peru, where its socioeconomic and demographic development has brought about a complex "double burden of malnutrition": the co-existence of a considerable prevalence of overweight and obesity (and of associated chronic diseases) in parallel to a still high prevalence of chronic malnutrition (Torres-Roman et al. (2017))[2]. For instance, although cardio-vascular disease (CVD) risk factors are higher among people living in urban areas and those of higher socioeconomic characteristics, there is recent evidence showing faster increases in body mass index and waist circumference in less urbanized regions[3]. This suggests that the emerging transition from traditional to unhealthier diets in Peru could be reaching rural populations. Hence we take into account potential adverse nutrition-related effects in our assessment of a program that targets largely (though not exclusively) pensioners living in rural areas[4]. Second, the money received through the program can give rise to substitution and income effects, which can affect the number of activities (including work) and the level of physical effort of pensioners, which in turn might affect health outcomes. And third, the income transfer of *Pension 65* can increase the adoption of higher-quality medical care through the use of different medical services and treatments that could not be accessible without the program.

Rare recent evidence on the impact of pension income on health includes research on South Africa showing that the transfer has a positive effect on perceived health of household members, improves the children's nutritional status and reduces the incidence of household members skipping meals due to lack of money (Duflo (2003); Case (2004); Case and Menendez (2007)). Using data on Russia, Jensen and Richter (2004) found adverse effects of exogenous negative income shocks, showing that pension loss, associated with the Russian pension crisis, has led to worsened health and higher mortality rate among the pensioners. For China, Cheng et al. (2018) have demonstrated that pension enrollment and income from the New Rural Pension scheme have improved objective measures of physical health, cognitive function, and psychological well-being of the rural elderly, as well as reducing mortality. Those outcomes appear to have been achieved via improved nutrition intake, better accessibility to health care, increased informal care and leisure activities, and a better self-perceived relative economic situation.

Mexico has also implemented a NCP (the '*70 y más*'), aimed at improving the living conditions of adults aged 70+. A comprehensive evaluation of the health and nutritional effects of the program (Salinas-Rodriguez et al. (2014)) indicated a statistically significant boost to the

[2]Although the majority of regions in Peru suffer from the double-burden of malnutrition (Chaparro and Estrada (2012)), the rates for under nutrition, obesity and non-communicable diseases (NCDs) vary across regions (McCloskey et al. (2017); Miranda et al. (2011)). For instance, the rate of stunting among children varies from 3% to 55% between regions (Martínez and Palma (2014)), and the prevalence of overweight and obesity varies from over 50% in coastal areas, including Lima, to between 40-50% in central and northern regions to below 30% in Huancavelica (Chaparro and Estrada (2012)).

[3]See Carrillo-Larco et al. (2016); Benziger et al. (2018) and Carrillo-Larco et al. (2018).

[4]The co-existence of both "over" - and "under"- nutrition makes anticipating the impact of any income transfer on nutrition (and hence health) difficult. While there is abundant evidence of greater financial means helping individuals overcome situations of food and calorie scarcity, thereby mitigating problems of under-nutrition (Haddad et al. (2003)), there is the risk of higher incomes contributing to excess calories or to the intake of more processed (and less nutritious, lower quality) foods and beverages (Popkin (2009)). This in turn may promote overweight and hypertension, as well as associated chronic diseases. In the specific Peruvian situation, it is important to understand, first, whether such compensating effects are happening, and if so, to whom they apply. This in turn would inform policymakers aware of potential unintended (health) consequences of NCP policies (and social protection policies in general). This may then help inform the design of complementary or alternative policies, addressing the complex health needs of an elderly population in demographic transition.

amount and adequacy of protein and carbohydrate intake, with particularly beneficial effects among women, indigenous groups and those in the lowest socio-economic group. The authors also found a beneficial impact on mental health, while no effects were detected on body mass index.

A recent study on Peru, Bando et al. (2020), also using the ESBAM data, examined the impact of the *Pension 65* program primarily on labour market outcomes, but also presenting results on a set of mental health and well-being outcomes. They find that the program reduces the proportion of older adults engaging in paid work, increases household consumption by 40%, and improves overall well-being, including mental health[5]. Our study adds to this research by zooming in more extensively on a broader set of particular nutrition-related health indicators, by disentangling the heterogeneity of potential effects (over time, by gender and by accessibility to health care facilities), and by exploring underlying mechanisms.

In our study, we find improvements in self-reported health, cognitive functioning, mortality risk markers, anaemia and mental health among eligible individuals. At the same time, we find some, if not strong, evidence that the program has increased the risk of obesity among women (though not for men). We also find that the number of self-reported diagnosed chronic diseases increase (although this could be attributed to more frequent health service use and diagnosis rather than an actual increase in the conditions). Other objectively measured chronic disease risk factors (e.g. blood pressure) saw no significant change. Overall thus, the resulting health benefits in areas of under-nutrition are at most very modestly compensated by deterioration in over-nutrition related conditions.

Among the channels, we find that the program improves the quality of nutrition and health care access, but reduces the performance of different activities. About half of the effects of all our indicators (18 out of 37) persist in the longer run (i.e. over more than two years), yet some are short-lived. From among the characteristics that boost the program effects, residing in a district with good access to health care facilities stands out as the most relevant one. A geographical diverse country like Peru lacks adequate and widely available health infrastructure, but addressing these challenges may boost the health effects of a social pension program.

The rest of the paper is organized as follows. Section 2 provides a overview of the *Pension 65* program. Section 3 describes the data and variables used. Section 4 presents our identification strategy to find the effects of the program in the RDD analysis. Section 5 presents our results, including an analysis of heterogeneous effects by intensity of the treatment, gender, residence area and access to health care facilities. Section 6 implements and discusses various robustness checks for the assumptions behind our design, and for our main findings. Lastly, Section 7 concludes.

[5] Other studies using ESBAM data are Olivera and Tournier (2016) and Decancq et al. (2019). The first study uses the baseline data of 2012 to assess the determinants of *successful ageing* in combination with a multi-dimensional poverty counting approach; while the second study uses a Dif-in-Dif design to study the normative properties of a multidimensional index of well-being.

2 Institutional background

Peru introduced the non-contributory pension program *Pension 65* in October 2011. The program, administered by the Ministry of Development and Social Inclusion (MIDIS), has two components. The first one is a transfer of 250 Soles paid every other month (about 31 USD per month) and the second one is the access to the public health insurance *Seguro Integral de Salud* (SIS), which involves access to care in public health facilities at no cost. The transfer amount – that has not changed since its introduction in 2011 – is equivalent (in monthly per capita basis) to 79.1% and 64.1% of the official poverty lines in rural and urban areas in 2019, respectively. In 2015, the year we use for our evaluation, the transfer represented 87.4% and 70.6% of the rural and urban extreme poverty lines. Although the transfer is relatively close to the extreme poverty line, note that the amount is only 29% of the average per capita household income in the rural area and 12% in the urban area in 2015 (INEI (2015)). The program is the second largest social program in Peru at a cost of about 0.11% of GDP (see Figure A.2) and reporting 557,043 recipients by 2019, that represents 20% of the population aged 65 and over.[6]

To be eligible to *Pension 65*, individuals must be at least 65 years old, not receiving pensions from any contributory pension system, and need to live in households officially classified as extreme poor. To verify whether a household is extremely poor, the program uses the official targeting system SISFOH (*Sistema de Focalización de Hogares*). This is a unified household registry that is maintained and used to compute targeting indicators for the social assistance policy in Peru. The registry draws on information about the socio-economic conditions of the households, that is collected by government officers. The largest roll-out of a census aimed to collect this data occurred in 2012, which is used to set up the sample framework of the survey we exploit in this study. The variables collected comprise: the access to basic infrastructure and its quality (water, electricity, sewage), fuel quality, material quality of the dwelling, home overcrowding, education attainment, home assets and health insurance access.

The information of the roll-out census is used to compute a weighted welfare index for the household, called IFH (*Índice de Focalización de Hogares*), which follows an official methodology involving distinctive region-specific weights for the variables, and regional cut-offs to establish poverty classification groups. Once the index is computed for each household, this is compared with regional specific thresholds in order to determinate whether the household is classified as i) extreme poor, ii) non-extreme poor, or iii) non-poor. The classification is valid for a period of 3 years in urban areas and 4 years in rural areas. Importantly, the individuals do not

[6]One year before the introduction of *Pension 65*, the government implemented a small scale pilot program of social pensions called *Bono Gratitud*, running from October 2010 to August 2011. The number of recipients reached 21,783 in August 2011 and were located in 14 departments: Amazonas, Ancash, Apurímac, Ayacucho, Cajamarca, Cusco, Huancavelica, Huánuco, Junín, La Libertad, Piura, Puno, Lima (metropolitan area), and Callao. While the eligibility conditions to access to this program were a minimum age of 75 and belonging to an extreme poor classified household, the transfer amount was 100 Soles. The roll-out of *Pension 65* started in October 2011 with the individuals living in the poorest districts located in six prioritized departments (Apurímac, Ayacucho, Huancavelica, Puno, Ica and Huanuco). Then, in May 2012 the affiliation was extended to include the fourteen departments were the *Bono Gratitud* pilot program was in place.

know neither the algorithm to compute the index nor the score; they only know their poverty classification. Although the issue of manipulation of eligibility is an important challenge for social programs and the identification of causal impacts, we have not detected manipulation in the index around the eligibility threshold to the program (Section 6 deals with the analysis of manipulation).

People not surveyed in the roll-out censuses can apply to *Pension 65* at the municipality where they reside, and obtain an official poverty classification. The individual can be enrolled in the program as soon as the eligibility is confirmed, which takes around 25 days. Another way for enrollment is by means of information campaigns about the program that are jointly organized by local governments and officers from *Pension 65*. The program also search for potential recipients who have not been yet classified in SISFOH or who have not received yet their official identity document (DNI), which is needed to assess the eligibility. These channels indicate that participation in the program is not fully assured because the individual is eligible, but requires an application to the program and validation of the extreme poverty condition.

3 Data

3.1 The ESBAM survey

We use data from the *Encuesta de Salud y Bienestar del Adulto Mayor* (ESBAM), which was collected by the Peru's National Institute of Statistics (INEI) at the request of the Ministry of Economy in order to implement the impact evaluation of *Pension 65*. The baseline survey was carried out between October and November of 2012, while the follow-up survey was collected between July and September 2015. The survey was collected in 12 (out of 24) departments that had completed the roll-out of the SISFOH collection data, so that the sample framework design only considered these departments.[7] The sample framework was intentionally designed to implement an RDD utilizing the follow-up survey. This framework is composed of households where at least one member is aged between 65 and 80 and have a SISFOH score within 0.3 standard deviations above or below the threshold for extreme poverty. This design intends to obtain very similar households located around the eligibility threshold for *Pension 65*.

The sampling procedure to select the households for ESBAM is probabilistic, independent in each department, and stratified by rural and urban areas. The primary sampling units (PSU) are defined as the census units in urban areas (blocks) and villages (*centro poblado*) in rural areas. In a first step, there is selection of PSU within each department and area according to a selection probability that is proportional to the total number of households. Then, in a second step there is a systematic random sampling of households.[8]

[7] These departments are Amazonas, Ancash, Cajamarca, Cusco, Huánuco, Junín, La Libertad, Loreto, Pasco, Piura, Puno and Lima (provinces). Thus, our results do not necessarily apply to the whole population of poor elderly in Peru.

[8] For more methodological details consult MIDIS (2013).

The Figure A.3 in the Appendix confirms that the ESBAM sample is indeed very local when we compare the IFH values of this sample with the national IFH distribution. Households located in the right side of the threshold are non-extreme poor (i.e. ineligible for the program) but are very close to qualify as extreme poor, and households located in the left side of the threshold are extreme poor and just eligible for *Pension 65*.

The design of ESBAM basically compares the outcomes of those eligible individuals with that of those ineligibles due to non-extreme poverty status. Any difference observed between these two groups could be attributed to the effect of *Pension 65* at the extreme poverty threshold, for the eligible group. Section 4 shows graphically the local design of ESBAM and discusses with more detail the identification strategy.

3.2 Sample selection

We use the ESBAM follow-up survey of 2015 to run our RDD. The final sample is composed of 3,351 individuals, of which 2,190 are eligible and 1,161 are ineligible. This means that the individuals from these groups have an IFH just above or below the extreme poverty threshold, respectively. To arrive at this number, we drop the following observations: 193 individuals that did not have IFH information, 105 who received the *Pension 65* transfer before the baseline survey, 82 with no information about receiving the *Pension 65* transfer, 57 classified as non-poor, 4 who were younger than 65 at the 2012 baseline survey, and 36 who are eligible and are receiving other pension benefits. This means that from an initial number of 3,828 observations collected in 2015, we dropped a total of 477 observations. These selections are implemented in order to be able to use the IFH as the running variable in our RDD and to remove individuals who violate the sample framework (e.g. persons below age 65, being program recipients at baseline, receiving other pensions or being non-poor) and have key information for the RDD (e.g. being or not a recipient).[9]

3.3 Variables

The ESBAM survey includes information about the living standards of the elderly, demographics, well-being, beliefs, time use, nutrition, utilization of health services, subjective and objective health variables, anthropometric measures and bio-markers, among others. The survey also includes household-level information such as consumption and income, and demographic characteristics of other members. The information regarding the IFH score and whether and when the respondent received the transfer come from administrative registers.

[9]It is important to note that a similar sample selection procedure applied to the ESBAM baseline survey of 2012 reports a sample of 3,728 individuals, meaning that there is information from both baseline and follow-up years for 3,351 individuals, but not for 377 individuals who are lost due to attrition. However, this will hardly bias our estimates as we detect that the relationship between attrition and eligibility is not significant (*p-value* = 0.56). For more details, check the report by MEF (2016) and section 6.

3.3.1 Objective health measures

ESBAM includes the measurement of the following objective health markers that have been collected by qualified personnel: arterial blood pressure, blood sampling to determine the presence of anaemia, and anthropometric measures such as weight, waist circumference, mid-upper arm circumference (MUAC), calf circumference (CC), and arm-span. The anthropometric indicators are often included in geriatric health assessment, showing a strong predictive value for health status, mortality, nutritional status, and diseases. These measures may be more appropriate than the well-known Body Mass Index (BMI) to measure nutrition status and frailty among the elderly due to the changes in body composition during ageing. For example, abdominal fat accumulation (which can contribute to disability and functional limitations) is better captured by increased waist circumference than by BMI (Seidell and Visscher (2000); Seidell and Flegal (1997)). Waist circumference is also more closely associated with risks of cardiovascular disease and diabetes than BMI (Donahue et al. (1987); Rexrode et al. (1998); Bjorntorn (1997)). It is also difficult to obtain a correct measure of height among older adults due to shrinking and curvatures. We use a measure for abdominal obesity according to the cut-offs for waist recommended by the Latin American Diabetes Association (see ALAD (2010), Pajuelo-Ramirez et al. (2019)).

MUAC captures the nutritional status among older individuals. Due to its simplicity and the shrinking of old individuals, some studies have recommended their general use among the elderly individuals from developing countries instead of the BMI (Suraiya (1999); James et al. (1994)). Low muscle mass and/or low fat mass in older individuals (captured by low MUAC, an indication of thinness) contributes to the risk of mortality among older individuals (Wijnhoven et al. (2010); Schaap et al. (2018); Weng et al. (2018)). Reductions in MUAC among people with an initial low MUAC are more strongly correlated with mortality than reductions in BMI (Schaap et al. (2018)). There is some evidence suggesting that MUAC has a stronger association with mortality than alternative anthropometric measures (de Hollander et al. (2013)).

CC also captures nutritional status. It has been found that low CC is more strongly associated with mortality than BMI (Wijnhoven et al. (2010)). Weng et al. (2018) and other studies find a significant positive association between CC and the level of serum albumin, which is used to determine nutritional status. The subjects analysed in Weng et al. (2018) who are in the highest tertile of MUAC (27.8±2.2 cm) and CC (32.1±2.6 cm) were shown to have a significantly lower mortality rate than the subjects in the lowest tertile.

Arm span can capture childhood development and nutritional status (Huang et al. (2013); Maurer (2010)). Moreover, it is considered a suitable surrogate for height, and one that is more reliable than alternative measures, due to the shrinking of the elderly individuals (Huang et al. (2013)). For instance, de Lucia et al. (2002) used a proxy for BMI – based on arm span instead of height – to assess malnutrition, while Datta Banik (2011) found no statistically significant difference between height-based BMI and estimated arm span BMI.

The state of the cognitive functioning is captured by a reduced version of the Mini-Mental State Examination (MMSE) (Folstein et al. (1975)), which has also been used in other Latin American countries in order to take into account the high incidence of low literacy among older adults (Albala et al. (2005); Maurer (2010)). The score ranges from 0 to 14, depending on how many tasks (incl. memory, orientation, actions and visual/spatial ability) the individual performs correctly (see Leist et al. (2020) and Novella and Olivera (2017) for more details).

3.3.2 Self-reported health measures

The survey contains questions to compute the Mini-Nutritional Assessment (MNA). This indicator assesses the risks of under-nutrition and malnutrition of elderly individuals (Guigoz (2006); Harris and Haboubi (2005); Vellas et al. (1999); Morley (2011)). The questions are related to diet quality, mobility, disease history and anthropometric measures. The MNA has been used in the SABE survey (the Survey on Health and Well-being of Elders), a large-scale study carried out in the 2000s in seven capital cities of Latin America (Albala et al. (2005); Lera et al. (2016)). For Peru, Leist et al. (2020) and Olivera and Tournier (2016) have used the MNA of ESBAM to study the relationship between nutritional status and cognitive functioning as well as multidimensional deprivation.

Other self-reported measures comprise the chronic diseases as indicated by respondents from a list of 13 diseases (and whether they were medically diagnosed) and the depression symptoms measured with the Geriatric Depression Scale (Sheikh and Yesavage (1986)). The ESBAM also includes questions about respondents' subjective self-assessment of their well-being and health status, at the moment of the survey interview, with respect to last year, and with respect to other people of same age.

3.3.3 Other variables

Other key variables for our analysis are health care utilization, out-of-pocket medical expenses, proxies for active and sedentary lifestyles (time use, physical exercise, participation in events, etc.). For a detailed list of all variable definitions, see Appendix B, and for descriptive statistics, see Appendix C.

4 Identification strategy

According to the institutional setup, an individual is eligible to *Pension 65* if she is at least 65 years old, does not receive any pension, and lives in a household classified as extremely poor by the targeting system SISFOH. This means that the value of the welfare index (IFH) obtained by the household is below the cut-off separating between extreme poor and non-extreme poor. Variation of the index around the extreme poverty threshold provides a natural experiment that randomly assigns program eligibility. Thus, the control group are the individuals who are very close to the cut-off, but are narrowly ineligible. Following Bernal et al. (2017), we use a Sharp Discontinuous Regression Design (RDD) that includes the IFH as a running variable.

The potential effect of *Pension 65* is identified by the difference between the average value of the outcome below the extreme poverty cut-off (eligible) and the average value of the outcome above the cut-off (not eligible). Formally, we use the following econometric specification to find the expected effects and assume linearity as a starting point, so that we can estimate the expected effects of being eligible, i.e. the intention-to-treat effects (ITT).

$$y_i = \beta_0 + \beta_1 z_i + \beta_2 elig_i + \beta_3 z_i elig_i + X_i^{'} \beta_4 + \varepsilon_i \tag{1}$$

where y_i indicates a health outcome variable in particular, z_i is the IFH index centered at its specific regional threshold, $elig_i$ is an indicator for the program eligibility, which takes a value of 1 when $z_i < 0$ (that is, eligible) and takes value 0 otherwise, and X_i is a vector of controls. Our coefficient of interest is β_2, which we estimate with ordinary least squares (OLS). The regression controls are gender, age, years of education, head of household status, and married status. ε_i denotes the error term clustered at the primary sampling unit level.[10]

Our strategy has three assumptions. First, if there is no transfer or if the transfer was assigned to everybody around the threshold, then the respective expectation of the outcome conditional on the index would be smooth in the index z_i around zero. This assumption cannot be tested directly and is, therefore, the main assumption we make. As we have argued, the institutional rules suggest that it holds, as no other programs or rules are based on this extreme poverty threshold for people 65+. Moreover, this assumption will be supported by the sensitivity analysis of Section 6. The second assumption is that the recipient status is monotone in eligibility. This holds by construction, because changing from a value of the index slightly higher than the threshold to a value lower than the threshold directly makes an individual eligible. In that sense, monotonicity automatically holds. The final, third assumption is an exclusion restriction. It is that in a small neighbourhood around the eligibility threshold, the mean of the index, is independent of the outcomes, and in particular of ε_i. It would be violated if households could manipulate their answers in order to influence the value of the index. In Section 6, we provide evidence that there is no such violation, together with other robustness checks to assess the sensitivity of our results to a particular specification and whether the identifying assumptions can be supported by additional evidence.

It is worth mentioning that we use the sharp type design because we observe a high jump in the probability of receiving the transfer around the eligibility cut-off (see figure A.5). The main implication is that the expected effects (ITT) are mathematically similar to the Local Average Treatment Effect (LATE) estimator in a fuzzy design. The LATE effects in a Fuzzy RDD are the ITT effects deflated by the change in the probability of effectively receiving the treatment,

[10] As mentioned in 3.1, the first-stage of the sampling selection of ESBAM consisted in choosing the PSUs, and then the households. Following the recommendations by Abadie et al. (2020) to deal with design uncertainty, we use clusters at the PSU level to adjust the standard errors of the estimates.

which is obtained from the first stage. In addition, the interpretation of the ITT is more direct and does not only apply to people who effectively receive the treatment (i.e. the so-called compliers).

For the estimation of heterogeneous effects, we propose the following equation:

$$y_i = \beta_0 + \beta_1 z_i + \beta_2 elig_i + \beta_3 z_i elig_i + \beta_4 G_i + \beta_5 z_i G_i + \beta_6 elig_i G_i + X_i^{'} \beta + \nu_i \qquad (2)$$

where G_i is a dummy variable revealing heterogeneity in three variables: 1) duration of the treatment, that is, less than 24 months (short-term) or more than 24 months (long-term); 2) gender of the recipient; and 3) accessibility to health care facilities (near or distant facilities in the district of resident). For example, when we explore the effects of duration of exposure to treatment, $G_i = 1$ identifies that the individual has received the pension for more than 24 months, while $G_i = 0$ indicates that the individual has received the treatment for 24 months or less. The ITT effect for those who were exposed to treatment for more than 24 months is captured by $\beta_2 + \beta_4 + \beta_6$; while β_2 identifies the effect for those who received the treatment for less time. Regarding the analysis by gender and access to health care facilities, $G_i = 1$ indicates female, and bad (i.e. distant) accessibility, respectively. To measure accessibility, we use the average travel time to a public primary health care facility estimated by Carrasco-Escobar et al. (2020) at a district level. The ITT effect for these variables is given by $\beta_2 + \beta_6$, while the coefficient β_2 gives the ITT effect for $G_i = 0$. The controls selected for the main estimates of the effect of program eligibility are the same as before.

It is worth mentioning that the access to the public health insurance SIS does not necessarily depend on being eligible for *Pension 65*. Indeed, the eligibility for SIS is granted to individuals who live in households classified by SISFOH as poor, i.e being extreme poor or non-extreme poor. This implies that participation in *Pension 65* does not depend on SIS eligibility, nor does SIS eligibility depend on being enrolled into *Pension 65*. Rather, every recipient of pension 65 has the option to access to SIS services because they are within the eligible population. Note that this access would not generate bias in our estimates, since being eligible for the SIS is equally likely both for our control group (non-extreme poor) and for our treatment group (extreme poor).

5 Results

Table 1 reports the health effects of *Pension 65* on the covered individuals both for objective and self-reported measures. We start by looking at the overall potential effects and the respective baselines, which are estimates of the mean outcomes conditional on the index being just above the threshold, so that individuals are just not eligible to the program (columns (1) and (2)). We then report the estimates for the heterogeneous effects both over the short vs longer term and across relevant socioeconomic groups, i.e. by accessibility to health care facilities and gender (columns (3) to (8)). The last six columns use interactions between the heterogeneity and the outcome variable as we describe in equation 2. The estimates are very local, in the sense that we select individuals with an index that is within 0.3 standard deviations above or below the respective threshold for extreme poverty. We control for the value of the index separately to the left and to the right of the eligibility thresholds and we also add controls of age, gender, marital status, household head status, and years of education.

Overall, our results point toward health benefits related to under-nutrition, by reducing the incidence of anaemia and mortality risks as captured by improvements in the CC and MUAC measures. Many of the positive effects last only in the short term. The partial – and slightly worrying – flip side of the encouraging under-nutrition reducing effects is in the increase of abdominal obesity of women. Our results also suggest that the program might temporarily improve the mental health of the elderly, especially in women, by reducing the geriatric depression symptoms and improving cognitive functioning; however these effects only hold for individuals with good access to health care facilities.[11]

In terms of specific results, regarding the incidence of anaemia (objectively measured), we observe that the share of ineligible individuals with anaemia is 38%, while for the eligible individuals, this is reduced by 12 p.p.. However, this reduction is statistically significant only for women (down by 18 p.p.), in the short-term (less than 24 months) and among those living close to health care facilities.[12]

The observed improvements in the MUAC and CC measures are statistically significant overall (up 0.93 and 0.80 cm., respectively) and for both the short and long run. This means that the program may have effects on delaying the loss of muscle mass and/or fat mass associated with ageing, implying an expected reduction in mortality risk (de Hollander et al. (2013), Schaap et al. (2018), Wijnhoven et al. (2010). The significant increase on the MUAC is observed for both men and women, whereas the positive effect on the CC is concentrated among women. The MUAC improvement is observed both in districts with good and poor access to health care facilities, while the CC improvement is only observed in districts with good access.

The program also improves the level of cognitive functioning, captured by the MMSE score. The score improves by 0.55 points, representing an additional 5% with respect to the average score of the ineligible group. This positive result has also been found in Aguila et al. (2015) and Aguila and Casanova (2019) in Mexico and by Cheng et al. (2018) in China. In contrast to the previous studies, our design and data allow us to detect an effect both in the short- and longer-term, with the effect being concentrated among women and driven by individuals who live in districts with good access to health care facilities.

Table 1 also shows a reduction in the geriatric depression scale among the eligible individuals. In this scale, which ranges from 0 to 9 symptoms, the ineligible population report

[11]The graphical analysis - figure A.6 - in the Appendix also indicates that eligibility to *Pension 65* is associated with improvements on distinctive measures of health and potential channels of explanations.

[12]The quasi-experimental study by Aguila et al. (2015) also reported a lower incidence of low hemoglobin levels among the recipients of a regional social pension program in Yucatan, Mexico.

3.89 symptoms on average, while the program produces a 0.61 point reduction in symptoms. Positive effects of NCP programs on psychological well-being have previously been found by Salinas-Rodriguez et al. (2014) and Galiani et al. (2016) in Mexico, Chen et al. (2019) in China, and Bando et al. (2020) in Peru. A key difference between our study and Bando et al. (2020) is that while they look at the overall program effects, we assess the differential effects by the exposure time to the program, the access to health care facilities, and gender. We find that the effect of the program holds mostly only in the short run, for men only, and in districts with good access to health care facilities. This finding supports the idea that providing even a small financial transfer in very economically deprived circumstances and with good access to health infrastructure can indeed improve mental health, especially for men, and reduce under-nutrition (often across gender) but this effect might last only for up to two years.

Turning to outcomes more indicative of chronic, non-communicable diseases, objectively measured related to overweight and obesity, we find no significant overall effects on objectively measured indicators such as weight, waist circumference and abdominal obesity, although we detect some increases on specific sub-groups. For instance, waist circumference (which captures abdominal fat accumulation) in women significantly increases by about 3.5 cm., with the increase persisting only in the short run and in districts with bad access to health care facilities. This is consistent with the effect estimate on abdominal obesity (up by 12p.p.). These findings might raise concerns about potential negative side effects of the program, at least in terms of women's cardiovascular risk. Those effects may be driven by additional, perhaps unhealthy calorie intake (sugars, flours, potatoes, alcoholic beverages), and by reduced activity resulting from a more sedentary lifestyle. Other chronic disease risk factors such as high blood pressure saw no significant change.

Table 1 also reports the effect of *Pension 65* on the number of chronic diseases (self-reportedly) diagnosed by a doctor. The ineligible group reports having about 1.09 chronic illnesses, on average, while the eligible group reports having 0.48 illnesses more (on a range that goes from 0 to 13). This effect is statistically significant for both the short and longer term, for both genders and on areas with good access to health infrastructure.

Rises in this variable as we find here are usually seen in a critical way. However, one may question whether this is justified here, considering that our study focuses on a population largely (though not exclusively) living in poverty and in remote areas. We need to bear in mind that eligible and ineligible individuals to the program receive SIS insurance and, therefore, they receive information about their illnesses, but only the extreme poor individuals (covered by the program) receive some extra money that could be used to go to the facilities, get (new or update old) diagnosis and treat potential pre-existing conditions. This interpretation is consistent with the positive effects on the probability of seeking attention to illnesses and receiving medical attention, as observed in table 3, and considers as the baseline case individuals that do not treat their conditions or just buy drugs at the pharmacy (which are practices that may ultimately have adverse effects on health). Therefore, there is reason to believe that this increase in reported diagnosed chronic diseases is rather the result of the eligible individuals now having the chance to seek and obtain health care, instead of an actual growth in diseases susceptibility. Thus, by receiving the income of *Pension 65,* individuals have now the chance to treat health care needs and chronic conditions and, therefore, alleviate further negative consequences on the health status of our sample of elderly individuals.

In Table 1, we also show estimates of the effect of *Pension 65* on measures of self-reported subjective health: today's health status, the health status compared to others of same age, and health status with respect to 12 months earlier. For example, while about 58% of ineligible individuals report having at least the same health as that of last year, there is an increase of about 15 p.p. for this outcome among the eligible individuals. This effect is statistically significant both in the short and long term, among men and women, and it is concentrated in areas with good access to health facilities. The results are similar when the individual subjective assessment refers to the health status compared with other persons of same age, but this particular effect is only short-lived and it is concentrated among men.

Table 1: Effects of Pension 65 on health measures

	Overall effects		Duration of the transfer		Access to health care		Gender	
	Estimates	Baseline	0-24 months	≥24 months	Near	Distant	Male	Female
Objective health								
Anaemia (haemoglobin analysis) (1/0)	-0.115***	0.377	-0.167***	-0.054	-0.151***	-0.056	-0.066	-0.176***
	(0.04)		(0.043)	(0.057)	(0.054)	(0.064)	(0.055)	(0.053)
Weight (kg.)	1.23	57.159	1.528	1.023	0.058	2.37	-0.194	2.739*
	(0.993)		(1.14)	(1.281)	(1.373)	(1.509)	(1.145)	(1.491)
Waist (cm.)	1.912*	89.283	2.876**	0.891	0.32	2.713*	0.408	3.504**
	(1.065)		(1.262)	(1.29)	(1.57)	(1.502)	(1.278)	(1.532)
Abdominal obesity (1/0)	0.057	0.438	0.087*	0.026	-0.001	0.078	-0.006	0.123**
	(0.041)		(0.048)	(0.052)	(0.063)	(0.054)	(0.053)	(0.056)
Mid-upper arm circumference (cm.)	0.927***	25.751	1.213***	0.624*	0.739*	1.029**	0.768**	1.069**
	(0.294)		(0.353)	(0.355)	(0.391)	(0.436)	(0.312)	(0.474)
Calf circumference (cm.)	0.797***	31.932	0.890***	0.722**	0.545	1.114**	0.435	1.178***
	(0.265)		(0.307)	(0.337)	(0.339)	(0.432)	(0.294)	(0.398)
High blood pressure (1/0)	0.052	0.431	0.047	0.056	0.048	0.031	0.053	0.049
	(0.046)		(0.05)	(0.058)	(0.066)	(0.064)	(0.061)	(0.062)
Depression symptoms (0-9 score)	-0.614***	3.887	-0.792***	-0.384	-0.620**	-0.529	-0.776***	-0.431
	(0.229)		(0.238)	(0.312)	(0.311)	(0.321)	(0.261)	(0.299)
Cognitive functioning (0-14 score)	0.546***	11.331	0.405**	0.729***	0.717***	0.201	0.393*	0.731***
	(0.18)		(0.192)	(0.232)	(0.247)	(0.24)	(0.214)	(0.254)
Number of diagnosed chronic illnesses (0-13)	0.479***	1.089	0.470***	0.508***	0.738***	0.144	0.429***	0.518***
	(0.127)		(0.15)	(0.155)	(0.176)	(0.179)	(0.145)	(0.169)
Self-reported health (1/0)								
In good or very good health today	0.072*	0.58	0.119**	0.014	0.072	0.016	0.056	0.089
	(0.041)		(0.049)	(0.051)	(0.052)	(0.065)	(0.055)	(0.058)
In good or very good health compared to others	0.100**	0.611	0.133***	0.061	0.067	0.109*	0.111**	0.087
	(0.039)		(0.048)	(0.048)	(0.054)	(0.057)	(0.053)	(0.055)
Health is at least the same as that of last year	0.151***	0.585	0.137***	0.168***	0.186***	0.077	0.126**	0.176***
	(0.041)		(0.047)	(0.052)	(0.055)	(0.06)	(0.053)	(0.057)

Notes: The column *Estimates* reports the estimated coefficient β_2 of equation 1. The column *Baseline* reports the mean of the variable in the control group. The column *0-24 months* reports the estimated coefficient β_2 of equation 2, and the column *≥24 months* reports the estimated coefficients $\beta_2+\beta_4+\beta_6$. All models control for age, gender, marital status, household head status, and years of education. Clustered standard errors are in parentheses. $*p<0.10$, $**p<0.05$, $***p<0.01$.

To shed more light about the link between *Pension 65* and the health effects found here, we explore three potential transmission channels: nutritional outcomes and diet quality, activities as a proxy of sedentary or active lifestyle, and health care utilization. For each of these channels, tables 2 to 4 report the overall estimates and the estimates for the heterogeneous effects over time, by gender and by accessibility to health care facilities.

Table 2 reports important and statistically significant effects of the program on nutrition-related indicators. While the average MNA score is 12.17 for the ineligible individuals, there is an overall increase of 0.79 for this score among the covered individuals, representing a 6.5% increase. The positive overall effect appears to be driven by the significant short run effect, which does not persist beyond two years. The effect holds for both sexes, with women experiencing a larger impact (+0.95) than men (+0.64). Interestingly, the score improves only in districts with bad access to health care facilities (0.89 points). As the MNA score is a screening tool capturing the risks of being malnourished, our evidence suggests – taken together with the similar results on anaemia reported in Table 1 – that the program may be instrumental in at least temporarily addressing nutritional deficits.

The other outcomes of table 2 are part of the variables used to compute the MNA score. In general, there are statistically significant, positive overall effects on eating dairy products, fruits and vegetables, and protein products (eggs, beans or legumes). While the effects do not differ by gender, there are some differences across time and by accessibility to health care. Eligible individuals are more likely to consume dairy and protein products and vegetables and fruits both in the short and long run, but the probability to eat three or more meals per day only increases in the long-run. There is a positive effect also on the probability of being able to drink more glasses of water per day, both overall and in the short-run. The effect estimates by health care accessibility appear to be rather mixed.

Table 2: Effects of Pension 65 on nutrition quality

	Overall effects		Duration of the transfer		Access to health care		Gender	
	Estimates	Baseline	0-24 months	≥24months	Near	Distant	Male	Female
Mini Nutritional Assessment (MNA) score	0.785***	12.168	1.090***	0.439	0.511	0.887**	0.635**	0.950***
	(0.247)		(0.294)	(0.297)	(0.338)	(0.366)	(0.317)	(0.318)
Eating three or more meals per day (1/0)	0.045	0.834	0.009	0.089**	0.086**	-0.008	0.069	0.02
	(0.034)		(0.037)	(0.043)	(0.041)	(0.063)	(0.046)	(0.042)
Eating dairy products at least once a day (1/0)	0.221***	0.291	0.239***	0.205***	0.329***	0.06	0.217***	0.223***
	(0.05)		(0.058)	(0.066)	(0.07)	(0.071)	(0.06)	(0.062)
Eating fruits and vegetables at least twice a day (1/0)	0.136**	0.503	0.140**	0.136**	0.094	0.224***	0.132**	0.141**
	(0.054)		(0.06)	(0.067)	(0.07)	(0.081)	(0.065)	(0.063)
Drinking less than three glasses of water per day (1/0)	-0.120**	0.443	-0.152***	-0.08	-0.063	-0.162**	-0.100*	-0.144**
	(0.047)		(0.053)	(0.057)	(0.066)	(0.076)	(0.058)	(0.061)
Eating eggs, beans or legumes at least once a week (1/0)	0.119***	0.899	0.127***	0.111***	0.122***	0.103**	0.139***	0.096***
	(0.03)		(0.034)	(0.033)	(0.043)	(0.045)	(0.036)	(0.035)
Eating meat, fish or poultry at least three times a week (1/0)	0.012	0.598	0.031	-0.004	-0.093	0.084	-0.005	0.029
	(0.055)		(0.061)	(0.066)	(0.081)	(0.08)	(0.065)	(0.066)

Notes: MNA is a score for measuring the quality of diet and the risks of under-nutrition and malnutrition among old individuals. The scores originally ranges from 0 to 30, but the available information from ESBAM 2015 allows to compute the score between 0 and 19. The rest of the outcomes are dummy variables (1/0). The column *Estimates* reports the estimated coefficient β_2 of equation 1. The column *Baseline* reports the mean of the variable in the control group. The column *0-24 months* reports the estimated coefficient β_2 of equation 2, and the column *≥24 months* reports the estimated coefficients $\beta_2 + \beta_4 + \beta_6$. All models control for age, gender, marital status, household head status, and years of education. Clustered standard errors are in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

A second channel we explore is the access to – and consumption of – health care services. Table 3 shows statistically significant effects of the program on increasing the probability of being treated in a health centre (up 18 p.p. from 35.4% to 53.4%), receiving medical attention (up 14.8 p.p. from 30.5% to 45.3%), receiving medicines (up 12.6 p.p. from 49.7% to 62.3%), and taking laboratory tests (up 6.2 p.p. from 7.3% to 13.5%). Importantly, the program also reduces the probability that the individual will forego seeking medical care to a given disease (down 14.6 p.p. from 40.4% to 25.8%). As for the sub-group results, the effects on these outcomes are statistically significant in districts with good access to health care facilities (and not in localities with poor access), among men and in the long run. For women, only the effects on attending a health centre, receiving medical attention and seeking medical attention to treat disease are significant; in the short run, only the effects on receiving medical attention, taking lab analysis and seeking medical attention to treat disease are significant. These results are consistent with the findings of Aguila and Casanova (2019), Cheng et al. (2018) and Lloyd-Sherlock and Agrawal (2014) who find greater access to medical care and greater visits to the doctor among the recipients of social pensions in Mexico, China and South Africa, respectively. It is important to bear in mind that our sample consists of an elderly population that will naturally require more health services as they grow (even) older; in our empirical strategy, we do, however, control for age, and the ageing process is equally experienced by both eligible and ineligible individuals. Thus, we may legitimately attribute the effects on health care utilization to *Pension 65*.

In table 3 we also observe a positive overall effect on self-medication, which is defined in the survey as 'self-medication or use of past prescriptions' – a result that seems to be driven mainly by a statistically significant short run effect, while the long run effect is insignificant. We also find that the program doubles the out-of-pocket (OOP) spending on medicines (from 10.2 to 21.0 Soles per month), with the effect also being statistically significant in the short-run, for women, and in districts with good access to health care facilities. With a similar identification strategy to applied in Peru's capital, Bernal et al. (2017) also found an increase in OOP expenses when assessing the effects of the SIS, a public health insurance targeted to the poor. We concur with their arguments that access to health care may increase awareness about health conditions – including in terms of chronic illnesses – , which in turn may increase the willingness to pay for health services that are in short supply in a country like Peru. From this perspective, the increase in the reported number of diagnosed chronic diseases shown before may reflect increased awareness about health conditions, rather than a material increase in the conditions per se. The increase in OOP expenditures indicates the target population's revealed preferences for medical care. Thus, the income transfer of *Pension 65* facilitates the utilisation of previously inaccessible medical care for this population.

Table 3: Effects of Pension 65 on health care utilization and spending

	Overall effects		Duration of the transfer		Access to health care		Gender	
	Estimates	Baseline	0-24 months	≥24months	Near	Distant	Male	Female
***Health care utilization in the last month* (1/0)**								
Attended health centre to treat illness	0.180***	0.354	0.095	0.279***	0.319***	0.007	0.228***	0.125*
	(0.051)		(0.062)	(0.056)	(0.066)	(0.076)	(0.067)	(0.069)
Received medical attention	0.148***	0.305	0.104**	0.203***	0.226***	0.054	0.150***	0.142**
	(0.043)		(0.049)	(0.057)	(0.055)	(0.067)	(0.055)	(0.057)
Received medicines	0.126***	0.497	0.085	0.175***	0.152***	0.091	0.157***	0.086
	(0.046)		(0.052)	(0.057)	(0.058)	(0.073)	(0.057)	(0.06)
Took lab analysis	0.062**	0.073	0.049*	0.083**	0.087**	0.024	0.088***	0.032
	(0.025)		(0.028)	(0.035)	(0.036)	(0.03)	(0.031)	(0.039)
Did not seek medical attention to treat illness	-0.146***	0.404	-0.109*	-0.189***	-0.193***	-0.04	-0.144**	-0.143**
	(0.049)		(0.062)	(0.054)	(0.061)	(0.082)	(0.065)	(0.065)
Self-medication	0.111**	0.137	0.154**	0.039	0.151**	0.072	0.178**	0.041
	(0.054)		(0.061)	(0.076)	(0.069)	(0.079)	(0.07)	(0.073)
Out-of-pocket expenses (monthly Soles)								
Individual health expenditures	9.878	19.754	16.559*	2.019	13.103	5.968	1.403	19.157
	(7.147)		(9.226)	(8.12)	(10.53)	(8.88)	(6.86)	(12.674)
Individual expenditure on medical attention	-0.316	1.775	1.025	-1.836**	0.261	-1.234	-0.511	-0.095
	(0.752)		(1.000)	(0.756)	(0.963)	(1.167)	(0.914)	(1.232)
Individual expenditure on medicines	10.875**	10.165	13.128***	7.911	13.235**	8.594	5.039	17.066**
	(4.466)		(4.409)	(6.687)	(5.65)	(7.29)	(4.251)	(7.424)

Notes: The variable *Did not seek medical attention to treat illness* is only reported by individuals who have a pain, symptom or feel discomfort. Self-medication is only reported by the individuals who did not seek medical attention to treat any illness. The column *Estimates* reports the estimated coefficient β_2 of equation 1. The column *Baseline* reports the mean of the variable in the control group. The column *0-24 months* reports the estimated coefficient β_2 of equation 2, and the column *≥24 months* reports the estimated coefficients $\beta_2 + \beta_4 + \beta_6$. All models control for age, gender, marital status, household head status, and years of education. Clustered standard errors are in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 4 shows the effects of the program on various activities available in the survey that could proxy for changes in sedentary behaviour and physical activity, a third potential channel of explanation of our results. A growing body of research has shown that sedentary behaviour is associated with cardio-metabolic risk, sarcopenia (muscle loss that occurs with aging) and obesity (Chastin et al. (2012), Stamatakis et al. (2012)). Existing evidence also suggests that physical activity is positively associated with health benefits and psychological well-being of the elderly (Wang et al. (2004)). In our case, we argue that money received through *Pension 65* can give rise to an income effect by reducing the working hours and a substitution effect by increasing the time spent on other activities different from working. These effects cause changes on physical effort of pensioners, which in turn might affect health outcomes. For instance, a reduction in working hours may – ceteris paribus – be expected to entail a decline in overall physical activity, as the majority of our population of study works on agriculture and as street vendors which typically demand manual labor. As expected, we find a reduction in working hours of about 6.6 hours a week around the threshold among eligible individuals. As for the sub-group results, we observe a decline in working hours for both men and women, a larger decline in the long run (7.9 hours) than in the short run (5.5 hours), and a reduction of hours in districts with good access to health care facilities.

The program also reduces the time spent in leisure activities by about 5.5 hours a week, which might have an ambiguous effect on overall physical activity. This variable captures different activities with different demand of physical effort. For instance, there is time spent on watching TV, which unambiguously declines physical activity; but there is also time doing sports or exercising, which has the opposite effect.[13]

There are not statistically significant results for the other time use variables, except a positive small effect on care activities (looking after children and teenagers) of about 1.9 hours a week for men. The program has no overall effects on other activities, which are captured by Likert-scale variables for frequency (from never to always). However, we observe a negative impact on the level of participation in events organized by the municipality, in the short-run, and when individuals live in localities with good access to health care facilities. Besides working hours, this is one of the other few variables available in ESBAM associated with physical activity. Other variables were the frequency of visits around the neighbourhood, and visits beyond the neighbourhood. We find a statistically significant reduction on visits around the neighbourhood only in the long run, and weak increases on visits beyond the neighbourhood in the short run and among men. We have also employed a composite index of frequency for all these activities (exercising, participating in events, visits around), but the results were not statistically

[13]The questions for time use involve 10 broad types of activities. The variable of leisure activities shown in the regressions groups the activities indicated in the survey as "Use of free time" and "Share time with other members of the households and/or attend recreational, family or social activities". The examples provided to the subjects in the survey for the first activity type are watching TV, reading for pleasure, taking a walk, resting, doing sports or exercising, talking with friends, drawing, painting, dancing or other artistic activities; and the examples for the second activity type are talking with relatives, listening to music, and watching TV. See in Appendix B the definitions of the other time use variables.

significant either.

Taken together, the evidence suggests that the program reduces the time dedicated to different activities (including working and leisure) and the level of physical effort of pensioners.

Table 4: Effects of Pension 65 on activities

	Overall effects		Duration of the transfer		Access to health care		Gender	
	Estimates	Baseline	0-24 months	≥24months	Near	Distant	Male	Female
Time use (hours a week)								
Working hours	-6.556***	19.262	-5.462***	-7.930***	-12.494***	3.383	-7.950***	-4.978**
	(2.016)		(2.039)	(2.924)	(2.374)	(3.062)	(2.809)	(2.096)
Total hours in leisure activities	-5.476**	19.629	-5.104	-5.945**	-1.444	-7.413	-7.635***	-3.218
	(2.696)		(3.287)	(2.779)	(2.648)	(4.725)	(2.947)	(3.079)
Total hours in household activities	0.641	11.532	1.02	0.047	0.372	0.988	1.269	0.008
	(0.883)		(1.01)	(1.138)	(1.252)	(1.354)	(0.913)	(1.609)
Total hours in care activities	0.734	3.358	-0.154	1.827	1.654	0.069	1.855**	-0.542
	(0.927)		(0.956)	(1.204)	(1.023)	(1.545)	(0.908)	(1.41)
Frequency of other activities (1-4 Likert scale)								
Physical exercise	0.077	1.33	0.146	-0.005	0.206**	-0.061	0.05	0.12
	(0.087)		(0.099)	(0.104)	(0.105)	(0.141)	(0.119)	(0.094)
Attends municipality's events	-0.188	1.788	-0.273**	-0.098	-0.332**	0.043	-0.239	-0.123
	(0.121)		(0.125)	(0.161)	(0.162)	(0.173)	(0.155)	(0.136)
Visit around the neighbourhood	-0.073	3.179	0.093	-0.292***	-0.08	-0.028	-0.023	-0.14
	(0.09)		(0.097)	(0.107)	(0.13)	(0.126)	(0.114)	(0.123)
Visit outside the neighbourhood	0.05	2.727	0.177*	-0.115	-0.024	0.118	0.197*	-0.143
	(0.087)		(0.101)	(0.098)	(0.121)	(0.135)	(0.104)	(0.115)

Notes: *Leisure activities* include watching TV, reading for pleasure, taking a walk, resting, doing sports or exercising, talking with friends, drawing, painting, and dancing or other artistic activities. *Household activities* include cooking, cleaning, laundry, clothing, home management (budget and transporting children to care facilities). *Care activities* include looking babies, children and young people. The Likert scale takes values 1 (never), 2 (seldom), 3 (sometimes) or 4 (always). The column *Estimates* reports the estimated coefficient β_2 of equation 1. The column *Baseline* reports the mean of the variable in the control group. The column *0-24 months* reports the estimated coefficient β_2 of equation 2, and the column $\geq$*24 months* reports the estimated coefficients $\beta_2+\beta_4+\beta_6$. All models control for age, gender, marital status, household head status, and years of education. Clustered standard errors are in parentheses. $*p<0.10$, $**p<0.05$, $***p<0.01$.

6 Sensitivity Analysis

In this section, we explore the sensitivity of our results to the specification we choose and to the additional evidence we present to support our assumptions. First, we examine whether households might try to manipulate the IFH index to become eligible to *Pension 65*. Then, we assess whether eligible old-age individuals who have an index value just below the threshold are indeed similar to those ineligible who have a value just above it, so we test whether the expectation of some covariates are continuous functions of the index. Third, we explore whether our results change when we conduct a more local analysis by reducing the bandwidth size and using non-parametric regressions. Finally, we analyze the sensitivity of our effect estimates to changing the thresholds.

6.1 Continuity of the running variable

An important robustness check in RD designs is to analyze the possibility that households can manipulate the running variable. In that case, the variation in treatment around the threshold would not be random anymore (Lee and Lemieux (2010)). This would occur if households had information about how the IFH is calculated and, to the extent that they are interested in being eligible to Pension 65, they precisely manipulate their answers to qualify for the program. We do not think this is a problem because household's answers used in the SISFOH registry were collected prior to the existence of *Pension 65*, so individuals did not have the incentive to manipulate their answers to be part of a non-existent program. Second, individuals are unlikely to know the precise algorithm behind IFH computation. While the methodology is publicly accessible, it is complex to fully understand and replicate. And third, the majority of variables used in the index construction are verifiable by government officials and therefore difficult to manipulate. Therefore, manipulation - if it occurs exists - would be at most partial, which would not lead to identification problems.

We use the Cattaneo et al. (2018) test to evaluate whether the density of the running variable is continuous at the eligibility threshold. Figure A.4 in the Appendix presents the results. We do not find evidence for any significant discontinuity around the threshold. We also conduct the McCrary (2008) test and obtain similar results (not shown, but available on request).

6.2 Control variables and other specifications

In section 4, one of our main assumptions is that, in absence of *Pension 65*, the outcome is a smooth function of the IFH. This means that eligible individuals who have an index value just below the threshold are similar to those ineligible individuals who have a value just above it. To test this, we explore whether the expectation of some covariates such as gender, age, years of education, marital status and being the head of the household are continuous functions of the index at the threshold. We use them as control variables in our main specification. Figure

A.7 and Table A.6 in the Appendix summarize the results. We do not find evidence for any significant discontinuity.

We also run more regressions to analyze the sensitivity of our results to other specifications. This is important because it supports the validity of our identification strategy. We start by conducting a more local analysis. Our estimation strategy uses a bandwidth size of 0.3 standard deviations above or below the threshold for extreme poverty, which corresponds to almost all observations of the local ESBAM sample; however we conduct an even more local analysis by reducing the bandwidth size to around half of our initial one. Second, in our main specification we assume linearity around the eligibility threshold. However, one can argue that the linearity assumption is too strong for some outcomes, especially in finite samples. A simple way of relaxing this assumption is to conduct a non-parametric analysis in the form of a local polynomial regressions (Lee and Lemieux, 2010). More specifically, we run the regressions for the whole sample using a polynomial function of first and second degrees (with different kernel weighting function) and we control for the same covariates as in our main specification.

The more local results are reported in Tables A.7 to A.10 in the Appendix. Overall, the picture remains qualitatively and also quantitatively: the effects on the main health measures, diet quality, health care utilization and activities are larger, in particular for some outcomes. The significance of the reduction in anaemia and the improvements on the cognitive functioning and on the self-reporting of chronic illnesses diagnosed by a doctor do remain, as do the significance both over the short and long term, by gender and by accessibility to health care. The results also remain when the individual subjective assessment refers to the health status with respect to 12 months ago. This effect is significant both in the short term and long term, among men and women, and in areas with good access to health care facilities. However, the effects on the mortality risk markers (MUAC and CC) and the depression variable are not maintained, neither in the overall local analysis nor across time and groups – probably due to loss of power.

When we explore more locally the underlying mechanisms, we still find that *Pension 65* improves nutrition and health care utilization, but it is associated with a relatively less active lifestyle. Our findings on the MNA score fade away, but we still find effects on the consumption of dairy products and eggs, beans and legumes. The significance of the effects remain both over the short vs longer term and across relevant socioeconomic groups. The effects on health care utilization are very robust in the overall sample and across different groups. Interestingly, the magnitude of the effects on the probability of being treated in a health centre, receiving medical attention, receiving medicines, taking laboratory tests and that the individual seeks medical attention significantly increases in the more local analysis, which might indicate an even larger potential effect of the program. The increase in total OOP spending and the expenditure on medicines is still significant but only for women. Regarding the performance of activities, the more local analysis still suggests a reduction on the time spent in leisure activities, which occur for men and women and in the short and long term. The decrease on the level of participation in events organized by the municipality, in the short-run, and when individuals live in districts with good access to health care facilities are also upheld. The results for the working hours variable are statistically significant only for men and when individuals have good access to health care facilities.

The results using non-parametric regressions - see tables A.11 to A.14 - show a similar pattern. The overall effects on health, diet quality, activities and health care utilization variables are strongest and more robust, which suggests that the linear specification we use is appropriate. The effects on anaemia, MUAC and CC indicators, cognitive functioning, reported chronic illnesses and subjective health status with respect to 12 months ago remain and are larger in magnitude, especially when using a polynomial of first degree and a kernel uniform weighting function. However, the result on the depression variable does not remain. Looking at the mechanisms, we still find positive effects on nutrition and diet quality captured by significant estimates on the MNA score, eating dairy products, drinking more water, and eating proteins. Interestingly, the increase on the probability of eating dairy products is also statistically significant when we use a polynomial of second degree. Regarding the effects on health care utilization, the estimates seem very robust across different degrees of the polynomial and choice of the kernel weighting function. Similar to the previous more local analysis, the magnitude of the estimates on the probability of being treated in a health centre, receiving medical attention, taking laboratory tests significantly increases, which might again indicate a larger potential effect of the program. The effect on the OOP spending is not significant, except for the expenditure on medical attention when we assume a polynomial of second degree. Finally, when we explore the non-parametric regressions on activities, we again find significant reductions on working hours, leisure time and the level of participation in events organized by the municipality. Interestingly, a reduction in the physical activity variable is statistically significant when using a polynomial of second degree.

6.3 Changes in the thresholds

We also analyze whether our main effects are sensitive to potential changes in the threshold. We compute the treatment effect derivatives (TED) suggested by Dong and Lewbel (2015). This analysis helps to approximate the impact on our estimated effects when there is a small discrete change in the threshold. The sign of the estimates would tell us whether the average effect of eligibility to *Pension 65* increases or decreases when the threshold is marginally changed. We implement this analysis by running OLS regressions using the specification in equation (1), where β_3 captures the TED. The magnitude and significance indicate the stability of our results. A high TED estimate would indicate that slight changes in the running variable greatly affect the results. A positive (negative) and significant TED estimate would mean that the effects of being eligible to *Pension 65* by just crossing the threshold will be higher (lower) compared to those shown in Tables 1 to 4.

Tables A.15 to A.18 in the Appendix show the results. Focusing only on the main variables in which we already found significant effects, we observe that most of the TED estimates are not statistically significant, meaning that the majority of our results are stable when we change the threshold. The effects on anaemia, mortality risk markers (MUAC and CC), cognitive functioning, depression, chronic diseases and self-reported health are stable. However, the TED estimates on the MNA score, the probability to drink more water and to receive medical attention, the OOP expenditure on medicines and time spent on leisure and care activities are statistically different from zero, meaning that the effects on these variables are not very stable.

7 Conclusions

By means of a regression discontinuity design around a welfare index of eligibility, we have assessed the heterogeneous impacts of *Pension 65*, a non-contributory pension program in Peru, on the health of poor elderly individuals, measured via a uniquely broad battery of health indicators, allowing a particular focus on nutrition-related health outcomes. We obtain the heterogeneous effects of receiving the program over time (short vs long term), the accessibility to health care facilities (near vs distant facilities at the level of the district), and gender.

The program has overall positive effects on anaemia, mortality risk markers, cognitive functioning, depression, and self-reported health among eligible individuals. Moreover, the program tends to have more favorable effects on women than on men. It is of particular importance that the program reduces the incidence of anaemia among women but not among men, and that the effects on improving cognitive functioning and mortality risks are larger for women than for men. We also observe improvements in the quality of nutrition and health care access, but reductions in the frequency or intensity of physical activities. The estimated increasing effect on weight and waist among women may be a cause of concern due to the association of these measures to obesity and risks of cardiovascular disease. We also find that the number of self-reported diagnosed chronic diseases increase, although this could be attributable to more frequent health service use and diagnosis rather than an actual increase in the conditions. Other objectively measured chronic disease risk factors (e.g. blood pressure) saw no significant change.

The heterogeneous effects analysis also reveals that residing near health care facilities tends to improve the program effects. Overall, thus, the resulting health benefits in areas of undernutrition are at most very modestly attenuated by deterioration in over-nutrition related conditions. As the program evolves further, policymakers need to confront the challenge of continuing to ensure the health benefits in terms of reducing nutritional deficits while avoiding potential undesirable side effects in terms of over-nutrition. In addition, overcoming the lack of adequate and widely available health infrastructure in a geographically diverse country such as Peru has the potential to boost the health effects of a social pension program, alongside the direct health benefits this would likely entail.

Furthermore, we observe that the program increases OOP expenses on medicines, with the effect also being significant in the short-run, for women, and in districts with good access to health care facilities. As discussed in Bernal et al. (2017), we interpret this effect as the result of increasing awareness about health conditions (including chronic diseases) due to better access to health care, which may increase the willingness to pay for health services that are in short supply in a country like Peru. We conclude that the transfer of the program is enabling the poor elderly individuals to access valuable medical care that could not be possible without the program.

Overall, we observe that a small transfer may have important health effects on the elderly individuals living in extreme poverty. However, we note that this population – by definition – have experienced cumulative hardships and find themselves at the bottom of the distribution of welfare indicators. Providing a comparatively small financial help today could imply important gains in welfare, but it is not certain for how long this could be sustained. Our study finds that about half the effects on the analysed outcomes are maintained in the longer run, i.e. for more than two years. Further studies should try to assess longer periods as and when data comes available.

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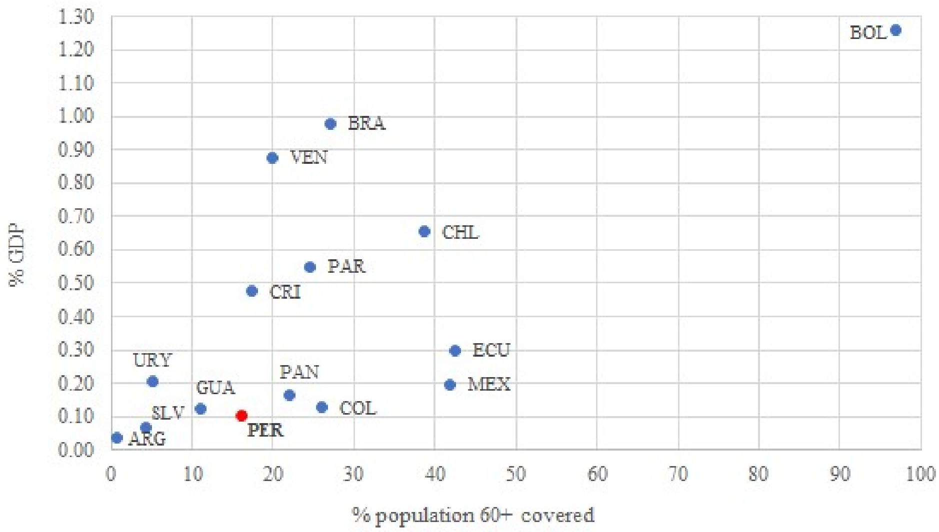
Appendix

This Appendix contains additional information about variable definitions, descriptive statistics, additional results, and results related to the sensitivity analysis of Section 6.

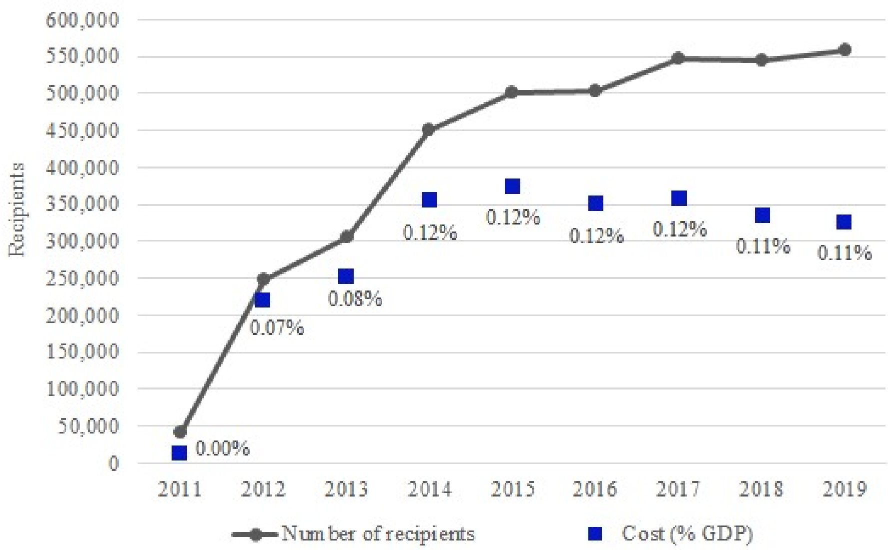
A Additional figures

Figure A.1: Costs and population coverage of non-contributory pension programs in Latin America



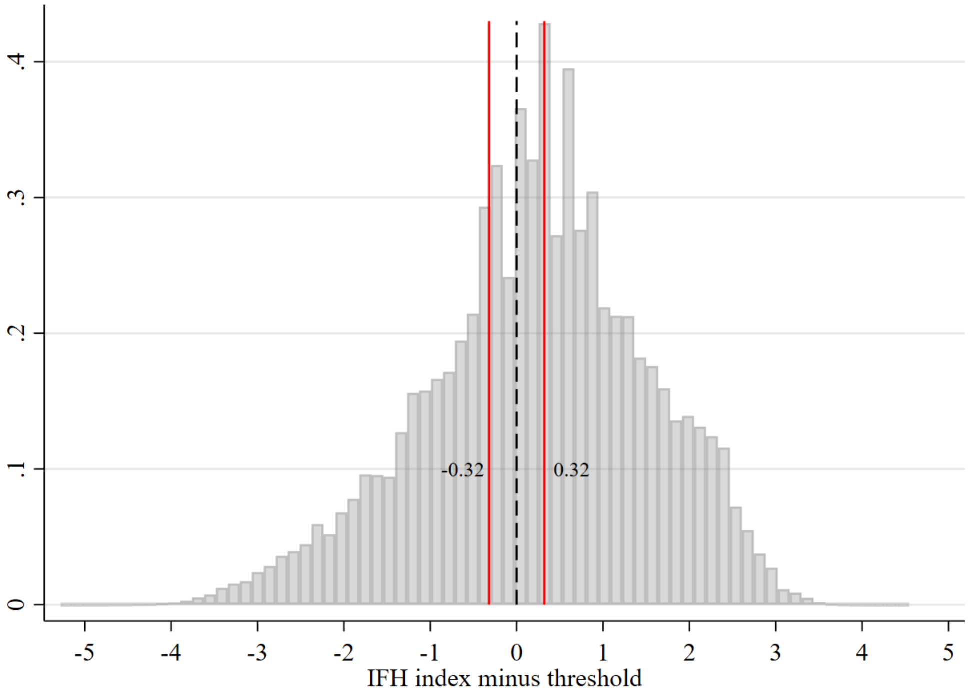
Note: The data come from the 2018 Database of Pension Watch (http://www.pension-watch.net/).

Figure A.2: Evolution of Pension 65 (2011-2019)



Source: *Pension 65*; National Institute of Statistics of Peru (INEI).

Figure A.3: Definition of the ESBAM bandwidth within SISFOH score



Notes: The data come from the 2012-2013 SISFOH census. The horizontal axis shows the standardized IFH, which is the IFH welfare index minus the extreme poverty thresholds. The vertical red lines indicate the bandwidth where the individuals in our ESBAM sample are found.

B Definitions of variables

Table A.1: Definition of variables (1/3)

Variable	Definition
Characteristics	
Woman	It takes value 1 if the individual is female, and 0 otherwise.
Age	Exact age of the individual.
Years of education	Number of completed years of education.
Married	It takes value 1 if the individual is married, and 0 otherwise.
Household head	It takes value 1 if the individual is head of household, and 0 otherwise.
Duration of transfer	It takes value 1 if the individual has received the transfer for less than 24 months, and 0 otherwise.
Access to healthcare facilities	It takes value 1 if the individual lives in a district where the average time to reach a healthcare facility is higher than 105 minutes, and 0 otherwise. The district-level data is drawn from (Carrasco-Escobar et al., 2020). The value of 105 minutes corresponds to the median observed in the sample.
Objective health	
Anaemia	It takes value 1 if the individual has anaemia, and 0 otherwise. The anaemia condition is determined according to haemoglobin levels analysed from blood samplings taken during the interview.
Weight	Body weight in kilograms.
Waist	Waist measurement in centimeters.
Abdominal obesity	It takes value 1 if the waist measure is larger of the cut-offs that indicate obesity according to the norms set up by the Latin American Diabetes Association (see ALAD (2010), Pajuelo-Ramirez et al. (2019)), and 0 otherwise. This cut-offs are 94cm and 88cm for men and women, respectively.
Mid-upper arm circumference (MUAC)	Upper middle arm circumference in centimetres.
Calf Circumference (CC)	Calf circumference in centimetres.
High blood pressure	It takes value 1 if the systolic blood pressure is greater than or equal to 140 (mm Hg) or if diastolic blood pressure is greater than or equal to 90 (mm Hg), and 0 otherwise.
Depression symptoms	It is the number of depression symptoms (score 0-9) measured with the geriatric depression scale from Sheikh and Yesavage (1986).
Cognitive functioning	It is a score (0-14) computed from the correct answers to five questions. *Orientation*: day of the week, day of the month, month and year. *Immediate memory*: recall of three words read by the interviewer. *Delayed memory*: recall of the same words again later in the interview *Command*: three actions that the respondent must complete in order: 'I will give you a piece of paper. Take this in your right hand, fold it in half with both hands and place it on your legs'. *Drawing*: ability to duplicate a picture of two intersecting circles, provided that the circles do not cross more than half way.
Number of diagnosed chronic illnesses	It is the total number of chronic medically diagnosed diseases reported by the individual from a close list of 13 diseases.
Self-reported health	
In good or very good health today	It takes value 1 if the individual rates her health as good or very good from a 1-4 Likert scale, and 0 otherwise.
In good or very good health compared to others	It takes value 1 if the individual rates her current health status, compared to other persons of same age, as good or very good from a 1-4 Likert scale, and 0 otherwise.
Health is at least the same as that of last year	It takes value 1 if the individual reports that her health status is the same, better or much better than last year from a 1-5 Likert scale, and 0 otherwise.

Table A.2: Definition of variables (2/3)

Variable	Definition
Nutrition quality	
Mini Nutritional Assessment (MNA) score	It is a score measuring the quality of diet and the risks of under-nutrition and malnutrition among old individuals. The scores originally ranges from 0 to 30, but the available information from ESBAM 2015 allows to compute a score ranging between 0 and 19.
Eating three or more meals per day	It takes value 1 if the individual reports eating at least 3 times per day, and 0 otherwise.
Eating dairy products at least once a day	It takes value 1 if the individual reports drinking milk, eating cheese or any other dairy product at least once per day, and 0 otherwise.
Eating fruits and vegetables at least twice a day	It takes value 1 if the individual reports eating fruits or vegetables at least twice per day, and 0 otherwise.
Drinking less than three glasses of water per day	It takes value 1 if the individual reports drinking less than three glasses of water per day, and 0 otherwise.
Eating eggs, beans or legumes at least once a week	It takes value 1 if the individual reports eating eggs or legumes (like lentils, beans, broad beans) at least once a week and 0 otherwise.
Eating meat, fish or poultry at least three times a week	It takes value 1 if the individual reports eating meat, fish or poultry like chicken, hen, turkey at least three times per week, and 0 otherwise.
Health care utilization in the last month (1/0)	
Attended health centre to treat illness	It takes value 1 if the individual who had any disease or symptom in the last month went to a health centre to treat them, and 0 otherwise. Note that for the observations with value 0 the individual did not attend a health centre or treated the illness in a pharmacy or at home.
Received medical attention	It takes value 1 if the individual received medical attention in the last month, and 0 otherwise.
Received medicines	It takes value 1 if the individual received medicines in the last month, and 0 otherwise.
Took lab analysis	It takes value 1 if the individual undergone a lab analysis in the last month, and 0 otherwise.
Did not seek medical attention to treat illness	It takes value 1 if the individual who had any disease or symptom in the last month did not go to a health centre to treat them, and 0 otherwise.
Self-medication	It takes value 1 if the individual self medicated or repeated a previous prescription, and 0 otherwise. It is conditioned on reporting any illness or symptom in the last 4 weeks.
Out-of-pocket expenses (monthly Soles)	
Individual health expenditures	Expenditure (Soles per month) used in health services.
Individual expenditure on medical attention	Expenditure (Soles per month) used in medical attention.
Individual expenditure on medicines	Expenditure (Soles per month) used in medicines.

Table A.3: Definition of variables (3/3)

Variable	Definition
Time use (hours a week)	
Working hours	It is the total number of hours worked in the previous week, including main and secondary occupations.
Total hours in leisure hours	It is the total number of hours in the week used on leisure activities. These activities include watching TV, reading for pleasure, taking a walk, resting, doing sports or exercising, talking with friends, drawing, painting, and dancing or other artistic activities.
Total hours in household activities	It is the total number of hours in the week used on household activities. These activities include cooking, cleaning, laundry, clothing, and home management such as budget and transporting children to care facilities.
Total hours in care activities	It is the total number of hours in the week used on care activities. These activities include looking after children and teenagers.
Frequency of other activities (1-4 Likert scale)	
Physical exercise	Frequency in exercising or doing sports: 1 (never), 2 (seldom), 3 (sometimes) or 4 (always).
Attends municipality's events	Frequency in participating in gatherings or events organized by the municipality: 1 (never), 2 (seldom), 3 (sometimes) or 4 (always).
Visit around the neighbourhood	Frequency in going out of home to go around the neighbourhood: 1 (never), 2 (seldom), 3 (sometimes) or 4 (always).
Visit outside the neighbourhood	Frequency in going out of home to go outside the neighbourhood: 1 (never), 2 (seldom), 3 (sometimes) or 4 (always).

C Descriptive statistics

Table A.4: Descriptive statistics (1/2)

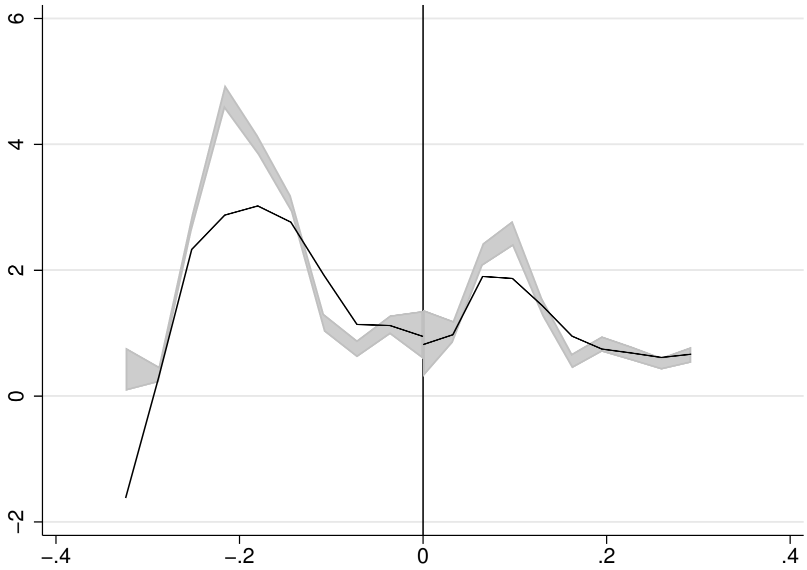
	Total sample	Eligible	Ineligible	Difference
Covariates				
Woman (1/0)	0.459	0.445	0.486	-0.041***
	(0.009)	(0.011)	(0.015)	(0.014)
Age	74.208	74.246	74.135	0.112
	(0.075)	(0.093)	(0.127)	(0.177)
Years of education	2.601	2.384	3.011	-0.627***
	(0.049)	(0.060)	(0.082)	(0.116)
Married (1/0)	0.668	0.676	0.652	0.024
	(0.008)	(0.010)	(0.014)	(0.019)
Household head (1/0)	0.651	0.654	0.646	0.008
	(0.008)	(0.010)	(0.014)	(0.014)
Duration of transfer (months)	13.162	19.939	0.379	19.560***
	(0.228)	(0.200)	(0.275)	(0.366)
Average time to reach healthcare facility (minutes)	129.243	129.393	128.960	0.433
	(1.689)	(2.090)	(2.870)	(4.744)
Distant access to healthcare facility (1/0)	0.468	0.469	0.464	0.005
	(0.009)	(0.011)	(0.015)	(0.028)
Objective health				
Anaemia (haemoglobin analysis) (1/0)	0.358	0.349	0.377	-0.028
	(0.008)	(0.010)	(0.014)	(0.018)
Weight (kg.)	55.954	55.322	57.159	-1.837***
	(0.196)	(0.241)	(0.333)	(0.442)
Waist (cm.)	87.929	87.220	89.283	-2.063***
	(0.200)	(0.246)	(0.340)	(0.447)
Abdominal obesity (1/0)	0.374	0.340	0.438	-0.099***
	(0.008)	(0.010)	(0.014)	(0.017)
Mid-upper arm circumference (cm.)	25.384	25.190	25.751	-0.560***
	(0.055)	(0.067)	(0.093)	(0.130)
Calf circumference (cm.)	31.691	31.564	31.932	-0.369***
	(0.055)	(0.068)	(0.093)	(0.129)
High blood pressure (1/0)	0.439	0.444	0.431	0.013
	(0.009)	(0.011)	(0.015)	(0.021)
Depression symptoms (0-9 score)	3.807	3.765	3.887	-0.122
	(0.042)	(0.051)	(0.071)	(0.111)
Cognitive functioning (0-14 score)	11.372	11.394	11.331	0.063
	(0.036)	(0.045)	(0.061)	(0.087)
Number of diagnosed chronic illnesses (0-13)	1.078	1.073	1.089	-0.016
	(0.022)	(0.027)	(0.037)	(0.050)
Self-reported health (1/0)				
In good or very good health today	0.575	0.572	0.580	-0.008
	(0.009)	(0.011)	(0.015)	(0.020)
In good or very good health compared to others	0.607	0.605	0.611	-0.006
	(0.009)	(0.011)	(0.014)	(0.020)
Health is at least the same as that of last year	0.602	0.611	0.585	0.025
	(0.008)	(0.010)	(0.014)	(0.020)
Nutrition quality				
Mini Nutritional Assessment (MNA) score	12.012	11.929	12.168	-0.239**
	(0.049)	(0.060)	(0.083)	(0.115)
Eating three or more meals per day (1/0)	0.854	0.865	0.834	0.032**
	(0.006)	(0.008)	(0.010)	(0.015)

Table A.5: Descriptive statistics (2/2)

	Total sample	Eligible	Ineligible	Difference
Eating dairy products at least once a day (1/0)	0.300	0.305	0.291	0.014
	(0.008)	(0.010)	(0.013)	(0.019)
Eating fruits and vegetables at least twice a day (1/0)	0.502	0.501	0.503	-0.003
	(0.009)	(0.011)	(0.015)	(0.022)
Drinking less than three glasses of water per day (1/0)	0.439	0.437	0.443	-0.006
	(0.009)	(0.011)	(0.015)	(0.020)
Eating eggs, beans or legumes at least once a week (1/0)	0.916	0.925	0.899	0.026*
	(0.005)	(0.006)	(0.008)	(0.014)
Eating meat, fish or poultry at least three times a week (1/0)	0.543	0.514	0.598	-0.084***
	(0.009)	(0.011)	(0.015)	(0.022)
Health care utilization in the last month (1/0)				
Attended health centre to treat illness	0.446	0.495	0.354	0.140***
	(0.010)	(0.013)	(0.017)	(0.021)
Received medical attention	0.373	0.409	0.305	0.104***
	(0.008)	(0.010)	(0.014)	(0.018)
Received medicines	0.538	0.560	0.497	0.063***
	(0.009)	(0.011)	(0.015)	(0.020)
Took lab analysis	0.081	0.085	0.073	0.011
	(0.005)	(0.006)	(0.008)	(0.010)
Did not seek medical attention to illness	0.340	0.306	0.404	-0.097***
	(0.010)	(0.012)	(0.017)	(0.021)
Self-medication	0.133	0.130	0.137	-0.007
	(0.010)	(0.012)	(0.015)	(0.020)
Out-of-pocket expenses (monthly Soles)				
Individual health expenditures	18.948	18.521	19.754	-1.233
	(1.718)	(2.126)	(2.919)	(3.237)
Individual expenditure on medical attention	1.555	1.438	1.775	-0.337
	(0.163)	(0.201)	(0.277)	(0.324)
Individual expenditure on medicines	10.683	10.958	10.165	0.793
	(1.370)	(1.695)	(2.328)	(2.534)
Time use (hours a week)				
Working hours	18.948	18.521	19.754	-1.233
	(1.718)	(2.126)	(2.919)	(3.237)
Total hours in leisure activities	1.555	1.438	1.775	-0.337
	(0.163)	(0.201)	(0.277)	(0.324)
Total hours in household activities	10.683	10.958	10.165	0.793
	(1.370)	(1.695)	(2.328)	(2.534)
Total hours in care activities	2.894	2.648	3.358	-0.710*
	(0.164)	(0.203)	(0.278)	(0.393)
Frequency of other activities (1-4 Likert scale)				
Physical exercise	1.312	1.303	1.330	-0.027
	(0.014)	(0.018)	(0.024)	(0.032)
Attends municipality’s events	1.781	1.777	1.788	-0.011
	(0.021)	(0.025)	(0.035)	(0.050)
Visit around the neighbourhood	3.157	3.145	3.179	-0.034
	(0.017)	(0.020)	(0.028)	(0.038)
Visit outside the neighbourhood	2.760	2.777	2.727	0.051
	(0.016)	(0.020)	(0.027)	(0.038)

D Manipulation test

Figure A.4: Manipulation test based on density discontinuity

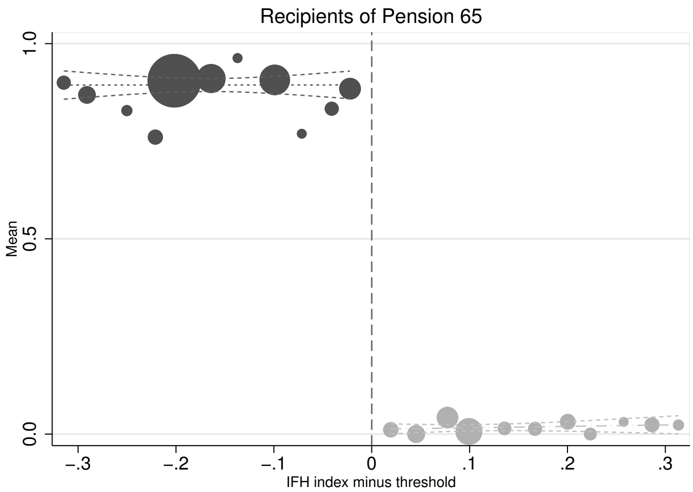


Note: Cattaneo et al. (2018) test. The figure shows a local estimation of the discontinuity of the IFH index density around the threshold, using a bandwidth size of 0.16 points of the running variable in the left side of the cut-off and a bandwidth size of 0.10 in the right side of the cut-off. No significant discontinuity is found. The Beta estimator is -0.646 with a standard error of 0.341 and a *p-value* of 0.518.

E Regression discontinuity plots

In this section we start by showing the relationship between the probability to receive *Pension 65* and the IFH index around the eligibility threshold (first-stage equation) using ESBAM data from the 2015. Recall that higher values of the index indicate a higher level of welfare. The figure A.5 plots the IFH index centered at zero (i.e. the index minus its eligibility threshold), so that values of the x-axis lower than zero indicate extreme poverty, i.e. eligibility to the program, which is why we expect a jump at zero. Our analysis is local in the sense that the individuals of the sample have a centered index very close to zero (it ranges between -0.32 and 0.32). We observe in figure A.5 that being eligible by crossing the threshold significantly increases the probability to receive *Pension 65* (in 85.7 percentage points), which strengthen the validity of our instrument.

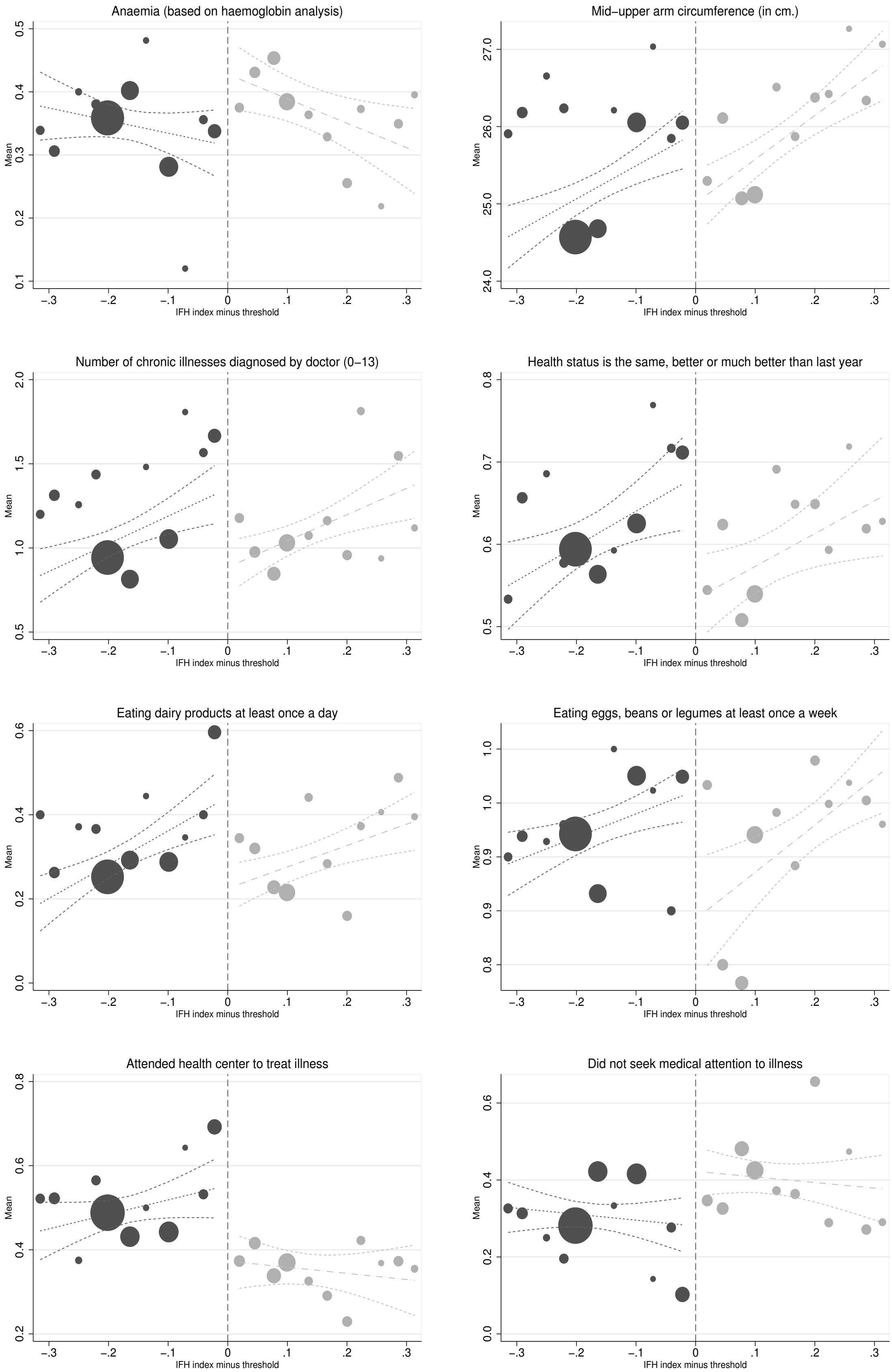
Figure A.5: Probability of being recipient of *Pension 65*



Note: The dots denote averages for equidistant cells of 0.03 points. Their size represents the number of observations. The regression lines and the 95% confidence intervals stem from separate linear regressions to the left and to the right of the threshold using the individual-level data.

Figure A.6 shows the relationship between selected health outcomes and channels and the IFH index around the eligibility threshold. The plots indicate that eligibility to *Pension 65* is associated with improvements on distinctive measures of health and potential channels of explanations. The plots of all the rest health outcomes and channels are available upon request.

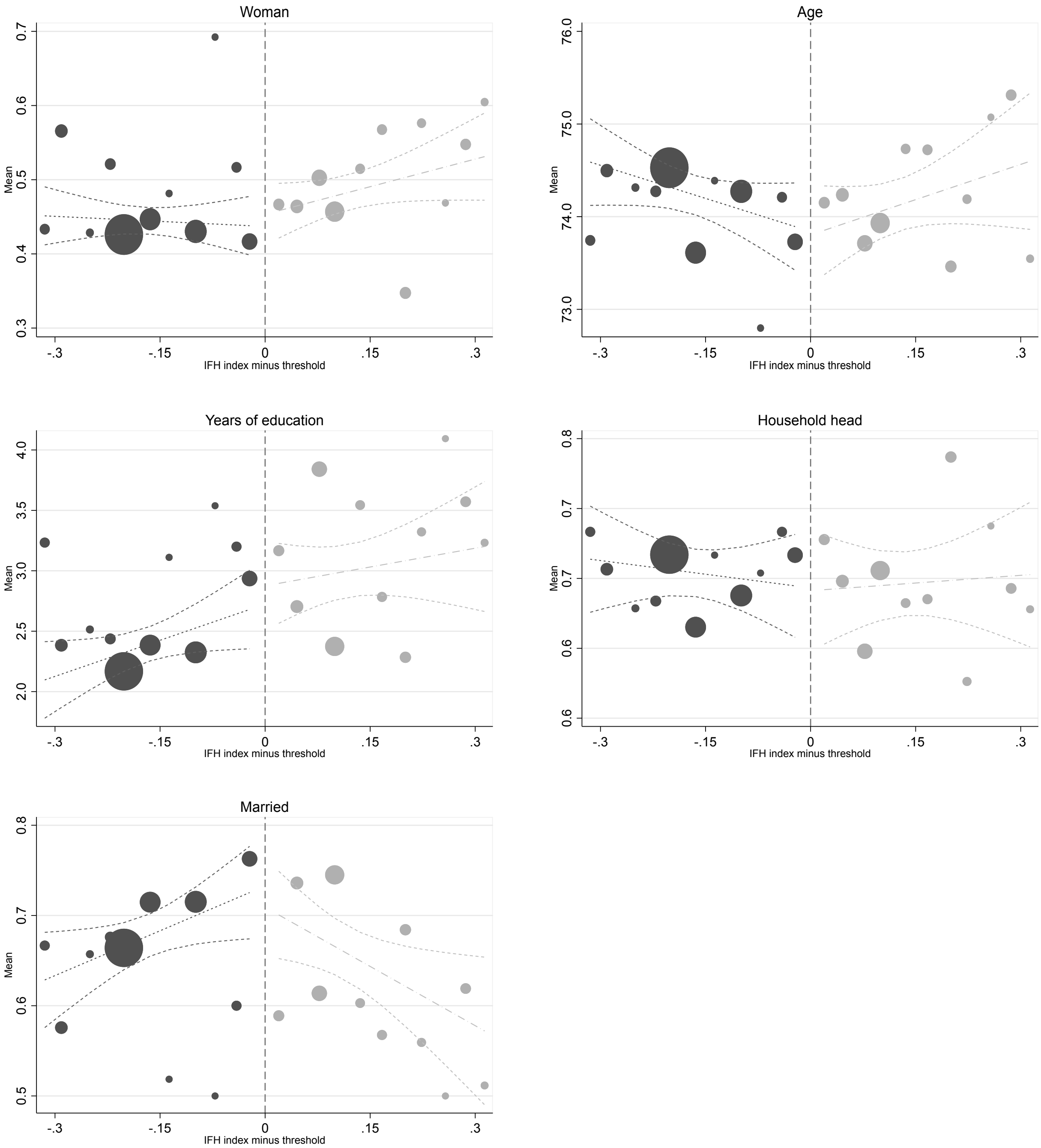
Figure A.6: Effects of Pension 65 on health measures and channels



Notes: The dots denote averages for equidistant cells of 0.03 points. Their size represents the number of observations. The regression lines and the 95% confidence intervals stem from separate linear regressions to the left and to the right of the threshold using the individual-level data. We only show graphs for selected outcomes of tables 1 to 4.

F Robustness check results

Figure A.7: Relationship between covariates and IFH index



Notes: The dots denote averages for equidistant cells of 0.03 points. Their size represents the number of observations. The regression lines and the 95% confidence intervals stem from separate linear regressions to the left and to the right of the threshold using the individual-level data.

Table A.6: Effects of *Pension 65* on the expectation of covariates

	Main specification		N
	Estimates	Baseline	
Woman	-0.015	0.489***	3,345
	(0.039)	(0.015)	
Age	0.101	74.156***	3,345
	(0.339)	(0.130)	
Years of education	-0.150	2.963***	3,345
	(0.250)	(0.095)	
Household head	0.007	0.644***	3,345
	(0.038)	(0.014)	
Married	0.012	0.649***	3,345
	(0.037)	(0.014)	

Notes: The column *Estimates* shows the coefficient β_2 of the estimation of equation 1. The column *Baseline* shows the mean of the variable in the control group. Clustered standard errors are in parentheses. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table A.7: More local effects of Pension 65 on health measures

	Overall effects	Duration of transfer		Access to health care		Gender	
	Estimates	0-24 months	≥24 months	Near	Distant	Male	Female
Objective health							
Anaemia (based on haemoglobin analysis) (1/0)	-0.132**	-0.191***	-0.054	-0.195**	-0.041	-0.159*	-0.112
	(0.067)	(0.071)	(0.101)	(0.093)	(0.101)	(0.093)	(0.084)
Weight (kg.)	0.697	0.504	1.033	-0.853	1.284	-0.362	1.950
	(1.636)	(1.849)	(2.258)	(2.237)	(2.606)	(2.070)	(2.257)
Waist (cm.)	0.494	0.582	0.510	-1.291	0.023	-0.500	1.715
	(1.783)	(2.070)	(2.211)	(2.552)	(2.517)	(2.229)	(2.446)
Abdominal obesity (1/0)	0.029	0.032	0.028	-0.069	0.075	-0.026	0.094
	(0.069)	(0.079)	(0.091)	(0.101)	(0.097)	(0.094)	(0.090)
Mid-upper arm circumference (cm.)	0.677	0.834	0.481	0.208	0.990	0.808	0.547
	(0.484)	(0.579)	(0.606)	(0.645)	(0.700)	(0.542)	(0.756)
Calf circumference (cm.)	0.111	0.024	0.254	-0.290	0.446	-0.257	0.539
	(0.426)	(0.460)	(0.570)	(0.586)	(0.640)	(0.506)	(0.611)
High blood pressure (1/0)	0.034	-0.007	0.091	-0.016	0.057	0.100	-0.036
	(0.074)	(0.083)	(0.095)	(0.108)	(0.107)	(0.100)	(0.093)
Depression symptoms (0-9 score)	-0.399	-0.374	-0.477	-0.352	-0.452	-1.061***	0.334
	(0.303)	(0.331)	(0.380)	(0.416)	(0.447)	(0.361)	(0.443)
Cognitive functioning (0-14 score)	0.876***	0.690**	1.125***	0.883**	0.624*	0.867***	0.907**
	(0.247)	(0.277)	(0.307)	(0.355)	(0.361)	(0.312)	(0.375)
Number of diagnosed chronic illnesses (0-13)	0.854***	0.840***	0.870***	1.233***	0.368	1.056***	0.635**
	(0.197)	(0.233)	(0.233)	(0.250)	(0.304)	(0.226)	(0.274)
Self-reported health (1/0)							
In good or very good health today	0.137**	0.187***	0.071	0.059	0.166	0.178**	0.092
	(0.064)	(0.070)	(0.076)	(0.082)	(0.105)	(0.080)	(0.094)
In good or very good health compared to others	0.062	0.072	0.055	-0.053	0.169*	0.152**	-0.038
	(0.060)	(0.072)	(0.072)	(0.081)	(0.089)	(0.070)	(0.095)
Health status is at least the same as that of last year	0.205***	0.200***	0.214**	0.225***	0.138	0.198**	0.213**
	(0.064)	(0.069)	(0.084)	(0.085)	(0.096)	(0.082)	(0.087)

Notes: The columns show the estimates using a bandwidth size of 0.16 points of the running variable around the cut-off. The column *Estimates* reports the estimated coefficient β_2 of equation 1. The column *0-24 months* reports the estimated coefficient β_2 of equation 2, and the column *≥24 months* reports the estimated coefficients $\beta_2 + \beta_4 + \beta_6$. All models control for age, gender, marital status, household head status, and years of education. Clustered standard errors are in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A.8: More local effects of Pension 65 on nutrition quality

	Overall effects	Duration of transfer		Access to health care		Gender	
	Estimates	0-24 months	≥24months	Near	Distant	Male	Female
Mini Nutritional Assessment (MNA) score	0.493	0.454	0.618	-0.174	0.885	0.595	0.391
	(0.387)	(0.445)	(0.444)	(0.523)	(0.550)	(0.468)	(0.526)
Eating three or more meals per day (1/0)	0.015	0.021	-0.001	0.073	-0.051	0.048	-0.021
	(0.055)	(0.059)	(0.075)	(0.067)	(0.101)	(0.073)	(0.067)
Eating dairy products at least once a day (1/0)	0.304***	0.301***	0.316***	0.271**	0.314***	0.329***	0.275***
	(0.075)	(0.081)	(0.099)	(0.109)	(0.100)	(0.090)	(0.094)
Eating fruits and vegetables at least twice a day (1/0)	-0.110	-0.097	-0.125	-0.148	0.005	-0.192**	-0.022
	(0.077)	(0.084)	(0.099)	(0.094)	(0.123)	(0.092)	(0.094)
Drinking less than three glasses of water per day (1/0)	-0.047	-0.068	-0.013	-0.035	-0.004	-0.024	-0.074
	(0.069)	(0.079)	(0.081)	(0.098)	(0.110)	(0.084)	(0.091)
Eating eggs, beans or legumes at least once a week (1/0)	0.116**	0.133***	0.091*	0.109*	0.110	0.123**	0.106**
	(0.047)	(0.049)	(0.055)	(0.064)	(0.072)	(0.056)	(0.052)
Eating meat, fish or poultry at least three times a week (1/0)	0.016	-0.009	0.065	-0.263**	0.266**	-0.065	0.105
	(0.081)	(0.090)	(0.097)	(0.108)	(0.118)	(0.096)	(0.097)

Notes: MNA is a score for measuring the quality of diet and the risks of under-nutrition and malnutrition among old individuals. The scores originally ranges from 0 to 30, but the available information from ESBAM 2015 allows to compute the score between 0 and 19. The rest of the outcomes are dummy variables (1/0). The columns show the estimates using a bandwidth size of 0.16 points of the running variable around the cut-off. The column *Estimates* reports the estimated coefficient β_2 of equation 1. The column *Baseline* reports the mean of the variable in the control group. The column *0-24 months* reports the estimated coefficient β_2 of equation 2, and the column *≥24 months* reports the estimated coefficients $\beta_2+\beta_4+\beta_6$. All models control for age, gender, marital status, household head status, and years of education. Clustered standard errors are in parentheses. $^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$.

Table A.9: More local effects of Pension 65 on health care utilization and spending

	Overall effects	Duration of transfer		Access to health care		Gender	
	Estimates	0-24 months	≥24months	Near	Distant	Male	Female
***Health care utilization in the last month* (1/0)**							
Attended health centre to treat illness	0.311***	0.172*	0.503***	0.458***	0.127	0.447***	0.162
	(0.076)	(0.092)	(0.084)	(0.103)	(0.120)	(0.105)	(0.107)
Received medical attention	0.235***	0.140*	0.368***	0.336***	0.126	0.285***	0.179*
	(0.065)	(0.077)	(0.080)	(0.086)	(0.100)	(0.083)	(0.097)
Received medicines	0.186***	0.115	0.284***	0.277***	0.065	0.203**	0.163
	(0.070)	(0.082)	(0.082)	(0.090)	(0.111)	(0.084)	(0.100)
Took lab analysis	0.133***	0.108**	0.168***	0.171**	0.085	0.125**	0.139**
	(0.045)	(0.048)	(0.061)	(0.068)	(0.056)	(0.051)	(0.069)
Did not seek medical attention to illness	-0.307***	-0.201**	-0.456***	-0.311***	-0.195*	-0.318***	-0.285***
	(0.063)	(0.081)	(0.064)	(0.086)	(0.112)	(0.086)	(0.095)
Self-medication	0.177*	0.212**	0.095	0.259**	0.088	0.141	0.202
	(0.090)	(0.097)	(0.134)	(0.122)	(0.127)	(0.116)	(0.130)
Out-of-pocket expenses (monthly Soles)							
Individual health expenditures	14.123	21.240	4.927	17.852	10.365	-12.011	43.264**
	(11.266)	(15.235)	(13.191)	(17.130)	(12.177)	(10.562)	(20.792)
Individual expenditure on medical attention	1.052	2.084	-0.248	0.210	2.476	0.447	1.709
	(1.230)	(1.722)	(1.002)	(1.721)	(1.884)	(1.546)	(1.931)
Individual expenditure on medicines	11.338*	11.256*	11.756	12.646	10.437	-2.609	26.903**
	(6.243)	(5.924)	(11.732)	(9.257)	(8.141)	(5.632)	(11.883)

Notes: The variable *Did not seek medical attention to treat illness* is only reported by individuals who have a pain, symptom or feel discomfort. Self-medication is only reported by the individuals who did not seek medical attention to treat any illness. The columns show the estimates using a bandwidth size of 0.16 points of the running variable around the cut-off. The column *Estimates* reports the estimated coefficient β_2 of equation 1. The column *Baseline* reports the mean of the variable in the control group. The column *0-24 months* reports the estimated coefficient β_2 of equation 2, and the column $\geq$*24 months* reports the estimated coefficients $\beta_2+\beta_4+\beta_6$. All models control for age, gender, marital status, household head status, and years of education. Clustered standard errors are in parentheses. $*p<0.10$, $**p<0.05$, $***p<0.01$.

Table A.10: More local effects of Pension 65 on activities

	Overall effects	Duration of transfer		Access to health care		Gender	
	Estimates	0-24 months	≥24months	Near	Distant	Male	Female
Time use (hours a week)							
Working hours	-3.637	-1.895	-5.975	-12.379***	9.479**	-9.234**	2.597
	(3.132)	(3.262)	(4.922)	(3.798)	(4.726)	(4.161)	(3.792)
Total hours in leisure activities	-8.928***	-7.094**	-11.534***	-3.640	-12.408**	-10.108***	-7.555**
	(3.081)	(3.342)	(3.593)	(3.928)	(4.828)	(3.672)	(3.563)
Total hours in household activities	0.615	0.311	0.994	0.764	0.600	1.736	-0.610
	(1.140)	(1.318)	(1.477)	(1.525)	(1.712)	(1.339)	(2.081)
Total hours in care activities	2.753*	0.571	5.818***	3.203*	4.098	4.445***	0.771
	(1.409)	(1.408)	(2.006)	(1.633)	(2.510)	(1.554)	(2.216)
Frequency of other activities (1-4 Likert scale)							
Physical exercise	-0.160	-0.099	-0.240	-0.146	-0.141	-0.214	-0.082
	(0.144)	(0.154)	(0.177)	(0.182)	(0.231)	(0.198)	(0.163)
Attends municipality's events	-0.585***	-0.650***	-0.509*	-0.677***	-0.361	-0.725***	-0.398*
	(0.192)	(0.188)	(0.281)	(0.252)	(0.302)	(0.249)	(0.212)
Visit around the neighbourhood	-0.125	0.051	-0.355**	-0.264	0.080	-0.043	-0.236
	(0.142)	(0.147)	(0.173)	(0.188)	(0.220)	(0.171)	(0.206)
Visit outside the neighbourhood	0.007	0.067	-0.043	-0.267*	0.285	0.194	-0.251
	(0.127)	(0.139)	(0.162)	(0.159)	(0.210)	(0.161)	(0.180)

Notes: *Leisure activities* include watching TV, reading for pleasure, taking a walk, resting, doing sports or exercising, talking with friends, drawing, painting, and dancing or other artistic activities. *Household activities* include cooking, cleaning, laundry, clothing, home management (budget and transporting children to care facilities). *Care activities* include looking babies, children and young people. The Likert scale takes values 1 (never), 2 (seldom), 3 (sometimes) or 4 (always). The columns show the estimates using a bandwidth size of 0.16 points of the running variable around the cut-off. The column *Estimates* reports the estimated coefficient β_2 of equation 1. The column *Baseline* reports the mean of the variable in the control group. The column *0-24 months* reports the estimated coefficient β_2 of equation 2, and the column $\geq$*24 months* reports the estimated coefficients $\beta_2+\beta_4+\beta_6$. All models control for age, gender, marital status, household head status, and years of education. Clustered standard errors are in parentheses. $*p<0.10$, $**p<0.05$, $***p<0.01$.

Table A.11: Non-parametric analysis of effects of Pension 65 on health measures

	Overall effects OLS	First Degree		Second Degree	
	Estimates	Kernel uniform	Kernel triangular	Kernel uniform	Kernel triangular
Objective health					
Anaemia (based on haemoglobin analysis) (1/0)	-0.115***	-0.181***	-0.090	0.020	0.069
	(0.04)	(0.067)	(0.075)	(0.098)	(0.101)
Weight (in kg.)	1.23	1.821	-0.228	-2.705	-4.746**
	(0.993)	(1.550)	(1.753)	(2.299)	(2.381)
Waist (in cm.)	1.912*	2.586	-0.347	-3.823	-7.044***
	(1.065)	(1.761)	(1.920)	(2.428)	(2.433)
Abdominal obesity (1/0)	0.057	0.086	-0.027	-0.159*	-0.298***
	(0.041)	(0.067)	(0.072)	(0.092)	(0.093)
Mid-upper arm circumference (cm.)	0.927***	1.683***	0.798	-0.261	-0.792
	(0.294)	(0.461)	(0.499)	(0.631)	(0.630)
Calf circumference (cm.)	0.797***	1.078**	0.096	-1.072*	-1.488**
	(0.265)	(0.433)	(0.464)	(0.614)	(0.639)
High blood pressure (1/0)	0.052	0.132*	0.015	-0.127	-0.182*
	(0.046)	(0.074)	(0.079)	(0.101)	(0.106)
Depression symptoms (0-9 score)	-0.614***	-0.485	-0.339	-0.134	0.149
	(0.229)	(0.322)	(0.330)	(0.425)	(0.423)
Cognitive functioning (0-14 score)	0.546***	1.273***	1.036***	0.758**	0.317
	(0.18)	(0.279)	(0.295)	(0.378)	(0.381)
Number of diagnosed chronic illnesses (0-13)	0.479***	0.905***	0.795***	0.655**	0.512*
	(0.127)	(0.202)	(0.223)	(0.283)	(0.287)
Self-reported health (1/0)					
In good or very good health today	0.072*	0.099	0.135*	0.176*	0.097
	(0.041)	(0.068)	(0.071)	(0.092)	(0.094)
In good or very good health compared to others	0.100**	0.111*	0.057	-0.005	-0.039
	(0.039)	(0.065)	(0.068)	(0.089)	(0.093)
Health status is at least the same as that of last year	0.151***	0.236***	0.214***	0.181*	0.151
	(0.041)	(0.069)	(0.072)	(0.095)	(0.099)

Notes: Unbiased estimates computed using all the ESBAM sample and the rdrobust command (Calonico et al., 2014). All models control for age, gender, marital status, household head status, and years of education. Clustered standard errors are in parentheses. *$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

Table A.12: Non-parametric analysis of effects of Pension 65 on nutrition quality

	Overall effects OLS	First Degree		Second Degree	
	Estimates	Kernel uniform	Kernel triangular	Kernel uniform	Kernel triangular
Mini Nutritional Assessment (MNA) score	0.785***	1.145***	0.343	-0.613	-1.184**
	(0.247)	(0.396)	(0.438)	(0.568)	(0.575)
Eating three or more meals per day (1/0)	0.045	0.081	0.024	-0.043	-0.127
	(0.034)	(0.060)	(0.064)	(0.078)	(0.081)
Eating dairy products at least once a day (1/0)	0.221***	0.243***	0.258***	0.272***	0.280***
	(0.05)	(0.076)	(0.080)	(0.101)	(0.106)
Eating fruits and vegetables at least twice a day (1/0)	0.136**	0.069	-0.165*	-0.443***	-0.463***
	(0.054)	(0.084)	(0.088)	(0.118)	(0.125)
Drinking less than three glasses of water per day (1/0)	-0.120**	-0.165**	-0.074	0.038	0.153
	(0.047)	(0.076)	(0.080)	(0.102)	(0.102)
Eating eggs, beans or legumes at least once a week (1/0)	0.119***	0.149***	0.095**	0.026	-0.024
	(0.03)	(0.047)	(0.044)	(0.048)	(0.039)
Eating meat, fish or poultry at least three times a week (1/0)	0.012	-0.007	-0.076	-0.158	-0.165
	(0.055)	(0.085)	(0.089)	(0.116)	(0.116)

Notes: MNA is a score for measuring the quality of diet and the risks of under-nutrition and malnutrition among old individuals. The scores originally ranges from 0 to 30, but the available information from ESBAM 2015 allows to compute the score between 0 and 19. The rest of the outcomes are dummy variables (1/0). Unbiased estimates computed using all the ESBAM sample and the rdrobust command (Calonico et al., 2014). All models control for age, gender, marital status, household head status, and years of education. Clustered standard errors are in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A.13: Non-parametric analysis of effects of Pension 65 on health care utilization and spending

	Overall effects OLS	First Degree		Second Degree	
	Estimates	Kernel uniform	Kernel triangular	Kernel uniform	Kernel triangular
***Health care utilization in the last month* (1/0)**					
Attended health centre to treat illness	0.180***	0.235***	0.301***	0.378***	0.395***
	(0.051)	(0.077)	(0.083)	(0.110)	(0.113)
Received medical attention	0.148***	0.150**	0.196***	0.245**	0.233**
	(0.043)	(0.067)	(0.074)	(0.097)	(0.102)
Received medicines	0.126***	0.100	0.134*	0.174*	0.118
	(0.046)	(0.073)	(0.077)	(0.101)	(0.104)
Took lab analysis	0.062**	0.127***	0.150***	0.175***	0.142**
	(0.025)	(0.043)	(0.050)	(0.064)	(0.067)
Did not seek medical attention to illness	-0.146***	-0.125*	-0.262***	-0.422***	-0.393***
	(0.049)	(0.072)	(0.075)	(0.101)	(0.108)
Self-medication	0.111**	0.213**	0.184*	0.150	0.120
	(0.054)	(0.086)	(0.095)	(0.122)	(0.126)
Out-of-pocket expenses (monthly Soles)					
Individual health expenditures	9.878	3.139	9.976	17.614	16.274
	(7.147)	(11.240)	(11.880)	(15.190)	(15.026)
Individual expenditure on medical attention	-0.316	0.562	1.594	2.823**	2.853**
	(0.752)	(1.163)	(1.125)	(1.384)	(1.323)
Individual expenditure on medicines	10.875**	1.176	7.581	15.130*	12.850
	(4.466)	(7.100)	(6.820)	(8.841)	(8.656)

Notes: The variable *Did not seek medical attention to treat illness* is only reported by individuals who have a pain, symptom or feel discomfort. Self-medication is only reported by the individuals who did not seek medical attention to treat any illness. The column *Estimates* reports the estimated coefficient β_2 of equation 1. Unbiased estimates computed using all the ESBAM sample and the rdrobust command (Calonico et al., 2014). All models control for age, gender, marital status, household head status, and years of education. Clustered standard errors are in parentheses. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table A.14: Non-parametric analysis of effects of Pension 65 on activities

	Overall effects OLS	First Degree		Second Degree	
	Estimates	Kernel uniform	Kernel triangular	Kernel uniform	Kernel triangular
Time use (hours a week)					
Working hours	-6.556***	-8.455***	-4.273	0.592	0.771
	(2.016)	(3.243)	(3.629)	(4.659)	(4.862)
Total hours in leisure activities	-5.476**	-5.837	-8.707**	-12.145**	-12.840**
	(2.696)	(4.059)	(3.810)	(4.957)	(5.387)
Total hours in household activities	0.641	0.943	1.555	2.309	1.638
	(0.883)	(1.285)	(1.273)	(1.678)	(1.684)
Total hours in care activities	0.734	2.020	3.622***	5.653***	5.522***
	(0.927)	(1.266)	(1.393)	(1.805)	(1.858)
Frequency of other activities (1-4 Likert scale)					
Physical exercise	0.077	-0.049	-0.263	-0.523**	-0.626***
	(0.087)	(0.152)	(0.169)	(0.213)	(0.228)
Attends municipality's events	-0.188	-0.732***	-0.750***	-0.767***	-0.577**
	(0.121)	(0.194)	(0.211)	(0.263)	(0.266)
Visit around the neighbourhood	-0.073	-0.280*	-0.191	-0.088	-0.024
	(0.09)	(0.146)	(0.157)	(0.200)	(0.205)
Visit outside the neighbourhood	0.05	-0.112	-0.093	-0.076	-0.057
	(0.087)	(0.133)	(0.140)	(0.181)	(0.183)

Notes: *Leisure activities* include watching TV, reading for pleasure, taking a walk, resting, doing sports or exercising, talking with friends, drawing, painting, and dancing or other artistic activities. *Household activities* include cooking, cleaning, laundry, clothing, home management (budget and transporting children to care facilities). *Care activities* include looking babies, children and young people. The Likert scale takes values 1 (never), 2 (seldom), 3 (sometimes) or 4 (always). Unbiased estimates computed using all the ESBAM sample and the rdrobust command (Calonico et al., 2014). All models control for age, gender, marital status, household head status, and years of education. Clustered standard errors are in parentheses. $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

Table A.15: Treatment effect derivative of Pension 65 on health measures

	Overall effects	Duration of transfer	Access to health care	Gender
Objective health				
Anaemia (based on haemoglobin analysis) (1/0)	0.223	-0.002	0.262	0.228
	(0.235)	(0.268)	(0.235)	(0.235)
Weight (kg.)	-12.092**	-16.070***	-10.943**	-11.401**
	(5.166)	(5.896)	(5.307)	(5.140)
Waist (cm.)	-19.340***	-20.478***	-17.520***	-18.509***
	(5.727)	(6.698)	(5.831)	(5.730)
Abdominal obesity (1/0)	-0.462**	-0.523*	-0.400*	-0.428*
	(0.233)	(0.286)	(0.236)	(0.233)
Mid-upper arm circumference (cm.)	-2.126	-2.235	-1.857	-1.933
	(1.643)	(1.953)	(1.643)	(1.650)
Calf circumference (cm.)	-1.628	-2.431	-1.428	-1.436
	(1.533)	(1.694)	(1.559)	(1.527)
High blood pressure (1/0)	-0.271	-0.321	-0.247	-0.263
	(0.254)	(0.273)	(0.257)	(0.254)
Depression symptoms (0-9 score)	-0.684	-1.815	-0.827	-0.656
	(1.265)	(1.409)	(1.224)	(1.268)
Cognitive functioning (0-14 score)	-0.913	-1.855*	-0.893	-0.933
	(0.951)	(1.064)	(0.958)	(0.953)
Number of diagnosed chronic illnesses (0-13)	0.225	-0.325	0.124	0.307
	(0.708)	(0.813)	(0.704)	(0.704)
Self-reported health (1/0)				
In good or very good health today	-0.272	-0.049	-0.243	-0.265
	(0.251)	(0.271)	(0.253)	(0.251)
In good or very good health compared to others	-0.101	-0.016	-0.068	-0.100
	(0.236)	(0.270)	(0.238)	(0.237)
Health status is at least the same as that of last year	0.037	-0.089	0.033	0.055
	(0.240)	(0.269)	(0.240)	(0.239)

Notes: The columns report the estimated coefficient β_3 of equations 1 and 2. All models control for age, gender, marital status, household head status, and years of education. Clustered standard errors are in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A.16: Treatment effect derivative of Pension 65 on nutrition quality

	Overall effects	Duration of transfer	Access to health care	Gender
Mini Nutritional Assessment (MNA) score	-5.025***	-4.513***	-4.719***	-4.986***
	(1.350)	(1.534)	(1.363)	(1.350)
Eating three or more meals per day (1/0)	-0.117	-0.270	-0.179	-0.129
	(0.184)	(0.193)	(0.186)	(0.184)
Eating dairy products at least once a day (1/0)	0.330	0.245	0.322	0.339
	(0.258)	(0.295)	(0.250)	(0.259)
Eating fruits and vegetables at least twice a day (1/0)	-0.074	-0.147	-0.035	-0.072
	(0.307)	(0.334)	(0.296)	(0.307)
Drinking less than three glasses of water per day (1/0)	1.176***	1.046***	1.141***	1.176***
	(0.256)	(0.288)	(0.256)	(0.255)
Eating eggs, beans or legumes at least once a week (1/0)	-0.236	-0.200	-0.248	-0.237
	(0.156)	(0.163)	(0.160)	(0.156)
Eating meat, fish or poultry at least three times a week (1/0)	-0.847***	-0.945***	-0.773***	-0.838***
	(0.269)	(0.297)	(0.270)	(0.269)

Notes: MNA is a score for measuring the quality of diet and the risks of under-nutrition and malnutrition among old individuals. The scores originally ranges from 0 to 30, but the available information from ESBAM 2015 allows to compute the score between 0 and 19. The rest of the outcomes are dummy variables (1/0). The columns report the estimated coefficient β_3 of equations 1 and 2. All models control for age, gender, marital status, household head status, and years of education. Clustered standard errors are in parentheses. $^*p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A.17: Treatment effect derivative of Pension 65 on health care utilization and spending

	Overall effects	Duration of transfer	Access to health care	Gender
***Health care utilization in the last month* (1/0)**				
Attended health centre to treat illness	0.485	0.190	0.447	0.488
	(0.304)	(0.356)	(0.305)	(0.300)
Received medical attention	0.529**	0.362	0.521**	0.538**
	(0.244)	(0.275)	(0.245)	(0.242)
Received medicines	0.171	0.034	0.156	0.182
	(0.270)	(0.301)	(0.271)	(0.270)
Took lab analysis	0.180	0.030	0.168	0.179
	(0.157)	(0.188)	(0.159)	(0.155)
Did not seek medical attention to illness	-0.050	0.080	-0.069	-0.082
	(0.295)	(0.355)	(0.304)	(0.295)
Self-medication	-0.002	0.229	-0.021	0.008
	(0.298)	(0.324)	(0.298)	(0.298)
Out-of-pocket expenses (monthly Soles)				
Individual health expenditures	-90.963*	-58.719	-91.164*	-88.142
	(53.834)	(65.526)	(54.412)	(54.297)
Individual expenditure on medical attention	-6.769	-1.260	-6.024	-6.737
	(5.220)	(6.549)	(5.098)	(5.170)
Individual expenditure on medicines	-78.845**	-57.188	-79.998**	-76.063**
	(37.959)	(36.379)	(38.640)	(37.695)

Notes: The variable *Did not seek medical attention to treat illness* is only reported by individuals who have a pain, symptom or feel discomfort. Self-medication is only reported by the individuals who did not seek medical attention to treat any illness.The columns report the estimated coefficient β_3 of equations 1 and 2. All models control for age, gender, marital status, household head status, and years of education. Clustered standard errors are in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table A.18: Treatment effect derivative of Pension 65 on activities

	Overall effects	Duration of transfer	Access to health care	Gender
Time use (hours a week)				
Working hours	-2.441	3.355	-0.601	-2.201
	(11.489)	(12.874)	(11.308)	(11.374)
Total hours in leisure activities	-41.645***	-38.696**	-44.517***	-40.483***
	(15.324)	(19.405)	(15.563)	(15.283)
Total hours in household activities	-2.145	1.725	-3.096	-2.586
	(5.207)	(5.578)	(5.350)	(5.217)
Total hours in care activities	11.141***	6.324	10.054**	10.971***
	(4.143)	(4.086)	(4.134)	(4.118)
Frequency of other activities (1-4 Likert scale)				
Physical exercise	0.278	0.382	0.210	0.259
	(0.510)	(0.539)	(0.505)	(0.510)
Attends municipality's events	1.015	0.943	1.075	1.027
	(0.669)	(0.669)	(0.657)	(0.666)
Visit around the neighbourhood	0.046	0.912	0.022	0.042
	(0.520)	(0.566)	(0.525)	(0.518)
Visit outside the neighbourhood	-0.244	0.380	-0.103	-0.266
	(0.470)	(0.540)	(0.473)	(0.469)

Notes: *Leisure activities* include watching TV, reading for pleasure, taking a walk, resting, doing sports or exercising, talking with friends, drawing, painting, and dancing or other artistic activities. *Household activities* include cooking, cleaning, laundry, clothing, home management (budget and transporting children to care facilities). *Care activities* include looking babies, children and young people. The Likert scale takes values 1 (never), 2 (seldom), 3 (sometimes) or 4 (always).The columns report the estimated coefficient β_3 of equations 1 and 2. All models control for age, gender, marital status, household head status, and years of education. Clustered standard errors are in parentheses. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$.