Plight of the Elderly:
Senior Citizen Allowance and Gender Disparities in Economic and Behavioral Outcomes

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Abstract

This article studies the impact of a universal social protection on a wide variety of economic indicators and behavioral outcomes related to food security among senior citizens in Nepal. The empirical strategy in the study exploits a sharp age cutoff for eligibility of a nationwide senior citizen allowance program. To overcome the challenge that individuals eligible for allowances might be systematically different from ineligible counterparts, this article employs a regression discontinuity design using different waves of nationally representative household surveys in Nepal. Results indicate that while the program caused a 64.4% increase in the likelihood of receiving financial assistance among the elderly, it did not have a significant impact on enhancing access to physical assets and improving food consumption. Strikingly, female senior citizens eligible for the allowance are 8.8% more likely to eat fewer meals induced by inadequate resources and 5.3% more likely to sleep hungry in response to inadequate food. Eligible male counterparts do not report significant changes in behavioral measures of food consumption, but are 9.7% more likely to own a mobile phone. Findings further show that the allowance program caused a significant increase in household size and likely exacerbated gender disparities in behavioral measures of food security. These results indicate that estimates of gender inequality and geographical heterogeneity need to be taken into consideration to ensure effective implementation of well-intentioned social assistance programs that offer financial support to the elderly.

Keywords: Gender, Economic Empowerment, Food Security Regression Discontinuity Design, Social Security, Universal Social Protection

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1 Introduction

Global declines in fertility and mortality rates have placed more policy emphasis on reducing poverty among the elderly (Bando et al., 2020). Recent estimates from the World Health Organization (WHO) indicate that the proportion of the world's population over 60 years will nearly double from 12% to 22% between 2015 and 2050, with 80% of older people living in low- and middle-income countries by the end of 2050. As countries face challenges to guarantee effective health and social systems for the elderly, there remains an increasing need to evaluate the feasibility of different policy interventions aimed at improving the lives of senior citizens. This is important because poverty rates among the elderly are substantially higher in developing countries where social security coverage is limited (Bando et al., 2020). Among developing countries, there exists a dearth of rigorous empirical evidence on how such social policies interact with economic and behavioral well-being of targeted population sub-groups. This necessitates a comprehensive evaluation of direct and indirect impact of well-intentioned policies designed to promote positive economic and behavioral outcomes among senior citizens in the developing world.

This article studies the impact of a universal social protection on a wide variety of economic indicators and behavioral outcomes related to food security among senior citizens in Nepal. Specifically, Nepal implemented the old age allowance program in 2008 that provides a monthly payment of 3000 Rupees for all residents aged 70 and over, including a monthly medical allowance of 1000 Rupees. To quantify economic and behavioral outcomes, this article makes use of binary indicators related to ownership of economic assets and healthy practices, measures of food security and household composition. The empirical strategy in the study exploits a sharp age cutoff for eligibility of a nationwide senior citizen allowance program. Using different waves of nationally representative household surveys in Nepal, this article employs a regression discontinuity design to overcome the challenge that individuals eligible for allowances might be systematically different from ineligible counterparts. The identification hinges on the assumption that individuals very close to allowance eligibility (in their late 60s) are comparable to those who

just became eligible (in their early 70s).

Results indicate that the nationwide old age allowance program caused a 64.4% increase in the likelihood of receiving financial assistance among the elderly. Findings show that the program did not have a significant impact on enhancing access to most physical assets (including ownership of bank account) and improving food consumption. Estimates indicate that the impact of the allowance program is heterogenous across gender. Specifically, female senior citizens eligible for the allowance are 8.8% more likely to eat fewer meals induced by inadequate resources and 5.3% more likely to sleep hungry in response to inadequate food in the past twelve months. However, eligible male counterparts who are 9.7% more likely to have a mobile phone do not report significant changes in behavioral measures of food consumption. Results also show that the old age allowance program eligibility affected household size, which likely exacerbated gender disparities in behavioral measures of food security. Estimates of gender inequality and geographical heterogeneity need to be taken into consideration to ensure effective implementation of well-intentioned social assistance programs that offer financial support to the elderly in a developing country setting.

To the best of the author's knowledge, this is the first article to rigorously examine the impact of an old age allowance program on economic and behavioral outcomes related to food consumption in a developing country setting. This article provides rigorous evidence that well-intentioned policy interventions can widen gender disparities across different dimensions. For example, estimates show that males and females eligible for the allowance program report different experiences in relation to ownership of a mobile phone. Specifically, age-eligible females are 7.7% less likely to own a mobile phone, while age-eligible males are 9.7% more likely to own a mobile phone. This contributes to previous studies that show that eligibility to other programs such as pensions induce increased ownership of consumer goods among females in South Africa (Duflo, 2000). The heterogeneity across gender documented in this study has direct implications on understanding gender inequality and subsequent repercussions on women's empowerment and household welfare (Danquah et al., 2021; Jakobsson et al., 2016).

This article is in line with previous literature that explores the linkage between access to social assistance programs and the composition of the household (Edmonds et al., 2005; Ambler, 2016; Hamoudi and Thomas, 2014). This study provides suggestive evidence that a change in household size induced by the allowance program may affect behavioral measures of food consumption among female and male senior citizens. A comprehensive evaluation of a nationwide old age allowance program should take into account that households may respond in intricate ways, causing behavioral changes in different dimensions. This is an important factor to consider when conducting cost-benefit analyses of social assistance programs. It is worth mentioning that this study does not suggest that universal social protection for the elderly population should be discouraged. Rather, the study concludes that mechanisms such as household size through which allowance eligibility may influence behavioral outcomes related to food consumption need to be adequately addressed.

This article contributes to a well-established literature on the economic impact of programs involving cash trasfers and pension reforms across the globe. Case and Deaton (1998) examine the social pension in South Africa, with a particular focus on behavioural outcomes associated with cash receipts including income allocation for food, schooling and savings. In a different study, Gertler et al. (2012) document that cash transfers cause long-term increases in consumption through investments in productive activities among poor rural Mexican households. Gilligan et al. (2009) show that participants with access to Ethiopia's Productive Safety Nets Programme (PSNP) are more likely to be food secure, use improved technologies and operate non-farm own business activities. Recent studies have explored labor market outcomes of prime-aged adults induced by the presence of pensioners in their households. For example, Ardington et al. (2009) show that large cash transfers to the elderly increase employment opportunities among prime-aged adults through the channel of labor migration. Other studies have shown that conditional cash transfers are effective in increasing educational achievements and reducing child work (De Janvry et al., 2006; Gitter and Barham, 2008). More recently, Maluccio (2020) find that conditional cash trasfer program in Nicaragua did not increase agricultural or non-agricultural investment.

This article is closest in spirit with recent studies that have explored pension programs in the developing world (Abel, 2019). In the context of China, Huang and Zhang (2021) exploit county-level variation in pension scheme rollout to show that age-eligible people benefit from higher household income and food expenditure, better health, and lower mortality. This supports the idea that pension programs providing older adults with supplementary income can improve health and wellbeing in old age through better access to health care and nutritional items (Águila et al., 2018). More specifically, Águila et al. (2018) find that the federal pension in Mexico led to a statistically significant increase in the severity of frailty for women, with no changes in frailty indices among men. Different studies have delved into the causal impact of exogenous income shocks on education (Churchill et al., 2021), household welfare (Unnikrishnan and Imai, 2020), subjective well-being Bando et al. (2020), financial vulnerability (Bucciol et al., 2020) and expectations about future financial support sources fo the elderly (Li et al., 2018). More recently, Grogan and Summerfield (2019) show that women report increased well-being at pension age, while men do not. Finally, Chen (2017) finds large and significant reduction in intergenerational co-residence of the extended family as well as an increase in service consumption among elderly parents around the pension eligibility age cut-off in the context of China.

This article also sheds light on key sources of geographical heterogeneity in better understanding the comprehensive effect of the old age allowance program on economic and behavioral outcomes. This has repercussions on distributional impact of policies designed to improve well-being of senior citizens. For example, this article shows that the impact of the nationwide allowance program on behavioral measure of food security appears is more severe in province no. 2, where individuals are 22.04% more likely to be worried about inadequate food and 19.95% more likely to eat a limited variety of foods due to lack of resources. Relatedly, a change in household size associated with the allowance program is much larger in magnitude and statistically significant in the case of Karnali province. These findings indicate that policy makers need to consider geographical heterogeneity in prioritizing future policy interventions aimed at improving socioeconomic outcomes of the elderly. Given that policies related to social assistance

programs in Nepal fall under provincial jurisdictions, the relationship between allowance program eligibility and behavioral outcomes across provinces is worth highlighting. This is crucial in the context of the developing world, where demographic changes induced by the program are likely to influence household dynamics and behavioral outcomes among senior citizens.

The remainder of the paper is structured as follows. Section 2 presents a brief background on old age allowance program in Nepal and discusses the data. Section 3 presents the empirical strategy. Section 4 describes the main findings followed by economic and policy implications and Section 5 concludes.

2 Background and Data

2.1 Background

Nepal is a land-locked country with a total area of 147,181 square kilometers surrounded by India on three sides and China to the north. Nepal is divided into seven provinces and 77 administrative districts, which are further subdivided in villages and municipalities. According to Paudel (2021b), each district has an average population of over 300,000 individuals and an average size of approx. 740 square miles. Nepal comprises of 103 caste and ethnic groups that are largely Hindus, Buddhists, some Muslims, and in some cases a combination of two or more of these (Paudel, 2021c). Different measures of poverty and labor migration in Nepal are strongly correlated with ethnic fractionalization and natural disasters such as forest fires and earthquakes (Paudel, 2021a; Shakya et al., 2021). Senior citizens in Nepal comprise of 10% of the country's population (Holmes et al., 2019), suggesting that the country is an "aged society" (Parker et al., 2014). Reports from the Asian Development Bank rank Nepal's social protection system at 0.19 on a scale of 0 to 11, which is much lower than the average level (Gurung, 2019).

Nepal provides a unique context to study the linkage between social safety nets, economic outcomes and behavioral changes among the elderly. The Government of Nepal runs a varied portfolio of well-intentioned social protection programs consisting of social insurance, cash and

in-kind social assistance programs, and various labor market programs (Palacios, 2016). According to Palacios (2016), the fiscal cost of social protection programs constitutes almost 2.5 percent of Nepal's annual Gross Domestic Product (GDP). The Social Security Allowance (SSA) program began in 1994 with the introduction of the old age allowance for those 75 years and over for 100 Rupees a month. The SSA, which is the largest cash transfer program covering 10% of the country's population, includes five schemes: old age allowance, single women allowance, disability allowance, endangered ethnicity allowance and child nutrition grant (Holmes et al., 2019). In 2008, the government changed the eligibility criterion from 75 to 70 years of age. Specifically, old age allowance entails a monthly payment of 3000 Rupees for all residents aged 70 and over, including a monthly medical allowance of 1000 Rupees (Holmes et al., 2019). Recent reports from Nepal's Ministry of Finance indicate that the SSA program, currently managed by the Department of National ID and Civil Registration (DONIDCR) under the Ministry of Home Affairs (MOHA), comprises an annual budget of 64.5 billion Rupees (Holmes et al., 2019).

An individual who is entitled to receive the old age allowance needs to make an application at the local level office, followed by the decision on the application within seven days. Individuals who (i) are appointed, elected, nominated for any government or public offices, (ii) are receiving pension from a government fund are not eligible for the old age allowance. The eligible individual needs to present an identity card at the local level office to receive the social security allowance. According to Palacios (2016), beneficiaries enroll or renew their enrollment once a year at a nearby Village Development Committee (VDC) office, which forwards the beneficiary roster to the District Development Committee (DDC). The next step involves DDC collating the VDC rosters into a document that indicates the number of beneficiaries for each category of SSAs before it gets sent to MOFALD. For payments, DOCR relies on hand delivery of the benefits in cash through VDC secretaries (Palacios, 2016)

2.2 Data

This article employs nationally representative household data available from (i) the National Living Standards Survey 2010-11 (NLSS III), and (ii) the Nepal Demographic and Health Surveys (NDHS) from 2011 and 2016 for empirical analysis. The NLSS III sample conducted by the Central Bureau of Statistics across all districts of Nepal consists of 1,328 observations. This sample includes individual-level information on age, demographics and whether an individual received the old age allowance from the government. The sampling frame used for the NDHS is based on the list of census enumeration areas with population and household information from the National Population and Housing Census (NPHC) conducted by the Central Bureau of Statistics. The household questionnaire employed in this article lists all the household members and their demographic characteristics (including age, sex, marital status, education and relationship to the head of the household) and provides detailed information on characteristics of the household's dwelling unit, ownership of different durable goods, migration, and food security. The unit of analysis in the entire NDHS sample is the household member. The NDHS sample comprises of 53,108 observations in 2011 and 45,747 observations in 2016.

Table 1 gives a summary of variables used in the study. Panel A and B provide information on the NLSS III sample and the NDHS sample, respectively. Panel A shows that individuals sampled in the NLSS III survey have an average age of 33.49 years with a standard deviation of 25.28. In relation to demographics, 47.2% of individuals are males, 85.4% reside in rural locations, 52.5% are married and 22.7% belong to high caste groups (categorized as either Brahmins or Chhetris). The average household has 5.23 members, ranged between a minimum of 1 and a maximum of 26. 57.9% of individuals report that they have received old age allowance from the government.

Panel B of Table 1 shows that individuals from the NDHS sample have an average age of 26.97 years with a standard deviation of 20.42. Similar to the statistics from the NLSS III survey, Panel B indicates that 46.3% of individuals in the NDHS sample are males. The average household size consists of 5.66 members with a standard deviation of 2.7, ranged between a minimum of 1 and a maximum of 38. 55.4% of individuals reside in rural locations and 75.4% of individuals have male

household heads. To quantify economic outcomes, this study uses three indicators: ownership of a mobile phone, ownership of a watch and ownership of a bank account. NDHS sample indicates that 85.1% of individuals own a mobile phone, 72.2% own a watch and 66.7% own a bank account. To quantify health-related behavioral outcomes, this study uses two indicators: whether an individual smokes, and whether an individual slept last night. Panel B shows that 46.1% of individuals never smoke and 95.4% slept last night.

Finally, this study makes use of eight food consumption-related behavioral outcomes. 50.5% of individuals report that they have never been worried about not having enough food in the past 12 months. 52.3% report that inadequate resources in the past 12 months have not prevented them from eating preferred foods. 54.5% report that they never ate a limited variety of food over the last year due to lack of resources. 78.9% of individuals report that they never ate smaller meals because there was not enough food in the past 12 months. In addition, 85% of individuals never ate fewer meals in a day because of lack of resources in the past 12 months. 88.7% of individuals report that they never encountered food unavailability due to inadequate resources over the last year. Moreover, 93.1% of individuals never went to sleep hungry because of inadequate food in the past 12 months. Finally, 51.4% of individuals report that their food deficiency has been caused by financial problems. This indicator is available only for 2011 in the NDHS sample.

3   Empirical Strategy

To identify the causal impact of a nationwide senior citizen allowance program eligibility on the likelihood of receiving a payment and a wide variety of economic and behavioral outcomes, I employ a regression discontinuity design. I utilize an age discontinuity in the old age allowance program eligibility to account for potential endogeneity associated with receiving the government benefits. This is important because a simple comparison of those eligible for the allowance with ineligible counterparts would confound the impact of the allowance program with systematic differences between two comparison groups. The analysis in this study compares individuals who

are age-eligible for the allowance to those who are almost eligible. The identification assumption underpinning the results is that individuals very close to allowance eligibility (in their late 60s) are comparable to those who just became eligible (in their early 70s). The abrupt shift in eligiblity implies that discontinuous changes in economic outcomes that occur at age 70 can be causally attributed to the senior citizen allowance program.

The empirical strategy involves the use of a local linear specification with a triangular kernel that places higher weight on observations closer to the age cut-off (Calonico et al., 2017, 2020). In this preferred approach, I cluster robust bias-corrected standard errors at the district level. As an additional robustness check, I also estimate the following regression equation:

$$
\begin{aligned}
Y_{ijt} = \alpha + \beta_1 \mathbf{1}\left(Age_{ijt} \geq 70\right) + \beta_2 \mathbf{1}\left(Age_{ijt} \geq 70\right) X \left(Age_{ijt} - 70\right) + \\
\beta_3 \mathbf{1}\left(Age_{ijt} < 70\right) X \left(Age_{ijt} - 70\right) + \theta \mathbf{X}_{ijt} + \delta_j + \epsilon_{it}
\end{aligned}
\tag{1}
$$

where Y_{ijt} denotes an outcome variable for an individual i in district j in year t. The indicator $\mathbf{1}\left(Age_{ijt} \geq 70\right)$ indicates that the individual is at least 70 years old and is therefore eligible for the old age allowance program. $\mathbf{1}\left(Age_{ijt} < 70\right)$ indicates that the individual is less than 70 years old and is not eligible for the allowance program. Age_{ijt} denotes an individual's age in years. I allow age trend terms to vary above and below the age cut-off through the use of interaction term between the polynomial and the age eligibility dummy, which results in an estimation of β_2 and β_3. $\mathbf{X}_{ijt}$ is a vector of individual controls such as gender and location type. δ_j captures district fixed effects that account for time-invariant factors at the district level such as quality of institutions and political influence. This is necessary because prior literature has indicated that district-level heterogeneity causes institutional differences in program delivery in Nepal (Paudel and de Araujo, 2017; Paudel, 2021a). The estimating equation clusters standard errors at the district level to control for the intra-class correlation in the error. The parameters of interest, β_1 identifies the causal effect of program eligibility on outcomes of interest at age 70.

I employ a wide variety of outcome variables in this article. First and foremost, I explore the likelihood that an individual receives the allowance from the government. Second, I use three

economic indicators to proxy for access to assets. These binary indicators include whether an individual owns a mobile phone, a watch and a bank account. Third, I quantify an individual's probability of sleeping last night and not smoking to proxy for healthy behavioral changes. Fourth, I use eight different indicators to investigate changes in food security-related behavioral outcomes among senior citizens. These eight binary indicators include: never worried about inadequate food, never unable to eat preferred food due to lack of resources, never ate a limited variety of foods due to lack of resources, never ate smaller meals because there was not enough food, never ate fewer meals because of lack of resources, never no food to eat because of lack of resources, never went to sleep hungry because there was not enough food, and food deficiency caused by financial resources. Finally, I include two additional variables, household size and gender of a household head, to proxy for changes in household composition.

Two methodological issues are worth highlighting. First, one might be concerned that Nepalese individuals might be incentivized to present themselves as older groups of individuals to receive benefits from the allowance program. While anecdotal evidence indicates that possibility of such cases is rare in the context of Nepal, it is worth pointing out that sampled individuals do not have incentives to lie about their age when participating in the DHS survey. Even if individuals were to misreport their age to receive social assistance, data employed in this study would contain higher proportion of individuals just above the age cutoff. However, Figure A3 shows that there exists no difference in sample size above the cutoff compared to just below. This approach outlined in Ambler (2016) gives confidence that misreporting is likely not an issue of significant concern in the context of this study. Section 4.4 explores additional robustness checks to strengthen the validity of the empirical strategy presented here.

Second, it is important to consider the spillover effects of the allowance program. Social assistance programs can induce a rise in the amount of allowance, which subsequently may influence households to reorganize (Ambler, 2016). This is worth exploring because prior literature suggests that access to social assistance programs such as pensions can significantly affect the composition of the household (Edmonds et al., 2005; Ambler, 2016; Hamoudi and

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Thomas, 2014). For example, old age allowance eligibility may increase the likelihood of receiving the payment, which might further induce households in a joint family arrangement to decide on having an additional child. If this results in an increase in household size, it is not necessary that allowance eligibility will have a positive impact on behavioral outcomes of senior citizens. Section 4.2 will examine whether allowance program eligibility led to a change in household size in the Nepalese setting.

4 Results

4.1 Economic and Behavioral Outcomes

I begin with an investigation of the direct impact of the old age allowance program on payment receipt among senior citizens of Nepal. Figure 1 shows that there is actually a discontinuity in likelihood of receiving an allowance from the government at age 70 among men and women. The NLSS survey asked each adult individually whether he or she received an allowance from the government. The averages of these responses in Table 2 shows that the probability of receiving the allowance from the government increased significantly among eligible individuals. Column (1) indicates that age-eligible individuals are 64.4% likely to receive payment from the government. The treatment effect estimates range between 38% and 64% from left to right across columns (2) - (8) and are statistically significant at the 1% level.

Next, I estimate the impact of the old age allowance program eligibility on a wide variety of economic and behavioral outcomes explained in Section 3. Figure 2 and Figure 3 present RD plot estimates on ownership of physical assets, health indicators and food-related behavioral outcomes by age. Although Figure 2 shows that there is some discontinuity in likelihood of owning a bank account and sleeping last night, regression estimates reveal that none of these slope coefficients are statistically significant. Figure 3 indicates that there is a slight downward discontinuity at the age cut-off for almost all food-related behavioral outcomes (except for food deficiency caused by lack of financial resources). A more formal regression estimation procedure shows that age-eligible

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individuals are 7.4% less likely to eat fewer meals because of lack of resources. This effect is statistically significant at the 1% level. It is worth noting that the impact of old age allowance eligibility on other behavioral outcomes is not statistically significant. This suggests that Nepal's nationwide old age allowance program did not have a significant impact on enhancing access to physical assets and improving food consumption among senior citizens.

To better understand potential heterogeneity of allowance program eligibility on both economic and behavioral outcomes, I decompose the overall effect across males and females. This is important because prospects of gender bias exist in a patriarchal society-based Nepal. For instance, Paudel (2018) argues that gender is a key determinant of inherent socioeconomic inequality in a developing country setting. Recent literature has also highlighted the role of locus of control in predicting gender-level differences (Churchill et al., 2020). In the context of this study, it is critical to understand whether the impact of old age allowance program is different between males and females. Figure 4 shows that there is a discontinuity in almost all food-related behavioral outcomes among females. Table 3 confirms the same relationship while documenting that the effect of allowance program eligibility is negative, strong and statistically significant on three specific outcomes. Columns (5) - (7) in Panel A show that female senior citizens eligible for the allowance are 8.8% more likely to eat fewer meals induced by inadequate resources, 8% more likely to find food unavailable due to inadequate resources and 5.3% more likely to sleep hungry in response to inadequate food in the past twelve months. Almost all other behavioral measures of food consumption among females (except for food deficiency caused by lack of financial resources) show a negative relationship, but the estimates are not statistically significant. Panel B investigates the relationship between allowance program eligibility and eight different behavioral measures of food consumption among males. It is striking that program eligibility did not have a statistically significant impact on none of the eight measures among males, suggesting that effects of the old age allowance program on behavioral outcomes related to food consumption are more pronounced among female senior citizens.

I also investigate whether program eligibility enhanced access to physical assets and promoted

healthy behavior among male and female senior citizens. I find that the old age allowance program did not have a significant impact on ownership of a watch and a bank account, likelihood of not smoking and sleeping last night. However, Table 4 indicates that males and females report different experiences in relation to access to a mobile phone. Specifically, column (1) shows that age-eligible females are 7.7% less likely to own a mobile phone, while age-eligible males are 9.7% more likely to own a mobile phone. This adds new evidence to existing literature that shows that eligibility to programs such as pensions induced an increased ownership of consumer goods among females in South Africa (Duflo, 2000).

Findings from Table 4 indicate that males and females likely spend their allowances in different ways. In fact, prior literature shows that welfare effects of cash transfers can be different between males and females. For example, Rubalcava et al. (2004) report that women spend additional money on clothing and investments in small livestock, implying that gender preferences may determine potential heterogeneity of cash transfers. In the context of rural Mexico, "resources under the control of women are more likely to be spent on future investments than resources that men control" (Rubalcava et al., 2004). In a different study, Schady and Rosero (2008) claim that transfers to women do not necessarily have the same welfare effects as other sources of income. According to Schady and Rosero (2008), females in Ecuador randomly assigned to receive transfers have significantly higher food shares after the program.

4.2   Household Size

The result that women's behavioral outcomes related to food consumption decreased with allowance-eligibility leads to the question of why results are different between males and females. The fact that old age allowance eligibility increased the likelihood of an individual receiving payment from the government is an important economic finding but the underlying gender-level heterogeneity associated with the behavioral impact of the allowance program has substantial policy implications. For example, proponents of universal social protection may argue that positive impact of payment receipt among senior citizens is evidence in favor of expanding access

to financial assistance for the elderly. However, it is possible that this increase in likelihood of receiving allowances comes at the expense of other demographic changes, causing female senior citizens to suffer more compared to male counterparts. It is well-documented that an increase in the number of young children in a household is associated with pension-eligibility among females (Ardington et al., 2009; Edmonds et al., 2005).

To understand why female senior citizens report negative changes in behavioral measures of food consumption, I investigate whether old age allowance eligibility in Nepal impacted household composition. I employ two measures of household composition based on data availability: household size and gender of the household head. To the extent that old age allowance eligibility induced joint family households (which is quite common throughout Nepal) to decide on having an extra child in the aftermath of increased monthly payments, behavioral outcomes among females might be driven by such demographic changes in household size. If this channel holds true, it is not unreasonable to assume that old age allowance meant for female senior citizens may be allocated for other household activities such as providing resources for a new child and so on. In settings where its common for grandmothers to raise grandchildren while parents go work during the daytime, it is worth exploring demographic changes associated with social assistance programs. It is also likely that money given to grandparents can reach young children (Duflo, 2000).

Table 5 provides evidence that household size is a key demographic variable that needs to be taken into consideration. Column (1) shows that allowance-eligibility caused an increase in household size by 0.5 members. Moving from left to right, columns (2) - (3) indicate that estimates on household size are statistically significant ranging between 0.31 and 0.59. I also find that the nationwide allowance program did not have a significant effect on the likelihood that the gender of a household is male. The estimate is smaller in magnitude, ranging between -0.004 to 0.004 across columns (5) - (8), and is not statistically significant.

Findings in Table 5 are in line with prior work documenting that access to programs such as pensions can significantly affect the composition of the household (Edmonds et al., 2005; Ambler,

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2016; Hamoudi and Thomas, 2014). In the context of this study, it is likely that female senior citizens bear the brunt of an increase in household size induced by allowance-eligibility. Musil et al. (2002) document that grandmothers raising grandchildren experience more parenting stress and parental distress than mothers. Consistent with this reasoning, it is possible that a change in household size differentially affects behavioral measures of food consumption among female and male senior citizens. A comprehensive evaluation of a nationwide old age allowance program should take into account that households may react in intricate ways, causing changes in behavioral outcomes. This study suggests that change in household size is an important factor to consider when conducting cost-benefit analyses of social assistance programs.

4.3   Economic and Policy Implications

This section breaks down the overall effect of allowance-eligibility on economic and behavioral outcomes among seven provinces of Nepal. This is important because management of government funds and implementation of social assistance programs in Nepal falls under provincial jurisdictions. Launching effective universal social protection schemes at the province level requires a comprehensive evaluation of how well-intentioned policies have both direct and indirect implications on ownership of economic capital and behavioral measures of food consumption.

Figure 5 presents the heterogenous effect of a nationwide old age allowance program on different outcomes across provinces of Nepal. Figure 5(a) shows that senior citizens eligible for the allowance residing in Bagmati province are 26.06% more likely to smoke. The impact of the nationwide allowance program on behavioral measures of food security appears to be prominent in province no. 2. In province no. 2, individuals are 22.04% more likely to be worried about inadequate food and 19.95% more likely to eat a limited variety of foods due to lack of resources in the last twelve months. Figure 5(d) shows that a change in household size associated with the allowance program is much larger in magnitude and statistically significant in the case of Karnali province.

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These findings indicate that policy makers need to consider geographical heterogeneity in prioritizing future policy interventions aimed at improving socioeconomic outcomes of the elderly. While this study concludes that allowance programs for the elderly can enhance the likelihood of receiving payments from the government, it is equally important to explore how demographic changes induced by the program may influence household dynamics and behavioral outcomes among senior citizens. This is crucial in settings where gender inequality and ethnic fractionalization are rampant (Paudel, 2021c). Empirical estimates from this study suggest that government transfers need to be well-targeted to those burdened with additional household responsibilities, specifically female individuals belonging to families experiencing an increase in household size. It is important to point out that this study does not suggest that universal social protection for the elderly should be discouraged. Rather, the study concludes that mechanisms such as household size through which allowance eligibility may influence behavioral outcomes related to food consumption need to be taken into consideration.

4.4   Robustness Checks

I have shown that eligibility of an old age allowance program caused a 64.4% increase in the likelihood of receiving financial assistance among the elderly in Nepal, with heterogeneous effects on economic and food-related behavioral outcomes across gender. To the extent that individuals around the age cut-off are similar in other characteristics that determine these outcomes, results presented in this article are valid. This section conducts additional robustness checks to make sure that this key identification condition is met.

First, I test for discontinuities in baseline characteristics that should not be affected by the old age allowance program. If baseline demographic or socioeconomic characteristics show discontinuous jumps, potential similarity between individuals barely below and barely above the age cut-off would be an issue of significant concern. Although it is not possible to test that the unobservable characteristics of the eligible group satisfy this condition, it is feasible to investigate the validity of this assumption. This test requires that the conditional expectations of the

observable baseline characteristics do not vary discontinuously in the neighborhood of the cut-off age. Figure A1 provides the graphic equivalent of the test on gender, caste, location type and marital status. All the horizontal axes represent an individual's normalized age relative to 70. The vertical axes are binary indicators of male, high caste, rural location and married status, respectively. The implication of these figures is that none of these characteristics shows discontinuity around the age 70 cut-off, implying that RD estimates in Table 2 are robust.

Second, I test potential discontinuities at other age cut-offs to investigate whether the jump observed in Figure 1 is driven by other age-related factors rather than the eligibility of the old age allowance. The identifying strategy employed in the study rests on the notion that an individual barely below the allowance eligible age should be similar to the one slightly above 70 except that the former does not receive any financial payment. Figure A2 reports placebo test results on likelihood of receiving payment using 65 and 75 as the age cut-off. This indicates that there are no significant discontinuities for pseudo age cut-offs, implying that the documented change at age 70 is, in fact, driven by the old age allowance program.

Third, I test for continuity of the density to ensure that individuals do not manipulate their age to gain entry to the allowance program. Specifically, I follow Cattaneo et al. (2018) and implement manipulation tests based on density discontinuity using the results for local-polynomial density estimators. The final manipulation test statistic from the procedure is 0.3475 with a p-value of 0.72. This indicates that there is no statistical evidence of systematic manipulation of the running variable. It is also worth pointing out that there exists no other policy discontinuity at age 70 that may potentially confound the likelihood of receiving an allowance.

Finally, I plot Figure A3 to show that there exists no difference in sample size above the age cutoff compared to just below. The figure shows that the relationship between sampled observations and age is pretty smooth throughout the entire range. The main results documented in this study are also robust to different bandwidth selections. These additional robustness checks strengthen the validity of RD estimates presented in the article.

5   Concluding Remarks

This article investigated the impact of a nationwide old age allowance program on a wide variety of economic and behavioral outcomes related to food security among senior citizens in Nepal. To quantify economic and behavioral outcomes, it made use of binary indicators related to ownership of economic assets and healthy practices, measures of food security and household composition. Using different waves of nationally representative household surveys in Nepal, this article employed a regression discontinuity design to overcome the challenge that individuals eligible for allowances might be systematically different from ineligible counterparts. Results indicated that the nationwide old age allowance program caused a 64.4% increase in the likelihood of receiving financial assistance among the elderly. However, the program did not have a significant impact on enhancing access to most physical assets (including ownership of bank account) and improving food consumption. Strikingly, female senior citizens eligible for the allowance are 8.8% more likely to eat fewer meals induced by inadequate resources and 5.3% more likely to sleep hungry in response to inadequate food in the past twelve months. However, eligible male counterparts do not report any significant changes in behavioral measures of food consumptions, but are 9.7% more likely to have a mobile phone.

The article also provided suggestive evidence that eligibility for the old age allowance program increased one's household size, which likely exacerbated gender disparities in behavioral measures of food security. It is important to point out that this study does not suggest that universal social protection for the elderly population should be discouraged. Rather, the study concludes that mechanisms such as household size through which allowance eligibility may influence behavioral outcomes related to food consumption need to be explored in more detail. Future research may benefit from a comprehensive understanding of how well-intentioned social safety nets influence household dynamics and key indicators of women's empowerment.
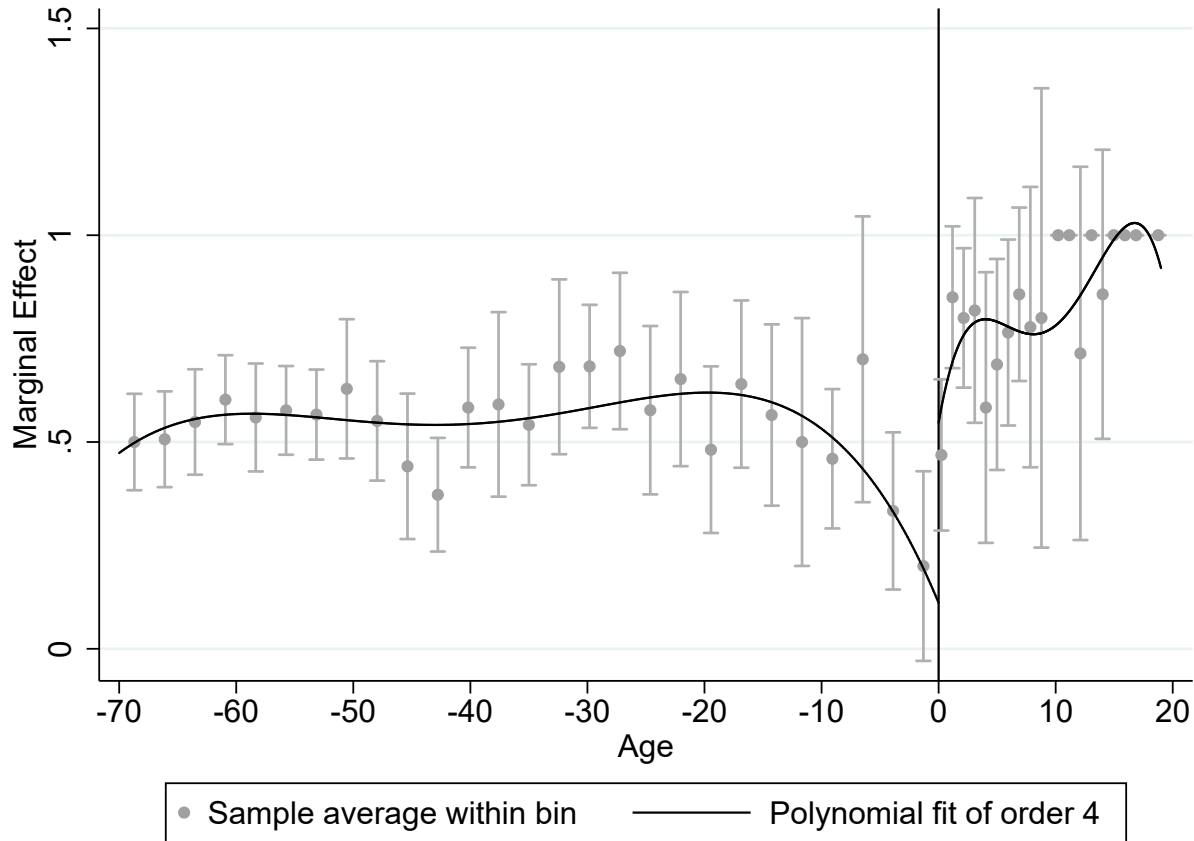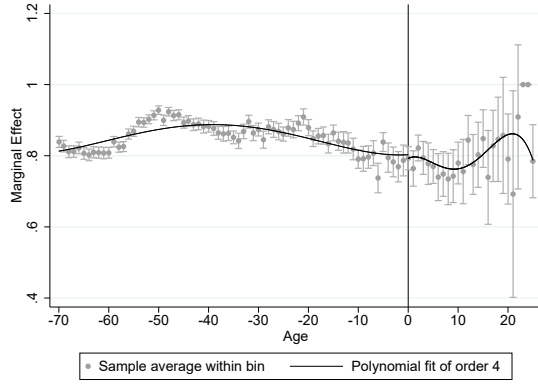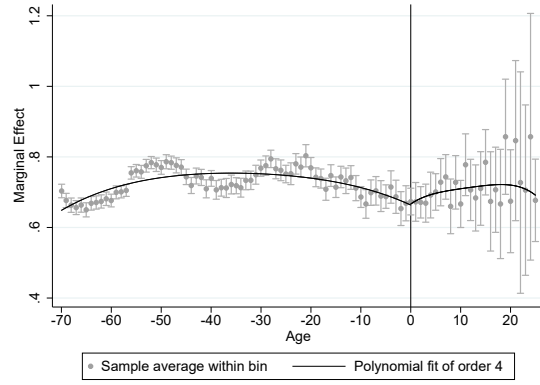
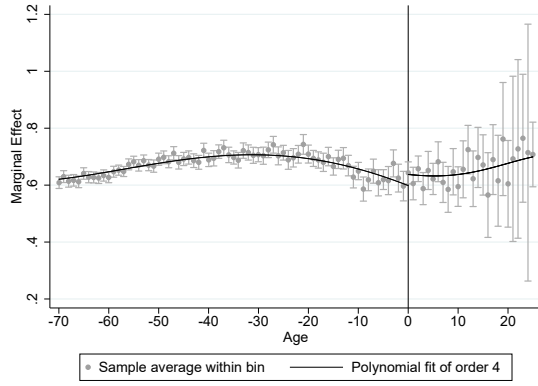Figure 1: Probability of receiving allowance by age

Notes: Automatic RD plot involves scaled-down optimal bin-length choice as specified in Calonico et al. (2017). The data-driven procedure to select the number of bins involves the mimicking-variance evenly spaced method using spacings estimators. Ninety-five percent confidence intervals for each bin are shown around the regression lines. Y-axis variable is a dummy variable representing an individual's likelihood of receiving old age allowance.
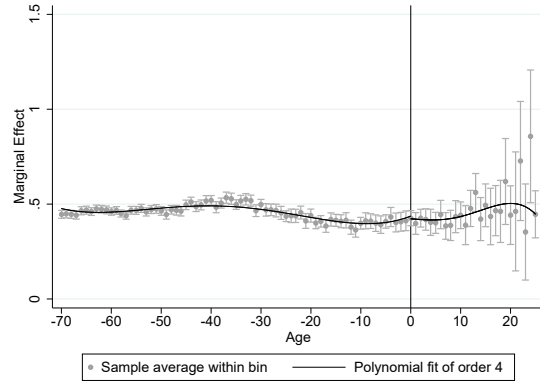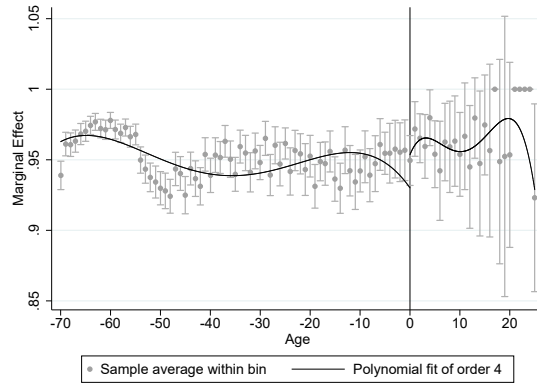
(a) Owns a mobile phone

(b) Owns a watch

(c) Owns a bank account

(d) Does not smoke

(e) Slept last night

Figure 2: Ownership of physical assets and health indicators by age

Notes: Automatic regression-discontinuity (RD) plot involves scaled-down optimal bin-length choice as specified in Calonico et al. (2017). The data-driven procedure to select the number of bins involves the mimicking-variance evenly spaced method using spacings estimators. Ninety-five percent confidence intervals for each bin are shown around the regression lines. Y-axis variable is a dummy variable representing an individual's ownership of a mobile phone, a watch, a bank account, no smoking status and last night's sleep.
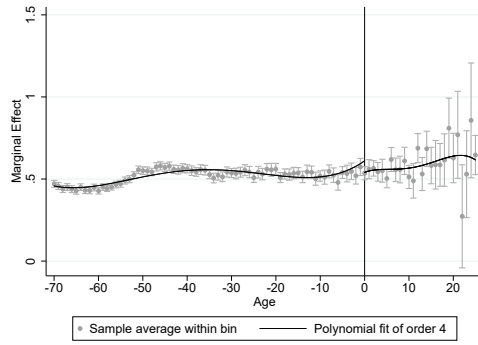
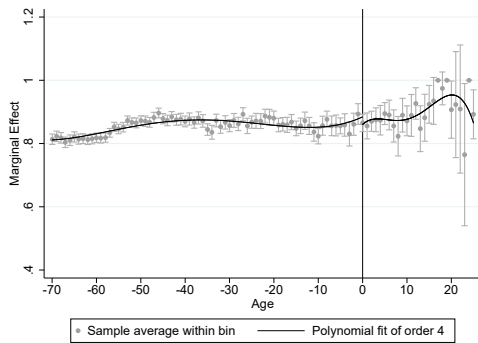(a) Never worried about inadequate food
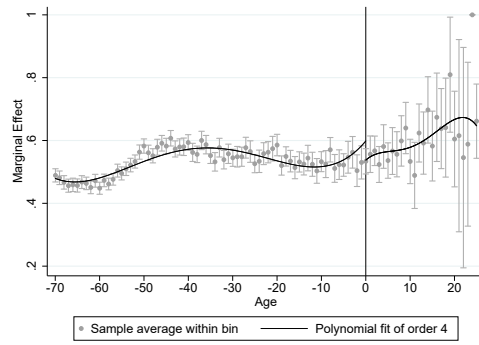
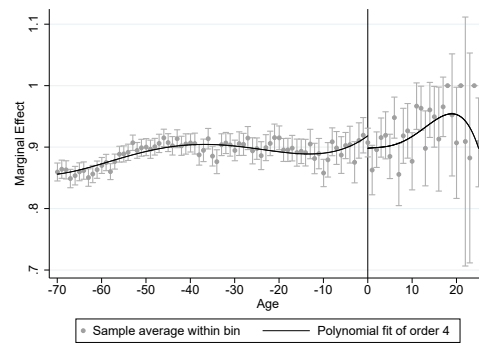(b) Never unable to eat preferred foods because of lack of resources
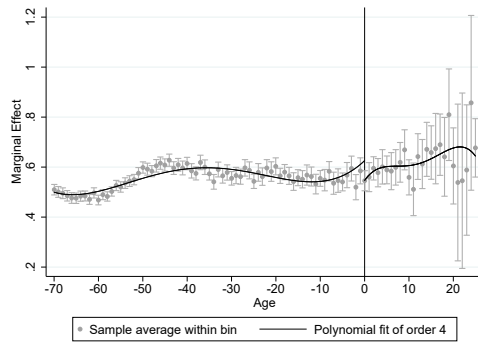
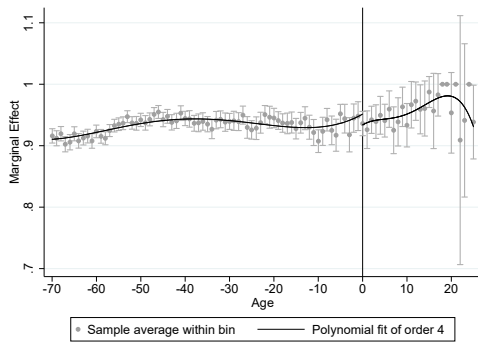(c) Never ate a limited variety of foods due to lack of resources
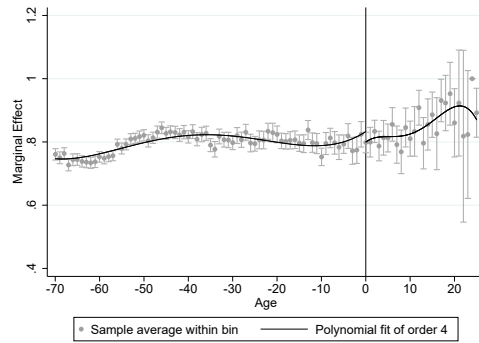
(d) Never ate smaller meals because there was not enough food
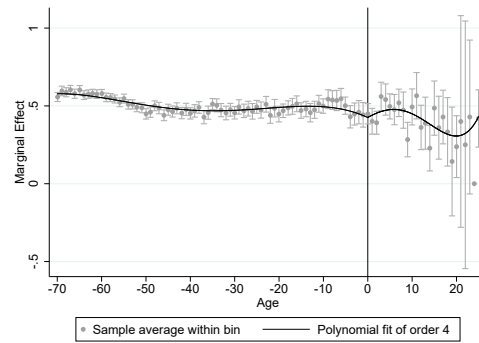
(e) Never ate fewer meals because of lack of resources

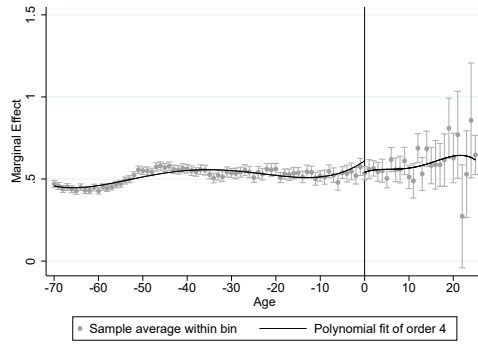(f) Never no food to eat because of lack of resources

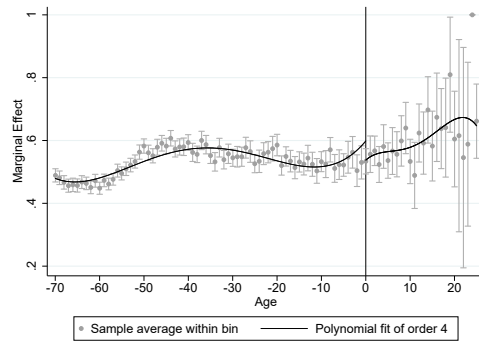(g) Never went to sleep hungry because there was not enough food

(h) Food deficiency caused by financial problem

Figure 3: Food-related behavioral outcomes by age

Notes: Automatic regression-discontinuity (RD) plot involves scaled-down optimal bin-length choice as specified in Calonico et al. (2017).

(a) Never worried about inadequate food

(b) Never unable to eat preferred foods because of lack of resources

(c) Never ate a limited variety of foods due to lack of resources

(d) Never ate smaller meals because there was not enough food

(e) Never ate fewer meals because of lack of resources
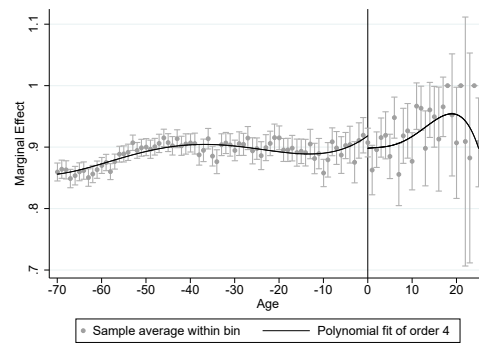
(f) Never no food to eat because of lack of resources
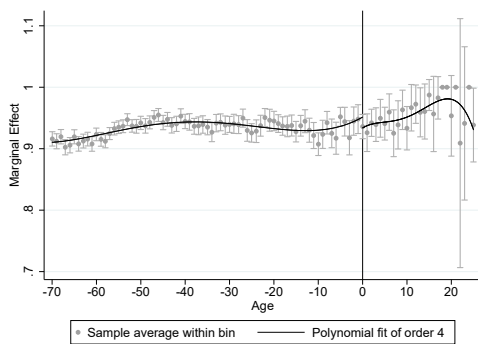
(g) Never went to sleep hungry because there was not enough food
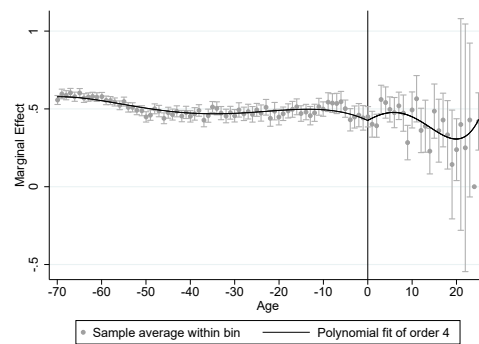
(h) Food deficiency caused by financial problem
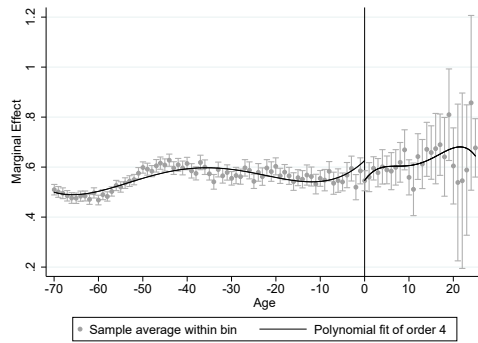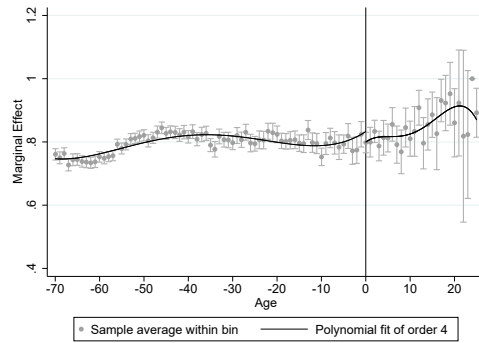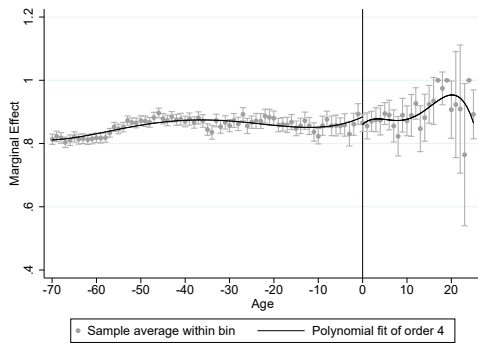
Figure 4: Food-related behavioral outcomes among females by age

Notes: Automatic regression-discontinuity (RD) plot involves scaled-down optimal bin-length choice as specified in Calonico et al. (2017).

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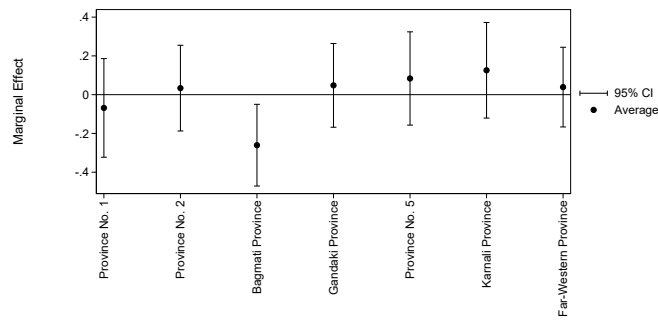
(a) Does not smoke
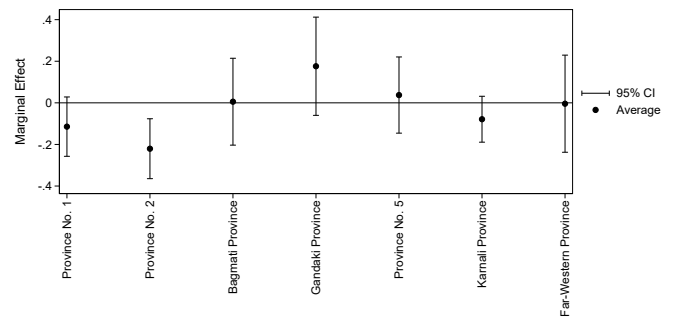
(b) Never worried about inadequate food

(c) Never ate a limited variety of foods due to lack of resources

(d) Household size

Figure 5: Regression-discontinuity (RD) estimates of economic and behavioral outcomes among seven provinces of Nepal

Table 1: Summary of data employed in the study

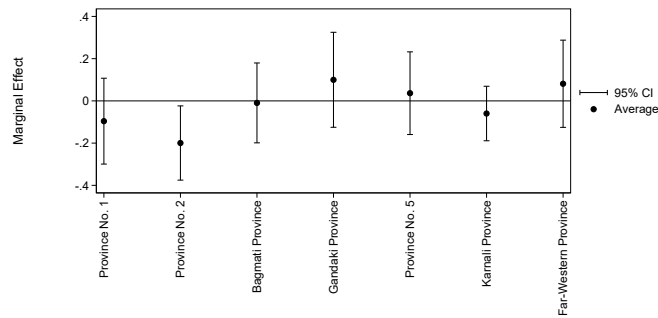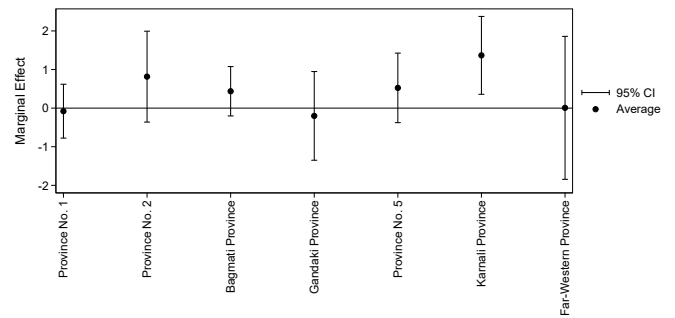| Characteristics	Observations	Mean	Standard Deviation	Minimum	Maximum
	(1)	(2)	(3)	(4)	(5)
Panel A: National Living Standards Survey, 2010					
Age	1,328	33.494	25.289	0	99
Male	1,328	0.472	0.499	0	1
Rural	1,252	0.854	0.353	0	1
Household size	935	5.23	2.64	1	26
Married	1,063	0.525	0.500	0	1
High Caste	1,328	0.227	0.419	0	1
Received allowance	1,328	0.579	0.494	0	1
Panel B: Demographic and Health Surveys, 2011 and 2016					
Age	98,855	26.970	20.425	0	95
Male	98,855	0.463	0.499	0	1
Rural	98,855	0.554	0.497	0	1
Household size	98,855	5.669	2.753	1	38
Male household head	98,855	0.754	0.431	0	1
Owns a mobile phone	98,855	0.851	0.356	0	1
Owns a watch	98,855	0.722	0.448	0	1
Owns a bank account	98,855	0.667	0.471	0	1
Never smokes	98,855	0.461	0.498	0	1
Slept last night	98,855	0.954	0.210	0	1
Never worried about not having enough food in the past 12 months	98,855	0.505	0.500	0	1
Never not able to eat preferred foods because of lack of resources in the past 12 months	98,855	0.523	0.499	0	1
Never ate a limited variety due to lack of resources in the past 12 months	98,855	0.545	0.498	0	1
Never ate smaller meals because there was not enough food in the past 12 months	98,855	0.789	0.408	0	1
Never ate fewer meals in a day because of lack of resources in the past 12 months	98,855	0.850	0.357	0	1
Never no food to eat because of lack of resources in the past 12 months	98,855	0.887	0.317	0	1
Never went to sleep hungry because there was not enough food in the past 12 months	98,855	0.931	0.254	0	1
Food deficiency caused by financial problems	49,791	0.514	0.500	0	1

Table 2: Impact of allowance eligibility on likelihood of receiving payment among senior citizens in Nepal

	Dependent variable: Binary indicator of receiving payment							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Conventional	0.558***	0.376***	0.531***	0.531***	0.558***	0.531***	0.412***	0.568***
	(0.171)	(0.101)	(0.168)	(0.168)	(0.171)	(0.161)	(0.113)	(0.151)
Bias-corrected	0.644***	0.380***	0.626***	0.626***	0.642***	0.600***	0.413***	0.625***
	(0.171)	(0.101)	(0.168)	(0.168)	(0.171)	(0.161)	(0.113)	(0.151)
Robust	0.644***	0.380***	0.626***	0.626***	0.642***	0.600***	0.413***	0.625***
	(0.209)	(0.116)	(0.205)	(0.205)	(0.210)	(0.189)	(0.124)	(0.165)
Triangular Kernel	✓	✓	✓	✓	✓	✓	✓	✓
Observations	1328	1328	1328	1328	1328	1328	1328	1328
Order Loc. Poly. (p)	1	1	1	1	1	1	1	1
Order Bias (q)	2	2	2	2	2	2	2	2
BW Loc. Poly. (h)	7.009	18.253	6.069	6.069	7.009	5.536	14.417	4.793
BW Bias (b)	13.732	31.946	12.324	12.324	13.732	13.732	31.946	12.324

Notes: This table reports results from local polynomial Regression Discontinuity (RD) point estimators with robust bias-corrected confidence intervals and inference procedures developed in Calonico et al. (2020) and Calonico et al. (2017). Each column specifies a different bandwidth selection procedure involving different types of mean square error-optimal bandwidth selectors and coverage error rate-optimal bandwidth selectors for both RD treatment effect estimator and the sum of regression estimates. Standard errors are clustered at the district level. *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

Table 3: Impact of allowance eligibility on food-related behavioral outcomes of senior citizens in Nepal

	Never worried (1)	Eat preferred (2)	Eat unlimited (3)	No smaller meals (4)	No fewer meals (5)	Food available (6)	Never slept hungry (7)	Food deficiency (8)
Panel A: Females Only								
Dependent variable: Binary indicator of food security								
Conventional	-0.081	-0.026	-0.061	-0.022	-0.075**	-0.072**	-0.048**	0.034
	(0.057)	(0.053)	(0.048)	(0.033)	(0.033)	(0.029)	(0.020)	(0.080)
Bias-corrected	-0.096*	-0.027	-0.074	-0.018	-0.088***	-0.080***	-0.053***	0.030
	(0.057)	(0.053)	(0.048)	(0.033)	(0.033)	(0.029)	(0.020)	(0.080)
Robust	-0.096	-0.027	-0.074	-0.018	-0.088**	-0.080**	-0.053**	0.030
	(0.066)	(0.061)	(0.053)	(0.038)	(0.037)	(0.033)	(0.023)	(0.094)
Triangular Kernel	✓	✓	✓	✓	✓	✓	✓	✓
Observations	53108	53108	53108	53108	53108	53108	53108	26516
Order Loc. Poly. (p)	1	1	1	1	1	1	1	1
Order Bias (q)	2	2	2	2	2	2	2	2
BW Loc. Poly. (h)	6.530	8.590	7.723	6.838	4.527	4.898	4.977	6.854
BW Bias (b)	10.486	12.406	12.936	10.925	9.265	9.600	9.152	10.146
Panel B: Males Only								
Dependent variable: Binary indicator of food security								
Conventional	0.010	0.032	-0.005	-0.007	-0.005	-0.006	-0.000	0.035
	(0.049)	(0.051)	(0.058)	(0.040)	(0.026)	(0.029)	(0.022)	(0.067)
Bias-corrected	0.002	0.026	-0.002	-0.019	-0.010	-0.007	-0.001	0.046
	(0.049)	(0.051)	(0.058)	(0.040)	(0.026)	(0.029)	(0.022)	(0.067)
Robust	0.002	0.026	-0.002	-0.019	-0.010	-0.007	-0.001	0.046
	(0.057)	(0.060)	(0.069)	(0.047)	(0.029)	(0.037)	(0.025)	(0.079)
Triangular Kernel	✓	✓	✓	✓	✓	✓	✓	✓
Observations	45747	45747	45747	45747	45747	45747	45747	23275
Order Loc. Poly. (p)	1	1	1	1	1	1	1	1
Order Bias (q)	2	2	2	2	2	2	2	2
BW Loc. Poly. (h)	7.067	7.119	5.747	6.231	10.297	5.680	7.548	8.041
BW Bias (b)	10.996	10.859	8.624	10.511	17.214	9.631	11.433	12.424

Notes: This table reports results from local polynomial Regression Discontinuity (RD) point estimators with robust bias-corrected confidence intervals and inference procedures developed in Calonico et al. (2020) and Calonico et al. (2017). Each column specifies a common mean square error-optimal bandwidth selector for the RD treatment effect estimator. Standard errors are clustered at the district level. *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

Table 4: Impact of allowance eligibility on economic outcomes of senior citizens in Nepal

	Panel A: Females Only				
	Dependent variable:				
	Mobile phone	Watch	Bank account	Never smokes	Slept last night
	(1)	(2)	(3)	(4)	(5)
Conventional	-0.066*	-0.009	-0.033	0.029	-0.001
	(0.036)	(0.040)	(0.048)	(0.052)	(0.018)
Bias-corrected	-0.077**	-0.014	-0.035	0.040	-0.003
	(0.036)	(0.040)	(0.048)	(0.052)	(0.018)
Robust	-0.077*	-0.014	-0.035	0.040	-0.003
	(0.042)	(0.046)	(0.057)	(0.060)	(0.021)
Triangular Kernel	✓	✓	✓	✓	✓
Observations	53108	53108	53108	53108	53108
Order Loc. Poly. (p)	1	1	1	1	1
Order Bias (q)	2	2	2	2	2
BW Loc. Poly. (h)	5.367	8.672	6.394	6.736	6.526
BW Bias (b)	9.955	13.593	10.292	10.534	10.568
	Panel B: Males Only				
	Dependent variable:				
	Mobile phone	Watch	Bank account	Never smokes	Slept last night
	(1)	(2)	(3)	(4)	(5)
Conventional	0.079*	0.045	0.054	-0.038	-0.005
	(0.048)	(0.052)	(0.051)	(0.058)	(0.020)
Bias-corrected	0.097**	0.064	0.066	-0.052	-0.004
	(0.048)	(0.052)	(0.051)	(0.058)	(0.020)
Robust	0.097*	0.064	0.066	-0.052	-0.004
	(0.057)	(0.062)	(0.061)	(0.068)	(0.024)
Triangular Kernel	✓	✓	✓	✓	✓
Observations	45747	45747	45747	45747	45747
Order Loc. Poly. (p)	1	1	1	1	1
Order Bias (q)	2	2	2	2	2
BW Loc. Poly. (h)	5.233	5.499	6.636	5.165	5.998
BW Bias (b)	9.303	9.473	10.886	8.542	9.589

Notes: This table reports results from local polynomial Regression Discontinuity (RD) point estimators with robust bias-corrected confidence intervals and inference procedures developed in Calonico et al. (2020) and Calonico et al. (2017). Each column specifies a common mean square error-optimal bandwidth selector for the RD treatment effect estimator. Standard errors are clustered at the district level. *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

Table 5: Impact of allowance eligibility on household composition in Nepal

| | Dependent variable: | | | | | | | |
| | Household Size | | | | Household Head is Male | | | |
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Conventional	0.466*	0.255	0.524*	0.310*	0.010	-0.006	0.011	0.003
	(0.245)	(0.167)	(0.281)	(0.172)	(0.023)	(0.019)	(0.025)	(0.020)
Bias-corrected	0.556**	0.319*	0.590**	0.342**	0.015	-0.004	0.015	0.004
	(0.245)	(0.167)	(0.281)	(0.172)	(0.023)	(0.019)	(0.025)	(0.020)
Robust	0.556**	0.319*	0.590*	0.342*	0.015	-0.004	0.015	0.004
	(0.274)	(0.177)	(0.304)	(0.177)	(0.026)	(0.021)	(0.027)	(0.022)
Triangular Kernel	✓	✓	✓	✓	✓	✓	✓	✓
Observations	98855	98855	98855	98855	98855	98855	98855	98855
Order Loc. Poly. (p)	1	1	1	1	1	1	1	1
Order Bias (q)	2	2	2	2	2	2	2	2
BW Loc. Poly. (h)	4.168	18.122	3.249	14.125	7.001	12.574	5.457	9.801
BW Bias (b)	8.183	34.005	8.183	34.005	13.026	26.377	13.026	26.377

Notes: This table reports results from local polynomial Regression Discontinuity (RD) point estimators with robust bias-corrected confidence intervals and inference procedures developed in Calonico et al. (2020) and Calonico et al. (2017). Each column specifies a different bandwidth selection procedure involving different types of mean square error-optimal bandwidth selectors and coverage error rate-optimal bandwidth selectors for both RD treatment effect estimator and the sum of regression estimates. Standard errors are clustered at the district level. *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

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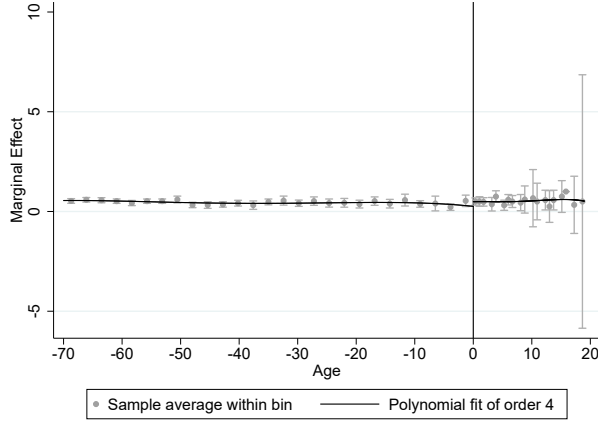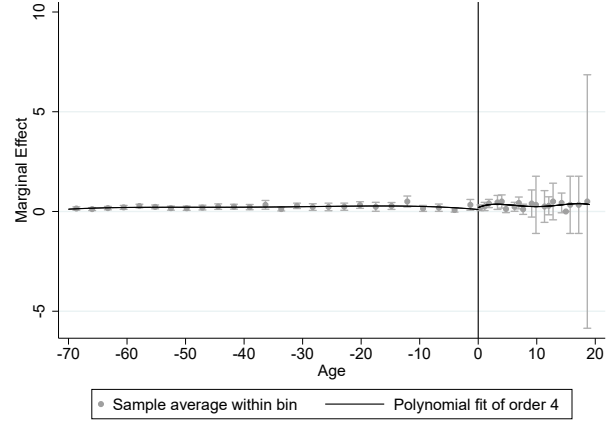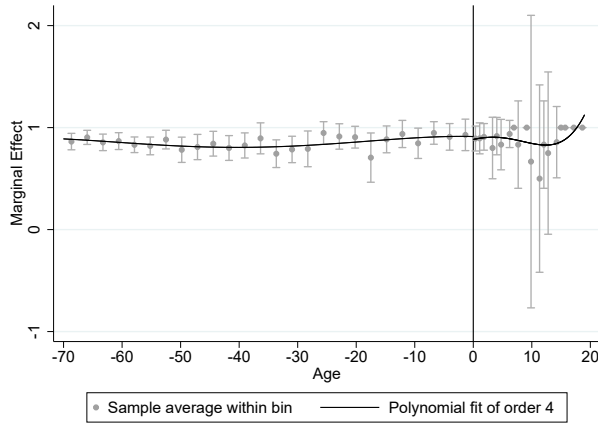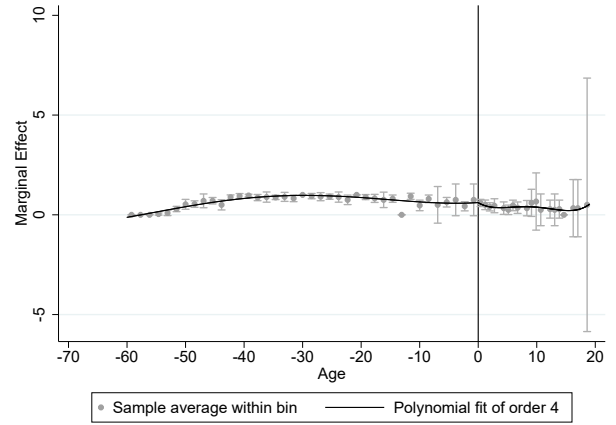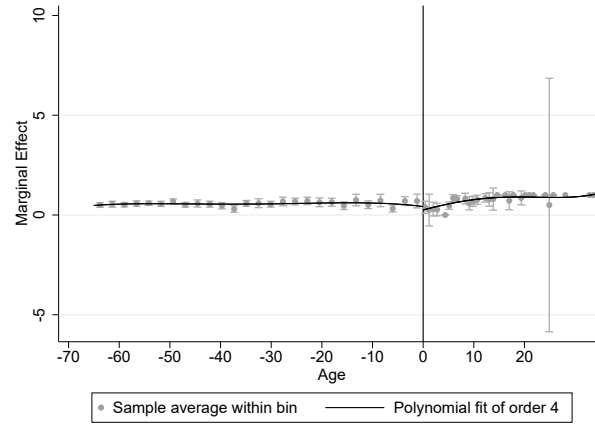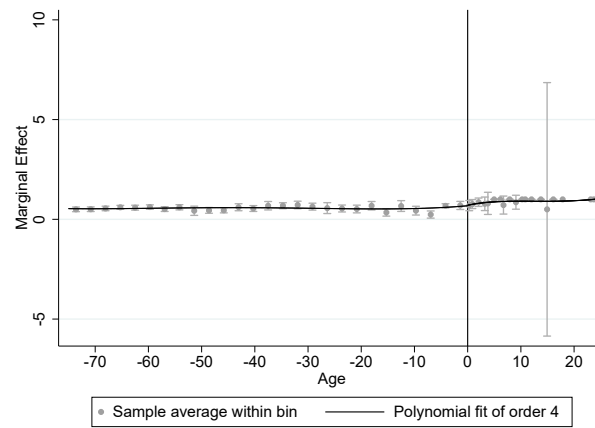
Figure A1: Demographic and socioeconomic characteristics by age

Notes: Automatic regression-discontinuity (RD) plot involves scaled-down optimal bin-length choice as specified in Calonico et al. (2017). The data-driven procedure to select the number of bins involves the mimicking-variance evenly spaced method using spacings estimators. Ninety-five percent confidence intervals for each bin are shown around the regression lines. Y-axis variable is a binary indicator representing an individual's gender, caste group, rural location and marital status.

(a) Placebo age cut-off (65)

(b) Placebo age cut-off (75)

Figure A2: Probability of receiving allowance by age

Notes: Automatic RD plot involves scaled-down optimal bin-length choice as specified in Calonico et al. (2017). The data-driven procedure to select the number of bins involves the mimicking-variance evenly spaced method using spacings estimators. Ninety-five percent confidence intervals for each bin are shown around the regression lines. Y-axis variable is a dummy variable representing an individual's likelihood of receiving old age allowance.
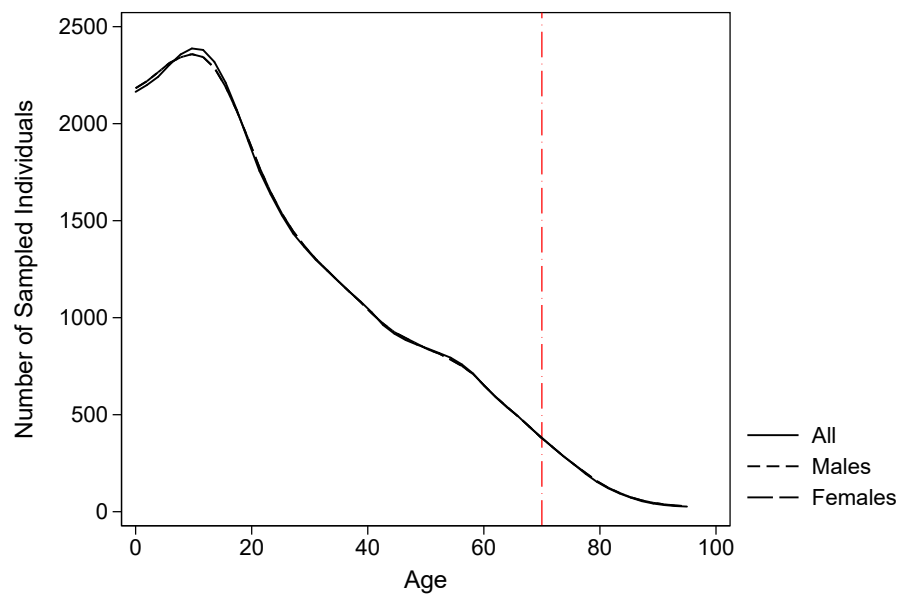
Figure A3: Sample population in 2011 and 2016 Demographic and Health Surveys (DHS) by age