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Old Age Allowance and Its Implications for Household Food Expenditure and Farming Investment: Evidence from Bangladesh

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ABSTRACT: The global demographic shift marked by the growing proportion of elderly individuals has prompted the urgent need to address the potential burden posed on households by these individuals. Safety net programs, such as the old age allowance (OAA), have been implemented in developing countries to protect the food security and social dignity of older individuals. This study investigates the impact of OAA on food expenditure and farming investment. By analyzing data from the Household Income and Expenditure Survey (HIES) in Bangladesh from 2016 to 2017, the findings show a transformative shift as OAA enhances investment in farming assets. However, OAA did not affect food expenditure. Additionally, this study validates the family transfer model, suggesting that financially supporting older family members contributes positively to the overall household economy. This study suggests that the allowance and coverage of OAA should be increased to ensure food security for older people.

KEYWORDS: elderly people, old age allowance, food expenditure, farming asset

1. Introduction

The aging population is currently a major global issue. The global percentage of individuals aged 65 or older increased from 5.1% in 1950 to 9.3% in 2020, with projections of 15.9% by 2050 and a further increase to 22.4% by 2100 (Gu et al. 2021, 604). Although this is a global issue, it is more complex in developing countries with filial cultures. This is because senior citizens are expected to be cared for by close relatives; hence, they are considered burdens when they lack income and savings for daily living (Mosarop Hossan et al. 2017, 129–140). In developing countries, most individuals aged 60 and older who work in the informal sector or are engaged in small-scale farming, have no pension or insurance coverage (Willmore 2007, 24–51). These individuals heavily depend on family members. However, this is not sustainable owing to the proliferation of nuclear families owing to industrialization, extreme poverty, migration, and self-centric attitudes (Irudaya Rajan 2008, 203–22; Karim and Hossain 2013; Ara et al. 2019, 18–32). Malak et al. (2020) studied the vulnerability and adaptive strategies of elderly people in cyclone-affected areas of Bangladesh and found that they lacked family support, care, and food security. Ali et al. (2022, 317–38) stated that rural people live

below the poverty line with limited resources to cover their livelihoods and medical facilities. Furthermore, an unstable income causes a lack of caregivers, loose family relations, and loneliness (Choudhary 2013, 262–68). Moreover, a key theme of the Sustainable Development Goals (SDGs) is to "leave no one behind," requiring growth to be inclusive for all, particularly older women, who are among the most impoverished. This study examined the impact of social protection interventions on aging people.

Social protection geared toward the SDGs must be universal, rights-based, and support older adults (Hanson and Lindgren 2021, 1006–031). An essential part of social safety for all ages is old age pensions, such as the old age allowance (OAA). The OAA is a safety-net program designed to provide social protection to the oldest people (Suwanrada and Sukontamarn 2023, 52–69). This allowance aims to promote social protection and social dignity for the oldest member of a household. However, the amount can only provide basic sustenance, making it an ineffective social protection tool for the aging generation. This study examined the impact of OAA on household food expenditure and farming investment.

First, it examines whether OAA impacts food expenditure, which suggests a household's food security status. Second, this study examines whether OAA impacts farming asset investment, suggesting the contribution of recipient elderly people to agricultural activities and the productive use of the allowance and maintenance of dignity for the oldest member of a family. This study addressed two research questions.

RQ1. What is the impact of OAA on food expenditure?

RQ2. What is the impact of OAA on farming investment?

Bangladeshi households whose oldest members are over 62 years of age were considered the units of analysis in this study. The 62-year age of the oldest member is considered one of the eligibility criteria for receiving an OAA. This allowance is given to the poorest households. Thus, its impact evaluation must deal with selection bias. This study applies fuzzy regression discontinuity design (RDD) as an identification method to address selection bias. This study applies land ownership as a running variable because one of the eligibility criteria for the program is based on land ownership (Bari et al. 2022, 668–87). The eligibility criterion of owning land (less than 0.5 acres) is considered to develop a fuzzy RDD setup that ensures local randomization.

The findings of this study have global policy implications, suggesting that OAA can promote welfare for the oldest people in society. Furthermore, the study has a theoretical implication on whether OAA receipt is spent on productive activities such as farming, providing evidence for family transfer models of microeconomics. This study is based on the family transfer model proposed by Laferrère and Wolff (2006, 889–969). The model suggests that any transfer provided to parents moves them from being altruistic parents to their children or families. This study examines the model by assuming that a small amount received by the oldest member of a household is spent with an altruistic purpose to attain welfare for the rest of the family for the present and future income generation. This study considers farming investment to be altruistic spending on OAA earnings received by the oldest member of the household.

Bangladesh has experienced substantial improvements in human development indicators, leading to significant declines in fertility and mortality rates. The demographic landscape is transforming, with a previously youthful population giving way to a burgeoning elderly segment, projected to rise from 5% in 2011 to an estimated 20% by 2050, necessitating the heightened importance of safety net programs (SNPs) for the impoverished elderly (World Bank 2019). The Bangladeshi government inaugurated SNPs to fight poverty after the 1974 famine. "Food for work" and "vulnerable group feeding (VGF)" are early steps of SNPs aiming to ensure food security, alleviate poverty, and improve the livelihood of low-income groups. The government commenced an old-

age allowance in the fiscal year 1997–1998, focusing on providing medical and food assistance, socioeconomic development, and upholding social dignity.

The OAA is an unconditional cash transfer allowance program managed by the Department of Social Services (DSS) under the Ministry of Social Welfare (MoSW) (Bari et al. 2022, 668–87). Universally, it is difficult to define old age from the perspective of life expectancy in different nations. Malak et al. (2020) referred to old age as equal and more than 60 years from a Bangladeshi perspective. The government imposes the criteria for recipient selection. Landless, physically inactive, aged (65 males and 62 females), income-less, and distressed Bangladeshi citizens were prioritized for obtaining old-age allowances. Table 1 presents the chronological allocation of the budget for OAA.

Table 1. Allocation of the budget for old age allowance

Fiscal year	**Beneficiaries (in thousands)**	**Monthly pay (BDT/person)**	**Annual Budget (in millions)**
2015–16	3000.00	400	14400.00
2016–17	3150.00	500	18900.00
2017–18	3500.00	500	21000.00
2018–19	4000.00	500	24000.00
2019–20	4400.00	500	26400.00
2020–21	4900.00	500	29400.00
2021–22	5701.00	500	34445.40
2022–23	5701.00	500	34445.50
2023–24	5801.00	600	42059.60

Source: Ministry of Finance Bangladesh (2023)

Table 1 indicates the old-age allowance's volume from 2015 to 2016 to the present fiscal year. Initially, the government allocated 125.00 million BDT (Bangladeshi currency) among 4.03 lakh beneficiaries, planning to provide 100 BDT (almost one dollar) per month. The government has increased this number. In the recent fiscal year 2023–2024, the government increased 600 BDT (5.5 USD) per month from 500 BDT per person as an allowance. The government sanctioned 420590.60 million BDT among 5801 beneficiaries, aiming to pay 600 BDT per month. Although the amount of OAA is small, it is assumed to positively impact beneficiaries' family welfare (Khan 2021, 306–32) as OAA eases distress and supports living expenses.

Studies have examined the vulnerabilities of aging populations. Malak et al. (2020) found that older adults lack adequate access to sanitation and hygiene amenities, face challenges regarding food stability, and experience insufficient familial care and assistance. However, Bozzaro et al. (2020, 233–9) argued that old age is not an indicator of vulnerability in ethics. Several studies examine the impact of an aging population on macroeconomic indicators. Orlická (2015, 598–605) found that an aging population is negatively associated with national savings and GDP growth rate. Similarly, Nagarajan et al. (2016, 4–35) argued that an aging population is negatively associated with economic growth. Moreover, Maestas et al. (2023, 306–32) argued that an aging population significantly reduces the GDP. Thus, finding a sustainable solution to the problem of aging is crucial.

Some studies have examined approaches to reducing vulnerability in older people. Grundy (2006, 105–34) argued that compensatory support significantly reduces the vulnerability of older adults by rebuilding reserves for later life. Furthermore, Gajda and Jeżewska-Zychowicz (2020, 717–27) argued that financial social support reduces the

food insecurity of older, vulnerable people. Shin and Do (2021, 1055–74) argued that old-age pensions enhance the financial well-being of older people.

Numerous studies worldwide have examined the effectiveness of the OAA, yielding mixed findings. While some researchers, such as Choudhary (2013, 262–68), criticized its limited economic impact and meager amount, others, such as Karim and Hossain (2013), suggested that it improves social relations and reduces distress. Mamun (2019) argued that OAA's positive influence on poverty reduction, especially in rural areas, impacts food consumption and social status. However, Ara et al. (2019, 18–32) pointed out that cash transfers to the elderly may not fully meet their basic living needs. Peng et al. (2023, 129–56) argued that OAA reduces the financial relationship between younger and older generations. Rahman (2020, 129–42) demonstrated how cash transfers positively impact livelihoods, aid food consumption, and aid disaster coping. Tarh (2014) demonstrated enhanced self-esteem and family relations among the tribal elderly in India, while Viet Nguyen (2021, 1165–202) highlights OAA's positive effect on psychological well-being, despite a negligible economic welfare impact. Sedhai (2020, 1–8) and Abruquah et al. (2019, 1918) emphasized the OAA's contributions to honor, self-esteem, and life satisfaction. However, caution is warranted, as indicated by Baird et al. (2018), who noted a decline in labor market participation among the elderly due to cash transfers.

Considering these previous studies, this study has two goals to address the research gaps. First, it estimates the causal impact of OAA on food expenditure and farming investment. Second, it examines the microeconomic theory of the family transfer model.

2. Materials and methods

2.1.Data and summary statistics

The units of analysis in this study are 9,614 households, of which the oldest member is older than 62. This data was obtained from the Household Income and Expenditure Survey (HIES) 2016–2017, a national survey conducted at five-year intervals in Bangladesh (Bangladesh Bureau of Statistics 2017). Food expenditure includes expenditure on any food item, such as rice, vegetables, fruits, fish, and meat. This study includes farming asset investment as expenditure on Plows and yokes, power pumps, power tillers, shallow tube wells, sprayers, threshers, tractors, husking machines, hand pumps, ginning machines, brooders, cage incubators, fishing nets, fishing boats, and deep tube wells. These farming assets are crucial for farming activities; thus, an increase in expenditure on farming assets indicates a significant increase in household welfare.

The dataset is nationally representative of Bangladesh. Table 2 presents summary statistics based on the OAA. Households were categorized into two groups: beneficiary households (those who received OAA) and nonbeneficiary households (those who did not receive OAA). Beneficiary households possess farming assets valued at BDT 1263.61, while nonbeneficiary households have farming assets valued at BDT 1570.38. On average, beneficiary households receive BDT 1741.30 as OAA annually. The average monthly food expenditure for beneficiary households was BDT 2388.77, compared to BDT 2958.77 for nonbeneficiary households. Similarly, the average monthly non-food expenditure for beneficiary households was BDT 1844.65, whereas that for nonbeneficiary households was BDT 2504.90. Regarding land ownership, beneficiary households own an average of 0.39 acres, while nonbeneficiary households own an average of 0.73 acres. Finally, the average age of beneficiary households was 60.13 years, whereas that of nonbeneficiary households was 57.77 years.

Table 2. Summary statistics: Based on old age allowance receipt

	Mean	Standard Deviation
Beneficiary Households		
Farming asset (BDT)	1263.61	10101.24
Allowance Amount (BDT)	1741.30	1341.98
Food expense (BDT)	2388.77	1712.28
Total non-food (BDT)	1844.65	2225.80
Total land (Acre)	0.39	2.59
Family Size	0.21	0.30
Head Age	60.13	17.85
Nonbeneficiary Households		
Farming asset (BDT)	1570.38	18197.69
Allowance Amount (BDT)	0	0
Food expense (BDT)	2958.49	2240.77
Total non-food (BDT)	2504.90	3367.85
Total land (Acre)	0.73	6.32
Family Size	0.15	0.25
Head Age	57.77	16.45

2.2. Identification strategy

The OAA receipts were not randomly assigned; thus, the treated households were systematically different from the control households. Any comparison that does not address self-selection will induce a biased estimation of the impact of the OAA. Randomization ensures that the treated units are compared with the same untreated units on average. RDD is an identification strategy that ensures local randomization just below and above the cutoff of a running variable (Cattaneo and Titiunik 2022, 821–51). RDD can be classified into two types: sharp and fuzzy. Sharp and fuzzy RDDs are used when the selection criterion is perfectly and partially compiled, respectively (Cattaneo et al. 2019). This study applies the fuzzy RDD as an identification strategy that relies on the cutoff of a running variable determined by land ownership to partially determine the treatment receipt. The study focuses on households with land measuring 0.5 acres or below as eligible for OAA. The land ownership criterion increased the likelihood of OAA receipt by 13% around the cutoff point, as presented in Table 2 (first-stage results).

Note that treatment assignment does not guarantee treatment receipt in fuzzy RDD (Bari et al. 2022). The land ownership threshold acts as an instrumental variable (IV) in this study, generating a dummy variable for the treatment assignment. The first-stage estimation demonstrated the relevance condition, indicating a strong correlation between the IV (land ownership) and treatment receipt. A discontinuity check of the assignment variable suggests that the eligibility dummy was randomly assigned. The internal validity of the fuzzy RDD is further supported by the exclusion restriction condition. The

discontinuity in the pretreatment covariates indicates that IV (land ownership) has no direct impact on the confounding variables.

Fuzzy RDD employs IV estimation, calculating the local average treatment effect (LATE) or average treatment effect for compliers only. The treatment effect is assessed solely for those who comply with the treatment assignment. The first-stage estimation is performed using the following equation:

$$OAA_i = \alpha_0 + \pi Eligibility_i + u_i$$

Here, OAA_i refers to the OAA receipt status, which is 1 if a household receives OAA. $Eligibility_i$ refers to the instrumental variable, taking the value of 1 if a household has less than 0.5 acres. $\widehat{OAA}_i$ refers to the predicted OAA using first-stage estimation. The second stage was estimated using the following equation:

$$Outcome_i = \beta_0 + \eta_c \widehat{OAA}_i + \varepsilon_i$$

The variable $Outcome_i$ denotes outcome variables. LATE is estimated and reported using η_c. Selecting an appropriate bandwidth around the threshold is critical in the RDD settings. Therefore, we utilized a CE-optimal bandwidth choice specifically designed to minimize the coverage error of the interval estimator, as proposed by Calonico et al. (2022, 2998–3022).

3. Results and analysis

3.1. Main results

Table 3 presents the first stage of the two-stage least squares regression. The first-stage estimation showed that eligibility positively impacted OAA receipt at the 1% significance level. The results suggest that eligibility based on land ownership criteria increases the probability of treatment receipt by 14–15%. The first-stage estimation proves the relevance of eligibility as an instrumental variable. A significant jump at the cut-off of the assignment variable is evident in Figure 1, suggesting the relevance of the eligibility criteria at the cut-off for OAA receipt.

Table 3. Results of the first-stage estimation

Outcome Variable	**RD Estimates**	
	Conventional	Robust
Treatment Status	0.14***	0.15***
	(0.05)	(0.05)

Note: Standard errors are in parentheses. Significance levels were determined using the robust method, where * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$. "Robust" estimates use bias-corrected coefficient estimators and robust variance estimators.

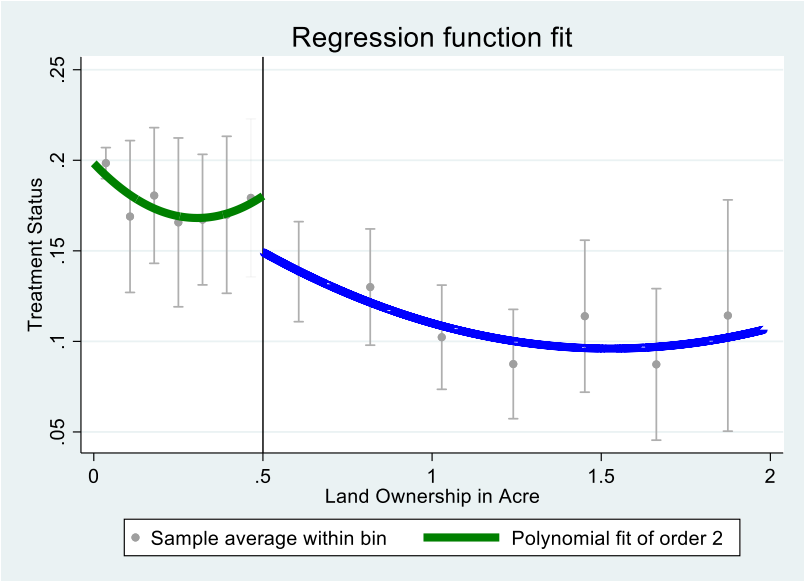

Figure 1. Discontinuity in treatment status

Notes: The horizontal axis represents land ownership in acres, and the vertical axis represents treatment status.

Table 4 presents the impact of OAA receipt on food expenditure and farming asset investment. The regression discontinuity estimates show that OAA receipt increases the farming asset investment at the 5% significance level. However, OAA has no impact on food expenditure. The result shows that the OAA increases farming asset investment by BDT8914.50 in accordance with the robust estimate and BDT7560.40 in accordance with the conventional estimate. The standard error is large; therefore, the estimated impact is larger than usual. Another reason for the high estimate is the comparatively weak first-stage estimation.

Table 4. Results of the second-stage estimation

Outcome Variables	**RD Estimates**	
	Conventional	Robust
Food Expenditure (In	-3139.50	-3311.60
BDT)	(2871.20)	(3029.50)
Farming Asset Investment	7560.40**	8914.50**
(In BDT)	(3615.60)	(4168.50)

Note: Standard errors are in parentheses. Significance levels were determined using the robust method, where * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$. "Robust" estimates use bias-corrected coefficient estimators and robust variance estimators.

3.2. Specification test

This study applies a continuity-based RDD that assumes that all characteristics of the units are continuous around the cutoff. Two tests were conducted to validate the proposed RDD setup. The first test was to check the continuity of the density of the running variable around the cutoff base on Cattaneo et al. (2018, 234–61). The second test was used as a balance check to verify the continuity of the placebo outcomes.

3.2.1.Continuity of running variable

To verify the integrity of the RDD setup, it was essential to ensure the absence of any noteworthy discontinuities in the distribution of the running variable (land ownership) at the cutoff point. The manipulation test proposed by Cattaneo et al. (2018, 234–61) was employed to examine whether there was any significant discontinuity in the conditional density of the running variable (land ownership). The results of the Cattaneo test confirm no significant discontinuity in the distribution of land ownership. The results show that the null hypothesis is not rejected, as the p-value is 0.56, indicating the absence of manipulation.

3.2.2. Continuity of pretreatment covariates

The credibility of the RDD may be compromised if there is a notable discontinuity in pretreatment covariates. Therefore, examining the existence of such discontinuities is imperative. Table 5 presents the RD estimates of the covariates; the results indicate that they are not statistically significant. This implies that there was no substantial discontinuity in the pretreatment covariates at the cutoff point.

Table 5. Continuity check of pretreatment covariates

Pretreatment Covariates	**RD Estimation**
Family Size	-0.34
	(0.30)
Gender (=1 if Male)	-0.01
	(0.05)
Age	-0.41
	(2.5)
Religion (=1 if Islam)	-0.06
	(0.07)

Note: Standard errors are in parentheses

4. Discussion and conclusion

4.1. Discussion

The aging population introduces numerous challenges related to pension provision, medical care, dependency ratios, and family dynamics globally (Chand 2018, 189–206). Developing countries must address food and nutritional issues to ensure social protection of the elderly population (Brzeska et al. 2015, 668–87). This study shows that OAA does not improve beneficiary households' food security. Moreover, this study reports that OAA empowers older people in society by enabling them to invest in productive activities, such as agricultural farming. The OAA can play a crucial role globally, although it failed to enhance food expenditure, support the impoverished aging people, and support the farmers for their farm investment simultaneously. This study reported that OAA reduced the vulnerability of older adults in society. These findings are consistent with those of Grundy (2006, 105–34), who argued that supportive measures must be implemented to alleviate older people's vulnerability.

An aging population creates challenges for any economy, and OAA can be implemented as a policy tool to counteract these challenges. Orlická (2015, 598–605) found that an aging population negatively impacts national savings and GDP growth,

which is supported by Nagarajan et al. (2016, 4–35) and Maestas et al. (2023, 306–32). Therefore, addressing the challenges of aging is crucial for sustainable policy solutions. This study provides policy guidelines to enable the use of OAA as a policy tool to promote the social status of elderly people by transforming them into productive household members. Policy efforts aimed at diminishing vulnerability can target each stage of the evolving process that contributes to the vulnerability of older adults (Grundy 2006, 105–34). The increase in farming asset investment suggests that OAA is used for productive purposes and is supposed to enhance honor, self-esteem, and financial independence in elderly people in society (Sedhai 2020, 1–8; Abruquah et al. 2019, 1918). Globally, the increase in farming assets through OAA can be considered an effect of OAA (Chepngeno-Langat et al. 2023, 107–24). This study assumes that older people invest in agriculture if they gain any additional income, such as OAA, because agriculture plays a major role in the household economy of Bangladesh, and the contribution of each capable member makes the member an asset to the household. However, the OAA is not effective in attaining food security for older people because it has no impact on food expenditure.

4.2. Theoretical and policy implications

This study links OAA with family transfer models proposed by Laferrère and Wolff (2006, 889–969). The findings suggest that parents altruistically utilize small OAA receipts for the benefit of their children or family by investing in farming assets. Even a modest sum received by the eldest household member is expended with altruistic intent, aiming to enhance the well-being of the entire family in the present and future.. This study specifically explores agricultural investment as a form of altruistic expenditure derived from the earnings of the oldest household member.

The OAA has some limitations that adversely impact program efficacy. First, the program cannot effectively enhance the beneficiary selection process. Most beneficiaries are incorrectly included. The main cause of this incorrect selection is the excessive influence of local elected officials over the process. Moreover, the benefit amount is considerably minimal and meager (BDT 600; less than US$ 6) per month now. This is insufficient to satisfy the needs of the elderly population. Additionally, the severe manpower shortage across all agencies involved in the program's implementation and inadequate means of assisting poor urban people are vital challenges for this program. Furthermore, most of the cash collection and disbursement booths are in distant locations, causing the elderly to incur additional costs traveling to those locations.

4.3. Limitations and future study

This study has certain limitations: First, the coefficient of the local average treatment effect is large. Hence, large standard error, which is common in instrumental variable estimations, must be considered. Second, the temporal gap between treatment receipt and outcome may have been determined because of the cross-sectional nature of the data. Third, the findings of this study cannot be generalized because the RDD has less external validity as it focuses on households just below and above the cutoff. Future research should explore how OAA can effectively attain food security in older adults.

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