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Original Research Article

Aging Farmers and Agricultural Productivity in Ondo State: Implications for Food Security in Nigeria

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Abstract: This study explores the impact of an aging farming population on agricultural productivity and rural livelihoods in Ondo State, Nigeria. With an average farmer age of 65, concerns about declining productivity, succession challenges, and rural economic sustainability become inevitable. The research identifies key issues such as reduced farm output, informal succession planning, low technology adoption, and youth disinterest in agriculture as contributory factors. Findings indicate that many aging farmers are shifting to non-farm occupations, while others plan to transfer their farmland informally, which further increases the risk of farm abandonment. Government intervention through social security packages, grants support, and low-interest agricultural loans could incentivize youth to participate in agriculture, additionally, the government can introduce grants, low-interest loans, and training programs to attract young people to agriculture, ensuring a smooth transition of knowledge and resources. Future research should examine regional differences and health-related productivity impacts. This study contributes valuable insights into agricultural policy and rural development strategies.

Keywords: Aging farmers, agricultural productivity, food security, succession planning, livelihood diversification.

INTRODUCTION

Aging and productivity are concerns that affect individuals and occupations alike (Tanyi *et al.*, 2018). As workers age, they accumulate on-the-job experiences, which enhances their productivity. However, at a certain point, the physical and cognitive decline associated with aging begins to downplay the benefits of accumulated knowledge (Arora *et al.*, 2021). This results in an inverted U-shaped relationship between age and productivity, where experience initially drives productivity upward before aging-related decline eventually takes over (Fried & Tauer, 2016). The specific pattern of this relationship can differ across individuals and professions, particularly in this study with a focus on farming and agricultural productivity.

The issue of the aging farming population therefore warrants the need for scholars to explore this concern through empirical research. Moreover, productivity is closely linked to economic growth and the effects of aging on development remain uncertain (Seok *et al.*, 2018). In other words, existing research has yet to determine whether sustainable development goals (SDGs) can be achieved in the context of aging and productivity (Seok *et al.*, 2018). For instance, globally, there is declining fertility while population aging increases (Lutz, *et al.*, 2008, Tanyi *et al.*, 2018). Therefore, meeting the SDGs portends uncertainty given aging concerns in Nigeria especially goals related to eliminating poverty, reducing hunger, and food security (Ayinde *et al.*, 2020). In Nigeria, the total population over the age of 65 years is about 2.8% [6 million in 2020] with the projection to increase to a share of 10.1% [74 million] by 2100 (Mbam *et al.*, 2022).

Aging Nigerian agriculture

Agriculture remains a critical component of Nigeria's economy, serving as the primary source of livelihood for a large proportion of the rural population where both food and cash crops are cultivated extensively (Adepoju & Obayelu, 2013). Despite agriculture's central role, the sector faces multifaceted challenges, among which the aging farming population stands out as a pervasive concern (Ajao, 2011; Ren *et al.*, 2023). Aging by itself has significant effects on agricultural productivity. The phenomenon of an aging farming population and its implications for agricultural

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productivity and rural livelihoods has gained increasing attention globally given sustainability and food security concerns (Milovanovic & Smutka, 2020; Szabo *et al.*, 2021).

Particularly in Nigeria, this concern is amplified by the rapidly aging demographic of farmers and the declining appeal of agriculture among younger generations (Ajao, 2011). According to Omotayo (2010), the average age of farmers in Nigeria is 65 years, with many farmers expressing intentions to retire only in their seventies or when they can no longer continue (Ajao, 2011). This late retirement age is not accompanied by structured retirement or succession plans, but rather informal transfers of farmland to children who may not be interested in agriculture or abandonment (Ajao, 2011; Tanyi *et al.*, 2018). This observation aligns with a larger trend in rural Nigeria where poverty, lack of social security, and absence of institutional pension structures force older farmers to continue working long past conventional retirement ages, despite diminishing health and productivity (Ajao, 2011; Tanyi *et al.*, 2018).

Aging effects on productivity and livelihood

The study by Ajao (2011) supports previous results which highlight the aging farming population in Nigeria and are characterized by significant reductions in farm size, labor capacity, time spent on the farm, and harvest output. The study also highlighted that most aging farmers lack structured retirement plans, with many relying on informal family remittances and limited financial security (Togunu-Bickersteth, 1988). Additionally, physical features declination are further exacerbated by reliance on traditional tools such as hoes and cutlasses, labor-intensive operations, or lack of credit services to convert into mechanized operations (Tanyi *et al.*, 2018). Similarly, in India, a study found that farmers intensively engaged in planting, irrigation, and harvesting such that decline in performance and productivity slowly plummeted beginning from 60 years old (Milovanovic & Smutka, 2020). Furthermore, aging farmers face increasing challenges in adopting new technologies due to cost implications and their declining ability to personally supervise or engage in physically demanding tasks (Ajao, 2011). This decline in productivity ultimately affects household income, food security, and standard of living, therefore these once-active farmers become a dependent and negative contributor to household expenses (Milovanovic & Smutka, 2020).

The decline of productivity associated with aging manifests in reduced farm sizes, diminished physical capacity for labor-intensive tasks, reduced input used (chemical fertilizer), and an increasing dependence on hired labor instead of new technology adoption (Ajao, 2011, Cole & Donovan, 2008). Though the decline in productivity is a result of many factors, particularly aging, Freid and Tauer (2016) posit that aging farmers could still produce more only when new technologies are adopted to enhance operations. Older farmers are viewed to have lower educational status when compared with younger farmers who are more than often able to easily try out new technologies and update their skills (Ren *et al.*, 2023). Aging farmers' incapacity to farm results in farm abandonment, transfer of ownership, or cultivation on a very small scale often the case of unplanned retirement arrangements and succession (Ajao, 2011). Moreover, among aging farmers are often informal or poorly defined transfer of farmland to their children, who may or may not continue in agriculture (Ajao, 2011).

Compounding this situation is the reluctance of the youth to engage in agriculture due to its association with poverty and the perception of farming as an unattractive, labor-intensive, and low-income occupation and status that considers non-farming jobs (Auta *et al.*, 2010; Riggs *et al.*, 2020). Moreover, higher education attainment tends to increase the younger population's interest in other sectors of the economy than in agriculture. Simultaneously, other issues that bewilder the Nigerian agrarian sector include inadequate extension services, limited funding, poor infrastructure, and lack of access to formal pension and security structures (Camillone *et al.*, 2020; Nwaogu & Akinbile, 2018). As a coping mechanism, many rural households have diversified their livelihoods into off-farm and non-farm activities, a strategy found to positively impact household welfare and reduce vulnerability to agricultural and market-related risks (Adepoju & Obayelu, 2013; Dedehouanou & McPeak, 2020). Income diversification, while beneficial in the short term, also signifies declining interest and disinvestment in core agricultural production, particularly among the farming population.

In contrast, urban agriculture has emerged as an important livelihood strategy in semi-urban and urban areas of Ondo State, supplementing household income and enhancing food security (Akinnagbe & Ipinmoye, 2022; Enete & Achike, 2008). However, urban agriculture is largely practiced on a small scale with a contribution toward improved household welfare, but it does not sufficiently offset the declining productivity in rural agriculture caused by the aging farmer demographic (Akinnagbe & Ipinmoye, 2022). The interplay of aging, agricultural productivity, and rural livelihoods has been minimally studied, despite the strong interrelatedness between these factors (Fried & Tauer, 2016). Existing studies either focus on aging and its effect on individual farm productivity (Ajao, 2011), on the diversification strategies employed by rural households (Adepoju & Obayelu, 2013), or on urban agriculture's impact on livelihoods (Akinnagbe & Ipinmoye, 2022).

Problem Statement

The exists a dearth of literature on the aging issue in Nigeria compared to developed nations (Dopkpesi, 2015), at the same time, much of the limited

studies have not fully explored the impacts of aging on the agricultural sector that hold much severity compared to other sectors (Ajao, 2011; Lindsjö, *et al.,* 2021). While studies have explored aspects of aging in Nigeria (Mbam *et al.*, 2022), a critical gap remains in fully understanding how the aging farming population, directly and indirectly affects agricultural productivity and rural livelihoods (Fried & Tauer, 2016; Ren *et al.,* 2023) in the context of Nigeria.

Ajao (2011) conducted a quantitative study on the perceived effects of aging on agricultural activities in the western part of Nigeria. While this research provides valuable insight into the personal challenges of aging and by extension what smallholder farmers face, it has limited understanding of the broader socio-economic and community-wide implications of these individual declines on rural household welfare and agricultural sustainability (Ren *et al.,* 2023).

In another study, Adepoju and Obayelu (2013) investigated livelihood diversification and its impact on rural household welfare in Ondo State. Their findings emphasized that diversification into non-farm and off-farm activities improved welfare outcomes for rural households to mitigate uncertainties. However, the study did not explicitly connect the push factors behind diversification to demographic shifts, such as age (Adepoju & Obayelu, 2013). The underlying triggers that force households to seek alternative income streams, including the decline in agricultural labor due to aging farmers and the disinterest of younger generations in farming, were not fully addressed (Igwe *et al.,* 2020).

In addition, the study by Akinnagbe and Ipinmoye (2022) on urban agriculture practices in Ondo State documented the growing role of urban farming in supplementing livelihoods. Their findings confirmed that urban agriculture contributes to improved household savings, standard of living, and food security. Nevertheless, this study focused solely on urban settings and did not explore the linkage between rural agricultural productivity constraints—especially those related to the aging farmer demographic—and the increasing shift toward urban-based agricultural alternatives.

These studies highlight the need for a comprehensive analysis of how the aging rural farming population affects agricultural productivity, rural livelihood vulnerabilities, and its broader influence on migration, diversification strategies, and food security. This study addresses a key gap by exploring the direct impact of aging on agricultural productivity and its broader effects on rural livelihoods, succession planning, and the rural economy in Ondo State to influence practical and policy implementation. Hence this study addresses the following objectives;

1. To assess the direct effects of aging on agricultural productivity in Ondo State,
2. To analyse coping strategies, succession decisions, and retirement plans of aging farmers,
3. To describe the socio-demographics of aging farmers,
4. To provide policy recommendations that can address aging concerns in Nigeria's agriculture

METHODOLOGY

The study adapted established methodological approaches used in previous studies on aging farmers, livelihood diversification, and agricultural productivity in Ondo State, ensuring both relevance and rigor. This study used a multi-stage sampling technique, mirroring the design successfully implemented and data obtained in previous studies (Adepoju & Obayelu, 2013; Ajao, 2011; Akinnagbe & Ipinmoye, 2022).

The study area was Ondo State, Nigeria, located between latitudes 5°45’ and 7°52’ N and longitudes 4°20’ and 6°05’ E, comprising 18 Local Government Areas (LGAs) across three senatorial districts: Ondo South, Ondo North, and Ondo Central. The state is predominantly agrarian, with food crops such as maize, cassava, yam, and vegetables, as well as cash crops like cocoa, oil palm, and kola nut cultivated extensively (Adepoju & Obayelu, 2013). Furthermore, as established by Akinnagbe and Ipinmoye (2022), both rural and urban agriculture are significant livelihood components in this state, making it an appropriate focus for a study on the impact of aging on agricultural productivity and rural livelihoods.

The sampling procedure follows a multi-stage procedure. The first stage of sampling involves a purposive selection of two LGAs representing about 10 percent of all LGAs in the state, similar to the purposive sampling used by Ajao (2011). The second stage will involve stratifying communities within each LGA into rural and peri-urban categories to allow comparative analysis between aging farmers in core rural settings and those transitioning to more urbanized livelihoods (Akinnagbe & Ipinmoye, 2022). The third stage will involve the random selection of households within each stratum (Ary *et al.,* 2019)

Study participants were defined as farmers aged 50 years and above who have been actively engaged in farming for at least 10 years. This age threshold is drawn from Ajao’s (2011) study, which identifies 50 years as the point at which farmers begin to experience significant physiological and productivity-related challenges. The sample data from Ajao (2011) was adapted.

Data were collected through personal interviews. This method was appropriate given the low educational status of farmers and, therefore offers the opportunity to include closed and open-ended questions in a single phase by directly reading the questions to the participants in a face-to-face setting (Ary *et al.,* 2019).

Though this method ensures a high response rate, it is often time-consuming and expensive (Ary *et al.,* 2019).

Quantitative data collected were concerned about the socioeconomic characteristics (including age, education, household size, farm size, and primary occupation), agricultural production activities (farm output, labor utilization, time spent on the farm, and harvest yields), succession and retirement plans, coping strategies, and perceived welfare status. This design builds on the comprehensive instrument used by Ajao (2011), which addressed socioeconomic attributes, production activities, and retirement coping strategies, with additional construct – livelihood diversification strategies, adapted from Adepoju and Obayelu (2013). Open-ended questions (qualitative data) on the other hand provided a more in-depth understanding and perception of farmers about aging, succession challenges, retirement strategies, and the factors hindering youth involvement in agriculture.

On one hand, quantitative data were analysed using descriptive and inferential statistics e.g., frequencies and percentages, and t-test (Ary *et al.,* 2019). Qualitative on the other hand, were analysed thematically to elicit themes and meanings across the sample (Clarke & Braun, 2017). Both data phases were integrated (Creswell & Creswell, 2023) to provide a robust interpretation of the phenomenon understudy in Ondo State while extending policy implications for the Nigeria agricultural sector.

RESULTS AND DISCUSSION

1. Effect of aging on agricultural activities

The data show how aging has affected their agricultural activities. When younger than 50 years old, over 70% of respondents reported high levels of involvement in various farming activities ranging from land preparation (tilling, planting, and weeding), harvesting, processing, transportation, and marketing. However, in old age, only fewer, 3-7% maintained the same level of participation, indicating a decline in physical appearance and productivity. Findings reveal that respondents were highly engaged in marketing, transportation, processing, and storage when younger, with land clearing being the least preferred due to its strenuous nature. However, in Table 1, in old age, they remained relatively active though their capacity declined and engaged in farming despite aging "That is only what I know best to do." However, land clearing and heap making showed the largest decline in involvement (diminishing health), leading to increased labor hiring or reduced farmland cultivated.

A paired sampled t-test, Table 2, was conducted to determine if there was a difference in the mean perception of aging on farm activities when younger and now older among the respondents over time. The test results indicated that, on average, farm activities when younger scores (M = 30.90, SD = 3.55) and aging scores (M = 14.61, SD = 7.29) were statistically different from each other $t(150) = 16.29$, $p = .000$, $d = 2.0$. The effect size of 2 is considered very large and indicates an exceptionally strong effect (Cohen, 1988). This result therefore illustrates a minimal overlap between young and older perception scores i.e., higher scores when younger and relatively lower scores when aging. Using farm-level data, this result corroborates other studies that found younger farmers to be more adaptable to new technologies, engage in more labor-intensive activities, and generally have higher physical stamina. In contrast, older farmers tend to experience reduced physical capacity, adopt fewer innovations, and gradually decrease their level of farm involvement, leading to lower overall productivity (Ren *et al.*, 2023; Seok, 2018).

Table 1: Perception of aging on agricultural activities

Implication of aging	Mean score
Reduction of farm size	2.82
Reduced work time	3.05
Reduced work done	3.52
Reduced harvest	3.53
Need to hire labor(s)	3.28
Reduced standard of living	3.29
Being poorer than before	2.95
Declining health	3.84

Table 2: Perception score of agriculture activities over time

Perception of Farm Activity Involvement	Mean	Std. Deviation	Std. Error Mean
When young	30.90	3.55	0.35
Now aging	14.61	7.29	0.72

2. Coping strategies, succession decisions, and retirement plans of aging farmers

The findings in Table 3 represent the distribution of aging farmers' primary occupations based on findings. The results show that a majority (84%) of aging farmers have begun to diversify farming or engage in farming to sustain household livelihood indicating that

only a small proportion of aging farmers are full-time agriculturalists.

Table 3: Primary occupation of distribution of aging farming population

Farm involvement	Frequency
Full-time farming	16.0
Off-farm	84.0

This pattern of livelihood diversification confirms the trend that agriculture has become a part-time or secondary occupation for many, rather than a full-time commitment. The sharp increase in off-farm activities reflects the growing need for diversification to sustain household welfare. This is particularly important as aging reduces farmers' capacity to engage in physically intensive agricultural labor (Ajao, 2011; Akinnagbe & Ipinmoye, 2022).). The marked decline in the percentage of full-time farmers highlights a critical vulnerability in the rural agricultural system: as farmers age, they increasingly exit intensive farming and instead rely on supplemental income streams, leading to a potential decrease in the total volume of agricultural output. This trend raises two significant concerns. First, it reveals that agricultural sustainability is under threat as physiological aging reduces full-time engagement. Second, it suggests that without deliberate policies to incentivize young people to enter full-time agriculture, the state may face long-term food security challenges (Igwe *et al.*, 2020). The prominence of trading and artisan work as fallback occupations underscores the urgent need for agricultural extension services and rural investment programs to revitalize interest in farming (Adepoju & Obayelu, 2013).

Based on Ajao (2011), Table 4 illustrates the distribution of farmers' succession decisions — a critical factor affecting long-term agricultural sustainability. The study shows that over half of aging farmers will transfer land informally to their children, with minimal structured succession planning. This lack of formal planning poses a threat to agricultural continuity and productivity as children who are already disinterested in farming decide to keep the farmland or not (Ajao, 2011).

Table 4: Succession decision of aging farmers

Succession Decisions	Percent
Hand over to children	59.3
Sharecropping	10.0
Sell farmland	15.0
Undecided	15.7

Many older farmers struggle to pass on their farms because they view farming as their identity rather than just an occupation. This attachment makes it challenging for them to step away, even when retirement approaches (Inwood & Sharp, 2012). Figure 2 shows that 59.3% of aging farmers plan to hand over their farms to their children, a clear indication of the cultural reliance on family-based succession planning (Ajao, 2011). However, the presence of 15% of respondents intending to sell their farmland and another 15.7% undecided signals instability and potential fragmentation of farmland holdings. The 10% of the respondents planning to lease land reflects an emerging short-term, transactional approach to land use that may limit investment in long-term farm development. The steep drop from the majority group handing over farmland to children to those who plan to sell or lease highlights a significant challenge: without structured succession programs and training for the younger generation, the sustainability of agricultural enterprises is uncertain. Corroborated by Baker, Lobley, and Whitehead (2016), the authors posit that farmers often resist succession discussions, fearing a loss of purpose and control over the land they have cultivated for decades.

Land tenure security also affects aging farmers' decisions regarding succession planning and farm investments. The study reveals that while many farmers intend to transfer their farmland to their children, most do so informally, lacking legal documentation or structured succession plans. This raise concerns over land fragmentation, disputes, and potential underutilization of agricultural land by future generations. Additionally, the 15.7% of farmers who are undecided about succession decisions indicate a worrying degree of uncertainty and lack of planning often due to their emotional attachment to farmland and the cultural significance of farming heritage. Their succession decision may be attributed to the disinterest of children in farming, poor pension structures, or a lack of incentives for generational transfer (Ajao, 2011). This trend, if not addressed, could lead to increased land abandonment, inefficient land use, and diminished rural livelihood. Kimhi and Nachlieli (2001) indicate that many children of farmers prefer non-agricultural careers, citing financial instability and the labor-intensive nature of farming as deterrents. This generational divide creates a succession dilemma, a gap threatening the sustainability of family farms.

These two figures in combination reveal that aging farmers are progressively moving away from agriculture as a full-time occupation, while also facing serious uncertainties regarding succession. The intersection of these challenges paints a stark picture: reduced agricultural productivity, diminished rural food security, and a generational disconnect that threatens the future of farming and food security in Ondo State, and Nigeria as a whole.

3. Socio-demographics of farmers

Table 3 shows the socio-demographics of respondents considered in this study which include age, sex, level of education, household size, type of labor used, and type of agricultural enterprise. The results show a higher percentage of the participants are above 65 years old, supporting reduced agricultural

productivity of farmers among the study population. This aging trend is largely attributed to rural-urban migration, where younger individuals seek employment opportunities outside farming due to perceptions of agriculture as labor-intensive and financially unappealing. As a result, farming is increasingly dominated by aging individuals, who face physical limitations that reduce their ability to maintain high productivity levels. More males (71%) than females were reported. This gender implication supports the systemic barriers women face in owning farmland. In cases they do, it is often through inheritance from the parent(s) or husband (late) with few buying land for farming.

Educational attainment among aging farmers is another key factor influencing agricultural decision-making and the adoption of modern practices. In this study 61% of the participants have no formal education, limiting their ability to access and utilize extension services, financial resources, and inquisitiveness to adopt new technologies that can enhance their operations Consequently, reliance on traditional farming methods reinforces the productivity decline associated with aging. Most respondents hold more than 2 acres of land, while some attributed non-expansion to limited funding or reduced ability. Additionally, the majority are involved in arable crop production, this finding is supported by the fact that arable crop production has a shorter production term with a quicker turnover than other livestock or cash crop production. Household size and composition further shape the aging farming dynamic. Older farmers with larger families tend to depend on family labor for farming activities. However, with the increasing disinterest of youth in agriculture, reliance on hired labor has become more common. This shift increases production costs and contributes to reduced cultivated land areas. Those with smaller households or without available labor often experience greater difficulties in sustaining farming activities, leading to land abandonment or diversification into less labor-intensive non-farm activities.

Table 5: Socio-demographic characteristics of respondents

Variables	Frequency (N = 100)	Percent
Age of farmers (Years)		
50-65	49	49.0
Above 65	51	51.0
Gender		
Male	71	71.0
Female	29	29.0
Level of education		
No school	61	61.0
Primary school	33	33.0
Secondary school	4	4.0
HND/BSc.	2	2.0
Farming Experience (Years)		
10 – 25	22	22.0
26 – 40	42	42.0
More than 40	36	36.0
Total farm size (Acres)		
< 2	10	10.0
2 – 5	42	42.0
> 5	48	48.0
Type of agricultural operation		
Arable crop	80	80.0
Cash crop	38	38.0
Poultry	11	11.0
Sheep/Goat	37	37
Type of labor used		
Family	32	32.0
Hired	9	9.0
Family and hired	59	59.0

4. RECOMMENDATIONS

The aging farming population in Ondo State poses a significant threat to agricultural productivity, food security, and rural livelihoods. Addressing this challenge requires multi-layered interventions targeting both immediate concerns of aging farmers and long-term structural issues in agriculture. One of the primary recommendations is the establishment of structured succession planning programs. Research shows that while many elderly farmers intend to pass their farms to

their children, the informal nature of these transitions leads to inefficiencies and abandonment. Government agricultural agencies, in partnership with traditional leaders and extension services, should develop training and mentorship programs to prepare younger generations for farming as a business-oriented profession.

Equally important is reversing youth disinterest in agriculture by implementing policies that make farming attractive. Establishing agricultural innovation hubs can provide training, technology access, startup grants, and secure land tenure. Integrating agriculture into school curricula with practical learning modules will also help cultivate early interest. Mechanization is another key recommendation, as elderly farmers struggle with manual labor. Government-subsidized small-scale machinery, community-based equipment rental centres, and training on modern techniques can alleviate physical burdens while boosting productivity.

Extension services must also be expanded, as many farmers—particularly in rural areas—have little access to advisory support. More extension officers should be recruited, with mobile-based platforms providing remote access to agricultural information. Another critical issue is the absence of formal retirement structures. The government should introduce pension schemes, cooperative-based retirement funds, and social security grants to support elderly farmers financially and reduce their dependence on labor-intensive farming.

Infrastructure development, such as improved road networks, storage facilities, and reliable electricity, is essential for stabilizing farm incomes and reducing post-harvest losses. Climate-smart agricultural practices, including drought-resistant crops and water conservation techniques, should be promoted to help aging farmers adapt to environmental challenges while minimizing labor-intensive tasks. Strengthening farmer cooperatives can further support aging farmers through shared resources, collective bargaining, and mentorship programs that facilitate knowledge transfer.

Finally, urban and peri-urban agriculture should be encouraged as a strategy to complement rural farming. Policies promoting urban farming through land allocation, microcredit access, and rooftop or container farming technologies can support both retirees and young professionals in food production. Implementing these strategies — succession planning, youth engagement, mechanization, improved extension services, pensions, infrastructure, and climate-smart practices—will create a more sustainable and resilient agricultural system in Ondo State, ensuring long-term food security and economic stability.

CONCLUSION AND FUTURE RESEARCH

This study explores the impact of aging on agricultural productivity and rural livelihoods in Ondo State, Nigeria, using literature and data analysis. Aging in agriculture presents complex challenges requiring coordinated action. Without intervention, an aging workforce and weak succession planning will threaten food security. However, strategic policies and investments can transform these challenges into opportunities for modernization and sustainable rural livelihoods.

The findings indicate that aging farmers experience reduced physical strength, declining farm productivity, and a lack of structured succession plans. As they grow older, many shift toward less labor-intensive off-farm activities such as trading, artisanal work, and civil service. While this diversification supports household welfare, it also signals a gradual withdrawal from agriculture, threatening the long-term sustainability of rural farming.

Future research should explore regional comparisons, the effectiveness of social security schemes, factors driving youth disinterest in farming, and the role of digital agriculture in supporting aging farmers. Investigating health-related challenges and urban agriculture's potential in food production can further inform policy development.

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