Ahmadu Bello University, Zaria

ADVANCING AGRICULTURAL ECONOMICS: INSIGHTS INTO AGRICULTURAL PRODUCTION ECONOMICS, FOOD SECURITY AND HEALTH

AN INAUGURAL LECTURE

Series No. 02/26

Prof. Aderonke Bashirat Mohammed

B. Agric. (ABU), M.Sc., Ph.D. (UNILORIN), MNAAE, MASN, MANH, MHORTSON, MFAMAN

Professor of Agricultural Economics

Ahmadu Bello University, Zaria

DATE WEDNESDAY, 24TH JUNE, 2026

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Dedication

I dedicate this inaugural lecture to Almighty Allah and to my loving family whose love, prayers and support have made this moment possible.

Acknowledgements

All praise and adorations are due to Allah, the Lord of the worlds.

My Vice-Chancellor, Sir, kindly permit me to express my heartfelt appreciation to all those who have contributed in one way or another to my progress in life, even if I may not be able to mention each person by name.

I begin by expressing my deepest gratitude to Almighty Allah, the Lord of the Worlds, for His blessings and guidance.

I acknowledge the invaluable contributions of my family members, including:

My parents, Alhaji Rashidi Ademola Lawal and Hajia Amudalat Monilola Yusuf, who instilled in me the values of hard work and perseverance. My siblings, Hajia Medinat Dolapo, Dr. Folashade Fasilat, Alhaji Muyideen Aderemi, Dr. Olaitan Idayat, Dr. Adedeji Nurudeen, Alhaji Adedamola Lukman, and Dr. Mosunmola Hauwa for their love and support. I also appreciate the love and affection of their families. I equally thank my in-laws and my extended family members

I express my sincere gratitude to my current and former Vice-Chancellors, Deputy-vice chancellors, Directors, and other university officials for their leadership and support. I also extend my appreciation to my academic mentors, from primary school through university, including Prof. S.A. Sanni, my first-degree supervisor, for teaching me the art of research; Prof. A.O. Omotesho, my

MSc supervisor, for his guidance and support; Prof. M.O. Adewumi and Prof. A.O. Mokuolu, my PhD supervisors; and Prof. Shehu A. Rahman for their invaluable expertise and mentorship.

I acknowledge the support of my students, past and present, for their hard work and dedication. My fellow mentees of Prof. O.A. Omotesho and Prof. M.O. Adewumi, for their friendship and shared experiences.

I appreciate the support of my colleagues in the Faculty of Agriculture, Ahmadu Bello University, University of Ilorin, and the Department of Agricultural Economics. I also thank my friends and classmates at all levels of education.

I express my gratitude to the entire DAC Community, particularly my AEM and ABM Family, my family and friends and others who have supported me throughout my academic journey.

The entire members of Offa Professors Forum (OPF), Offa Professional Ladies Forum (OPLaF), and Our sister happiness foundation (OSH)

My loving husband, Mohammed Surajudeen Ayobami, who has been my rock and biggest supporter throughout my academic journey. My children, Kamilah, Kamaliyah, Kashif, and Kamil, who bring joy and inspiration to my life.

Finally, I remain deeply grateful to all who have supported me in various ways, especially my family, friends, and colleagues. Thank you all.

Protocols

- In the Name of Allah, the Most Gracious and the Most Merciful
- The Vice-Chancellor,
- Deputy Vice-Chancellors (Academic, Administration and Advancement, Research and Innovation),
- The University Librarian,
- The Registrar, and other principal officers,
- The chairman Agriculture and Vet Complex,
- The Director, Division of Agricultural Colleges,
- Principal officers of the Division of Agricultural Colleges,
- The provosts of the three sister colleges; Samaru, Kabba and Mando,
- Dean of Faculty of Agriculture,
- other Deans and Directors ,
- Head of Department, Agricultural Economics,
- Other Heads of Departments,
- Members of the University Council,
- Professors and other members of the Senate,
- My supervisors,
- My Academic Colleagues,
- Esteemed Teaching and Non-teaching staff of the Division and University,
- Students of the Division of Agricultural Colleges,
- The Congregation and Other Staff,
- Alumni of the University of Ilorin,
- Members, Agriculture, Nutrition and Health Academy,
- Members of my Nuclear and Extended family,
- My Special Guests, Friends and Well-Wishers,
- My dear Students (current and former),
- Greatest ABUSITEs,
- Gentlemen of the Press,
- Distinguished Ladies and Gentlemen.

Preamble

I give all praises and adoration to Almighty Allah, by saying Alhamdulillah Robil Alamin. As I reflect on my journey, I am reminded of a verse from the Holy Qur'an (Q55:13): "Fabi ayi ala'i Rabbikuma tukadhdhiban" ("So which of the favours of your Lord would you deny?"). My response is: Absolutely none!

I am grateful to Allah for granting me the opportunity to deliver this inaugural lecture, which marks a significant milestone in my academic career. Today's Inaugural lecture is the second in the Division of Agricultural Colleges and the second in the 2025/2026 academic session of Ahmadu Bello University.

My journey into the field of Agriculture was not entirely by choice, but rather by circumstance. Like many young students at the time, my initial ambition was to study Human Medicine**.** However, after my WAEC result was released, I had a pass in Physics, which made admission into Medicine impossible. Faced with this challenge, and amid the uncertainties of the ASUU strike at the time, my father took the decisive step of changing my course choice from Medicine to Agriculture.

Shortly afterwards, my GCE results were released and I obtained a credit in Physics, which reopened my chances of pursuing Medicine. Determined to follow my original dream, I sat for JAMB again and opted for Veterinary Medicine**,** with the hope of later switching to Human

Medicine. I was offered admission and, because I had already completed my first year in Agriculture, I was informed that I could proceed directly to 200 Level. Naturally, I was excited.

However, when I shared the news with my father, he firmly insisted that I return to Agriculture and continue with the programme I had already started. Though I was initially disappointed, that moment became a defining turning point in my life.

I resolved then to give my very best to the study of Agriculture to work hard, excel academically, and ultimately become a Professor of Agricultural Economics**.**

Today, as I stand before this distinguished audience, I recognize that what once appeared to be an unexpected redirection was indeed a divine blessing in disguise. That path has shaped my academic journey, defined my professional purpose, and brought me to this remarkable moment.

Here I am today, standing before you, to deliver this inaugural lecture. I am grateful to Almighty Allah for His favours and mercy. I have no regrets about taking this pathway, as I have reached the pinnacle of my career, Alhamdulillah.

It is indeed a great honour to stand before this august gathering, delivering this inaugural lecture as a testament to Ahmadu Bello University's enduring commitment to intellectual excellence, scholarship, and agricultural

advancement. I was particularly inspired to present this lecture after my colleague, Professor Usman Ibrahim, delivered an outstanding inaugural lecture shortly after attaining professorial rank.

Vice-Chancellor, sir, with profound humility and gratitude, I present the title of today's inaugural lecture:"Advancing Agricultural Economics: Insights into Agricultural Production Economics, Food Security, and Health." This lecture presents insights from my research journey and scholarly contributions in the areas of production economics, food security, and health economics.

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INTRODUCTION

Agricultural Economics and the Global Food Challenge

As we convene in this esteemed hall, millions worldwide grapple with the harsh realities of food insecurity, malnutrition, and poverty. According to the World Health Organization (WHO, 2023), over 820 million people suffer from chronic hunger, while 1.9 billion adults are overweight or obese, signaling the growing double burden of malnutrition globally. In Sub-Saharan Africa, nearly one in four people suffer from undernourishment, while simultaneously facing an increase in diet-related diseases such as hypertension, diabetes, and cardiovascular disorders (FAO, 2022). In Nigeria, a nation heavily reliant on agriculture, the sector employs nearly 30% of the workforce yet struggles to meet domestic food demands due to factors like inefficiency, market volatility, and climatic challenges (National Bureau of Statistics, 2021). Against this backdrop, Agricultural Economics emerges as a vital discipline, bridging the gap between farm and fork, policy and practice.

Agricultural Economics: Scope and Branches

Agricultural Economics is a multidisciplinary field that applies economic principles to agricultural production, food systems, natural resources, and rural development. It provides analytical tools for improving efficiency, productivity, and sustainability in agriculture.

The main branches of Agricultural Economics include:

- Production Economics – focuses on input-output relationships, efficiency, and resource use on farms.

- Agricultural Finance – deals with credit,investme nt, and financial management in agriculture.

- Farm Management – concerns decision-making at the farm level to optimize returns.

- Agricultural Marketing and Price Analysis – examines movement, pricing, and efficiency of agricultural products.

- Resource and Environmental Economics – analyzes natural resource use, sustainability, and environmental impacts.

- Agricultural Policy – investigates agricultural policy, rural development, and trade issues.

- Health and Nutrition Economics – explores the links between agriculture, nutrition, and public health outcomes.

The Role of Agricultural Economics in Addressing Global Challenges

Agricultural Economics plays a crucial role in addressing the pressing challenges of food insecurity, malnutrition, and poverty. This field integrates economic principles into the study of agricultural production, food systems, and the distribution of resources. As global food systems become more complex, the economic strategies employed within agriculture must adapt to meet the growing demands of a rising population and shrinking natural resources (Godfray et al., 2020). Recent data shows that the world's population is projected to reach 9.7 billion by 2050, further intensifying the need for sustainable agricultural practices that not only increase food production but also ensure equitable access to nutritious food (United Nations, 2019). Agricultural Economics, with its focus on improving efficiency, productivity, and sustainability, is at the forefront of developing solutions for these interconnected global challenges.

Through cutting-edge research, innovative policy solutions, and collaborative engagement, agricultural economists are contributing to the formulation of strategies to mitigate hunger, promote sustainable farming, and address environmental degradation (FAO, 2021)

As highlighted by Timmer (2021), agricultural economists play a pivotal role in designing policies that optimize food distribution and enhance the resilience of agricultural systems, ensuring that food systems can withstand both economic and environmental shocks.

Optimizing Agricultural Production: Efficiency and Resilience

A primary focus of Agricultural Economics is optimizing agricultural production within the constraints of limited resources, climate change, and fluctuating market demands. The need to increase agricultural productivity is particularly pressing given the growing concerns of resource scarcity, such as land, water, and energy (Cafiero et al., 2020). The use of innovative, resource-efficient techniques is essential to maximizing output and ensuring the long-term sustainability of agricultural systems. As Coelli et al. (2005) explain, economic efficiency in agricultural production involves optimizing input usage to generate higher yields, which is critical for addressing food security and environmental sustainability.

Advances in technology, such as precision agriculture, provide new opportunities for enhancing productivity while reducing waste. Technologies like remote sensing, drones, and automated systems help farmers better manage resources, monitor crops, and make data-driven decisions, which improves efficiency and reduces the environmental footprint of farming (Zhang et al., 2021). However, despite these advancements, many smallholder farmers in developing countries, including Nigeria, still face barriers to adopting these technologies, such as limited access to capital, training, and infrastructure (Bai et al., 2020). Overcoming these barriers is essential for maximizing the potential of agricultural production, especially in regions dependent on subsistence farming.

Agricultural Production and Food Security Nexus

The connection between agricultural production and food security is central to the discipline of Agricultural Economics. Food security is not only about ensuring an adequate supply of food but also about improving access to nutritious, safe food in a way that is affordable and sustainable (FAO, 2020). As highlighted by the Food and Agriculture Organization (FAO), the sustainability of agricultural systems is critical for achieving long-term food security, particularly in low-income countries that depend heavily on smallholder farming.

Smallholder farmers, who produce a significant portion of the world's food, are particularly vulnerable to climate change, poor infrastructure, and limited market access, all of which hinder their ability to contribute effectively to food security (FAO, 2021).

Research by Godfray et al. (2010) emphasized that improving agricultural productivity is essential for reducing poverty and increasing food availability, particularly in regions like Sub-Saharan Africa. Furthermore, more recent studies have underscored the importance of improving the economic viability of small-scale farmers. For example, improved access to credit, markets, and extension services can increase farmers' productivity and enable them to engage in more diversified and resilient farming practices (Norton & Foster, 2020). By enhancing the availability and affordability of food through these means, Agricultural Economics contributes directly to achieving global food security, especially in developing countries where malnutrition remains a pressing issue.

The Intersection of Health, Agricultural Production, and Food Security

A holistic approach to Agricultural Economics recognizes the intersection of agricultural production, food security, and health. Health is a crucial factor in determining labor productivity, which in turn influences agricultural output. Illnesses such as malaria, which are prevalent in many developing countries, create substantial economic burdens on farming households, particularly in sub-Saharan Africa (Asenso-Okyere et al., 2011). Malaria reduces labor availability during peak agricultural seasons, leading to lower yields and increased healthcare costs, which disrupt the agricultural cycle and food production. Furthermore, the direct costs of malaria treatment, coupled with indirect losses from reduced productivity, create a vicious cycle of poverty and food insecurity (Gallup & Sachs, 2001).

Recent studies have shown that improving health outcomes, such as reducing the prevalence of malaria, leads to greater labor productivity and agricultural output. For instance, the introduction of insecticide-treated bed nets and antimalarial programs in malaria-endemic regions has been shown to improve farmer productivity by reducing illness-related absenteeism (Benson et al., 2022, Mohammed et al., 2019) As such, addressing health issues within agricultural communities is not only a matter of improving welfare but also of enhancing the efficiency and resilience of agricultural production, contributing to food security.

Conceptual Framework on The Intersection of Agricultural Production Economics, Food Security, And Health, With Emphasis on Malaria Incidence and Crop Productivity

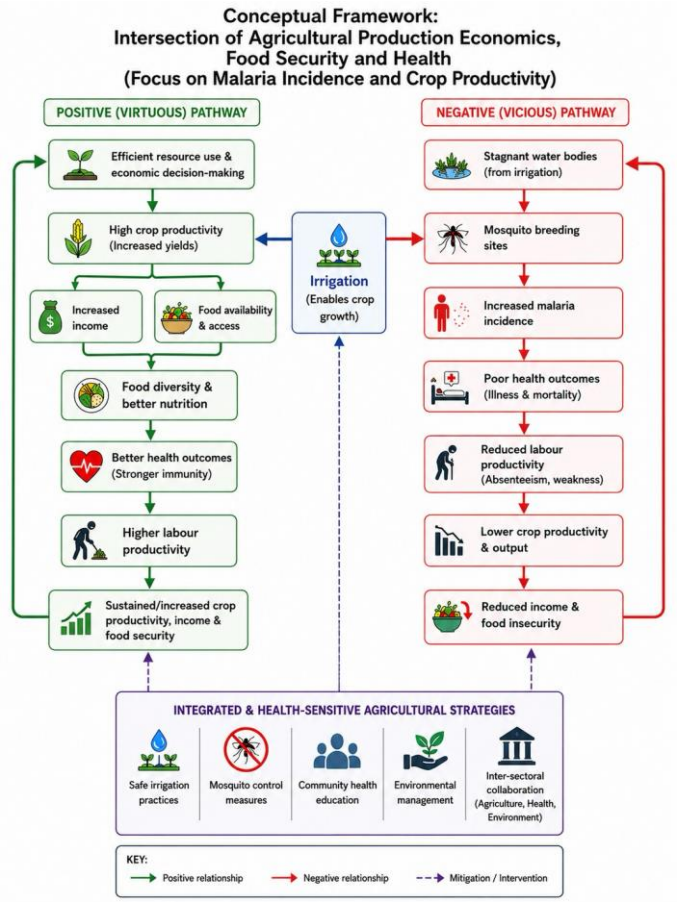

Plate 1: Conceptual Framework on the Intersection of Agriculture Economics, Food Security and Health.

The conceptual framework plate 1, illustrates the complex interconnections between agriculture, health, and environmental factors. At the core of the framework is high crop productivity, which is primarily driven by efficient resource use and informed economic decision-making. When farmers achieve higher productivity, it leads to improved food availability and increased household income. These outcomes enhance the accessibility and diversity of food, ultimately contributing to better nutritional outcomes for individuals and households.

Improved nutrition, in turn, plays a critical role in enhancing health outcomes. Proper nutrition strengthens the immune system, reduces vulnerability to disease, and promotes overall physical and cognitive development. Better health supports higher labour productivity, as healthier individuals are more capable of engaging in agricultural and other economic activities. This reinforces a positive cycle where productive labour further sustains or boosts crop yields, maintains income levels, and continues to support food security.

However, the framework also highlights the unintended health risks associated with some agricultural practices, particularly irrigation. While irrigation supports crop growth, it can also create stagnant water bodies, which serve as breeding grounds for mosquitoes. This environmental change increases the risk of malaria transmission, especially in rural and tropical regions. The rise in malaria incidence negatively affects health outcomes, leading to increased illness and mortality,

especially among vulnerable groups such as children and pregnant women.

As malaria spreads, it reduces labour productivity due to illness, absenteeism, and the burden of healthcare costs. Lower productivity then leads to reduced agricultural output, loss of income, and worsening food insecurity, especially in households that depend on subsistence farming. This creates a vicious cycle where poor health undermines agricultural progress, and diminished productivity intensifies poverty and vulnerability, further exposing populations to health and food-related risks.

The framework therefore calls for integrated and health-sensitive agricultural strategies. It emphasizes the importance of aligning agricultural development with public health and environmental management. Strategies such as safe irrigation practices, mosquito control measures, community health education, and inter-sectoral collaboration between agricultural, health, and environmental bodies are vital. Only through such an integrated approach can productivity gains be sustained without compromising the well-being of farming communities.

MY CONTRIBUTION TO THE FIELD OF AGRICULTURAL ECONOMICS IN THE AREAS OF AGRICULTURAL PRODUCTION ECONOMICS, FOOD SECURITY AND HEALTH

Mr. Vice-Chancellor, Sir, with due sense of modesty, humility, and responsibility, I solemnly render before you and this august gathering an account of my contributions to knowledge and human development singly and in collaboration with co-researchers in the field of Agricultural Economics.

This lecture will explore the intersections of agricultural production, food security, and health within agricultural economics, with particular attention to malaria as a critical health issue impacting crop productivity. The discussion will emphasize my contributions to understanding these intersections and their implications for developing resilient agricultural systems that support both economic and community well-being.

Agricultural Production Economics

Agricultural production economics focuses on optimizing the use of resources in farming to maximize output while minimizing costs. It examines how inputs - such as land, labour, capital, and technology can be allocated efficiently to achieve higher productivity and profitability in agriculture (Coelli et al., 2005). This field addresses core issues like production efficiency, cost management, and yield improvement, all of which are essential for supporting food security and economic stability, particularly in resource-limited settings.

In the course of my academic journey, my research has been anchored in key areas of agricultural production economics, with a focus on cereals, legumes, tubers, horticultural crops, and tree crops. I have also undertaken substantial work on intercropping systems, livestock production, and integrated mixed farming, contributing to a more holistic understanding of sustainable agricultural practices.

Cereal Crop Production

Mohammed et al. (2012) assessed the economics of maize production in Ogori/Magongo Local Government Area of Kogi State. The study revealed that farmers in the study area have small holdings. Land, fertilizer, and seed were the main factors influencing output of maize production. The profitability level of production was relatively low. Land, fertilizer, and seed were underutilized, indicating a need to increase these resources appreciably to achieve efficiency and profitability. The major constraints of maize production were lack of capital and improved seed.

Using the stochastic production function, **Mohammed** (2017) identified the determinants of technical efficiency in maize crop production. The study revealed that the significant factors influencing technical efficiency included age of farmers, level of education, and extension contact.

In the agricultural sector, access to timely and accurate information can significantly impact productivity, especially for staple crops like maize. Extension services

play a pivotal role in disseminating agricultural innovations and best practices, enabling farmers to make informed decisions that improve crop yields and profitability. These services often include training on improved seed varieties, modern farming techniques, soil fertility management, and pest control strategies, which are essential for optimizing maize production.

Mohammed (2018) determined the effect of extension information on the output of maize farmers. It was revealed that radio and television were the major sources of extension information. The sampled farmers who used extension information had a mean output of 1669.08 kg per hectare, while non-users had a mean output of 1490.12 kg. Further analysis showed that there was no significant difference in output between users and non-users of extension information in the study area.

Acceptability and adoption of improved varieties of maize are crucial for productivity, food security, nutrition, and sustainability. Baba et al. (2023) evaluated the acceptability and adoption of quality protein maize production in northwest Nigeria. The study found that 60.4% of farmers in Zamfara, 43% in Katsina, 40% in Jigawa, 30% in Kano, and 21% in Kaduna were not aware of QPM. Cumulatively, the proportion of farmers unaware of QPM across the states was 33.4%, while the aggregate adoption of QPM across the states was 42.2%. Sex, age, household size, income from primary occupation, cooperative membership, amount of credit received, and farm size significantly influenced the acceptability of QPM.

Fertilizer is a vital input for obtaining optimum yield in maize production. Ayanlere et al. (2013) assessed inorganic fertilizer usage among maize farmers in Ijumu Area of Kogi State using descriptive statistics and multivariate linear regression. The result revealed that the virile age group involved in farming was low, and the majority had a low level of education. Their fertilizer usage averaged 166.39 kg/ha/season, which is low compared to the required quantity/ha 240-310 kg/ha for maize production.

Globally, sorghum production has increased significantly, with Nigeria being the second-largest producer in Africa. In Nigeria, sorghum is a critical crop, particularly in the northern region, where it is used as a food source and livestock feed. Ayanlere, et al (2014) examined the resource use efficiency in sorghum production in Kabba/Bunnu Area of Kogi State. Findings indicated that sorghum production is profitable in the study area, with a gross margin of ₦31,384.53/ha and a profitability index of 0.71, including imputed cost of family labour. The result of the production function shows that fertilizer and seed are the major determinants of sorghum output. Results further revealed that all production resources were overutilized in sorghum production in the study area.

Rice *(Oryza sativa L*) is a staple food crop for over half of the world's population. In Nigeria, rice is the most consumed cereal after maize, with demand projected to increase due to population growth and urbanization. It is a major contributor to Nigeria's food import bill, approximately $1.5 billion annually. Muhammad-Lawal,

et al (2013) revealed that small-scale rice farmers in Ogun State realized an average gross margin of ₦90,634.35/ha. Farm size, labour, and production systems accounted for 80.50% of the changes in rice output. The study further revealed that farm size, labour, and quantity of seed were underutilized in rice production.

Horticultural Crop Production

Vegetables such as tomatoes, okra, and peppers are essential for human nutrition, providing vital micronutrients, fibre, and antioxidants, thus supporting livelihood and economic growth. Despite the importance of pepper and its relevance in the daily human diet, its production in the study area has not received attention.

Cost and returns analysis of pepper production in Ethiopia Area of Delta State by **Mohammed**, et al (2013) showed that farmers were small-scale, with a mean age of 45 years. The cost per hectare of pepper farm was ₦35,714.90, and the return per hectare was ₦94,572.35. An average pepper farmer had a gross margin of ₦58,808/ha. Labor constituted the highest (60%) of the production cost. Farmers were constrained by price instability, pest and disease attacks, inadequate capital, and bad access roads to their farms.

Similarly, an assessment of pepper production in Mopamuro Area of Kogi State, Nigeria, by Ayanlere, et al (2013) revealed that pepper production is profitable in the area, with a net farm income of ₦36,889/ha, including imputed family labour cost. The double log production function revealed that 67% of output variation in pepper

output is accounted for by inputs such as farm size, seeds, chemicals, and fertilizer. Pepper farmers did not attain absolute efficiency in the use of production resources. Chemicals, seeds, farm size, and capital were underutilized, while fertilizer was overutilized. The cost of hired labour, imputed cost of family labour, education, and cost of pepper seed had a positive effect on pepper output.

Mohammed, et al (2013) carried out an assessment of okra production in Kabba/Bunnu Area of Kogi State. The study revealed that 72% of the farmers were between the ages of 21-60 years, and most (95%) were male. A gross margin of ₦19,778.34/ha was realized, with a profitability index of 0.35. Farm size, fertilizer, seed, and labor usage had positive and significant effects on okra production ($P < 0.01$). The study also revealed that all inputs used for okra production were overutilized.

Tomatoes are one of the most widely cultivated and consumed vegetables globally, with over 180 million metric tons produced annually (FAO, 2022). Irrigation is crucial to tomato production, especially in areas with limited rainfall or water scarcity. Irrigation enhances tomato yield by 20-50% (Kumar et al., 2017). Bagya, et al (2024) assessed the effect of input intensification and cost efficiency on the productivity of irrigated tomato farmers in Kaduna State, Nigeria. The study revealed that sex, membership of farmers' cooperatives, and farming experience were major determinants of the level of input intensification. The input intensification adopted as a

complete package in the study area had a negative influence on productivity of tomato.

Furthermore, the age of the household head, number of extension contacts, farm size and distance to the input market significantly influenced the intensity of input use. The cost of tomato production is been influenced by farm size, access to credit, educational status and distance to input market $P<0.01$. The major constraints to tomato production were insects' infestation, high input cost, shortage of water and market fluctuation.

Another area I worked on was ginger production, a critical component of Nigeria's agricultural sector. A high-valued crop with immense economic and health benefits.

Mohammed (2019) undertook a study on the economics of ginger production, consumption, and utilization in Ijumu Area of Kogi State. Results revealed that ginger tea, salad dressing, dried ginger powder, and medicinal herbs were the different forms in which ginger was used among farmers. Health, nutrition, and performance benefits were derived from the consumption of ginger. Ginger production was profitable in the study area with a profitability index of 1.49. Labor constituted the major cost share of ginger production (55%). Capital, pests, and diseases, high cost of labor, and inadequate farm inputs were the major constraints to ginger production in the study area.

Similarly, **Mohammed** (2018) examined the determinants of small-scale ginger production in Kogi State, Nigeria. The study showed that 83% of small-scale

farmers had no contact with extension agents and operated on an average of 1 ha of land. They mostly practiced mixed farming and used family labor. Age, educational status, marital status, household size, farm size, farming experience, and income significantly determined ginger production ($p < 0.01$).

Intercropping

The Vice Chancellor, Sir, as we explore strategies to enhance agricultural productivity and sustainability, intercropping emerges as a vital practice. Therefore, **Mohammed, et al** (2010) assessed the economics of maize/tuber intercrops in Kabba/Bunnu Area of Kogi State, Nigeria. It was shown that maize/tuber intercrops were profitable, with maize/yam intercrop having the highest gross margin of ₦59,507/ha, followed by maize/cassava (₦40,275/ha), maize/cocoyam(₦37,942.22/ha), and maize/sweet potato (₦31,576.80/ha) respectively.

In determining the optimal farm plan in maize/tuber intercropping, results showed that farmers should devote 0.84 ha of land to maize/yam intercrop with the highest optimum returns of ₦34,523.80 compared to other intercrops. In addition, results on resource allocation and use patterns revealed that land and labor were underutilized in arriving at the optimal plan, while an additional unit of capital would reduce the farmers' income by 14.34 units.

Evaluating the economics of intercropping maize and groundnut in Ekiti East Area of Ekiti State by

Mohammed, **et al** (2012), findings revealed that farmers who intercropped maize/groundnut were educated (92%) and operated on a small scale. They were in their productive age with less than 10 years' experience in farming. Maize/groundnut intercrop is profitable with a gross margin of ₦53,635 and net returns to operating expenses of 2.9. The sales of groundnut output accounted for 43.5% of farm income, while maize accounted for 56.5%. Compared with the profitability of sole groundnut, results revealed a profitability index of 1.98, which is lower compared to that of maize/groundnut intercrop.

Furthermore, Ayanlere, **Mohammed**, Dutse, Abdullahi, and Muhammad-Lawal (2012) assessed the economics of maize/cowpea cropping systems in Oyun Local Government Area of Kwara State, Nigeria. Cost and return analysis revealed a gross margin of ₦29,440.63/ha and the return of every naira of 0.7. Farm size, seed, and fertilizer were significant factors influencing maize/cowpea production in the study area. Assessment of resource use efficiency indicated that quantity of seeds, farm land, and fertilizer were underutilized, while labor input was overutilized.

Tuber Crop Production

The Vice Chancellor, Sir, moving on to tubers, a vital staple crop in Nigeria and globally, my research examines the economics, allocative efficiency, technical efficiency, and socioeconomic factors influencing their productivity.

Mohammed, et al (2009) examined the effect of gender factors on cost and allocative efficiency of cassava

producers in Oriire Area of Oyo State. Using budgeting techniques and stochastic frontier cost functions, the results showed that male farmers made more profit than female farmers. The benefit-cost ratio was greater than one for both genders, implying that cassava production in the study area is profitable. The cost of cassava stem and transportation for both genders were significant factors influencing total cost of cassava production. Educational level and farming experience were significant factors that accounted for the observed variation in efficiency of the female farmers, while age and farming experience were significant for the male farmers.

Mohammed, Akpata, Peter, and Dutse (2010) carried out a study on factors declining cassava production in Ogori/Magongo Area of Kogi State, Nigeria. It was revealed that respondents were small-scale farmers with no access to improved cassava stems, viable markets, or credit facilities. Cost and returns analysis revealed a gross margin of ₦14,375.30 per respondent and a return on investment of 0.37.

Furthermore, Ayanlere, **Mohammed,** and Ojeleye (2017) assessed the technical efficiency of cocoyam farmers in Adavi and Okehi areas of Kogi State, Nigeria. The results revealed that 73% of the cocoyam farmers were above 40 years of age, with the majority being male and having about 28 years of farming experience. The technical efficiency level among farmers ranged from 13% to 92%, with a mean technical efficiency of 64%. Level of education, household size, years of farming experience, and mode of land acquisition were significant factors ($p <$

0.01) that increased the level of technical efficiency and accounted for most of the variations observed in efficiency among the farmers.

Mohammed, Ekenta, and Ayanlere (2014) carried out an analysis of gender factors and profitability of yam production in Yagba East Local Government Area of Kogi State, Nigeria. The study indicated that male farmers practiced more chemical weeding, applied more fertilizer, and employed more hired labor. Female respondents, on the other hand, engaged in manual weeding, applied less fertilizer, and used more family labor for yam production. Yam production in the study area was profitable, with a gross margin for male and female farmers of ₦57,796.08/ha and ₦33,765.86, respectively, with a marginal difference of ₦24,030.22 significant at ($p < 0.01$) level. Educational level, farming experience, land acquisition, and farm size positively influenced yam production in the study area ($P < 0.05$). Inadequate capital, insufficient access to land, bad roads, shortage of fertilizer, and unavailability of modern implements were the major constraints to yam production.

Tree Crop Production

Moving on to tree crops production, a vital sector contributing significantly to Nigeria's agricultural economy. Oloniruha, **Mohammed**, and Ekenta (2012) carried out an evaluation of factors associated with coffee production in Kabba/Bunnu Local Government Area, Kogi State. Results revealed that age, level of education, farm size, income, and land ownership had significant effects on coffee production at ($p < 0.05$) levels. The

major constraints to coffee production in the study area were pests and diseases, unavailability of readily accessible markets, unavailability of credit, insufficient capital, lack of adequate storage facilities, and high cost of inputs.

Mohammed, Ayanlere, and Ekenta (2013) revealed that the gross margin of coffee production in Kabba/Bunnu Area of Kogi State was ₦18,854.40/ha. The level of profit was affected by high cost of labour, processing methods, low yield, and the unavailability of accessible markets. Additionally, gender, age, household size, farming experience, and farm size had significant effects on coffee production ($P < 0.01$).

Ayanlere, Ekenta, **Mohammed,** Afolabi, and Saibu (2012) carried out an analysis of socioeconomic factors affecting cocoa production in Gboyin Local Government Area of Ekiti State, Nigeria. The study revealed that older men with a mean age of 65 years dominated cocoa production in the study area. Household size, quantity of chemicals, and level of education had significant effects on cocoa production ($P < 0.05$).

Mixed Farming and Livestock Production

Vice Chancellor, Sir, beyond crop production, mixed farming systems and livestock production are essential components of the agricultural landscape, offering opportunities for diversified income streams and improved livelihoods. As such, the effect of productive resources on the profitability of integrated crop-livestock farming systems was assessed among Agropasturalist in

Zaria Area of Kaduna State by Sanni, **Lawal** and Ajala (2003). Results indicated some level of the symbiotic relationship between crop and livestock enterprises among the agro-pastoralists. A net income of ₦142,057.00 per respondent and a return to naira invested of 2.21 was realized. The livestock enterprise contributed 86% of the total income, while crops contributed 14%. Further results showed that capital and wage had an inverse relationship with profit, while land and labour had a positive and significant impact on profit ($p < 0.01$). The sum of profit elasticity was 2.97, greater than 1, indicating increasing returns to scale.

In the same vein, **Mohammed**, Ayanlere, Dutse, and Kehinde (2009) examined the economics of mixed farming systems among households in Offa, Kwara State, Nigeria. Cost and return analysis revealed a gross margin of ₦69,222 per farmer. The livestock enterprise contributed 58.6% of the total income, while crop production contributed 41.4%. Further results revealed that intensification of the use of land and labour resources within the integrated crop-livestock farming system would increase the profit level of farming households.

A study by **Mohammed** (2017) revealed that women (63.3%) dominated goat rearing among inhabitants of Ajaokuta Area of Kogi State and mostly practiced extensive management systems (63.6%). Those who practiced semi-intensive management systems (36.75%) fed their goats with cassava leaves and peels. Goat was reared mainly to make a profit in the study area, and it was profitable with an average gross margin of ₦86,580 per

respondent and a benefit-cost ratio of 2.26:1. The cost of goat sold determined profitability in the study area ($P < 0.01$).

Mohammed (2019) assessed poultry production among residents in Kogi State, Nigeria. It was observed that 78% of the respondents had no access to extension contact, and facilitating access to credit was the most important extension need of the poultry producers (54.5%). Age, educational qualification, flock size, access to credit, and access to extension contact significantly affected the income of poultry production ($p < 0.01$).

Aquaculture and Apiculture Production

Vice Chancellor, Sir, I also delved into apiculture (beekeeping) and aquaculture (fish production). **Mohammed** (2014) carried out a study on the economics of modern beekeeping in Kogi State, Nigeria. The study indicated that, on average, farmers had seven hives and obtained a net farm income of ₦21,000 per hive. Size of the bee hives, number of harvests, number of employees, and capital had positive and significant effects on beekeeping ($p < 0.1$). Inadequate capital, high cost of equipment, illiteracy, inadequate extension visits, Bororo invasion (Fulani), and inadequate managerial skills were the major constraints associated with beekeeping.

The need to expand and harness the prospects of the aquaculture sector, which is a major source of animal protein and has high prospects in alleviating undernutrition and poverty, led to the study by **Mohammed,** Hinmikaiye, Oladehinde, and Ahmadu

(2015) on the economics of scale of catfish farming in Ikorodu Local Government Area of Lagos State, Nigeria. It was found that small-scale fish farmers reared an average of 1000 fingerlings, while large-scale farmers reared an average of 2500 fingerlings. The small-scale fish farmers made a profit of 0.61k for every naira invested, while the large-scale farmers had a profit of 0.55k for every naira invested. Results of the t-test indicated that there was no significant difference in the gross margin for small and large-scale fish farming. Therefore, fish farming is profitable, regardless of the scale of production.

Agricultural Finance

Vice Chancellor, Sir, credit is essential in agriculture, providing farmers with the resources needed to enhance productivity and sustainability. My work examines credit access, sources, procurement, and utilization, highlighting its role in improving agricultural production and, by extension, food security.

Mohammed, Ayanlere, Mohammed, and Olorunfemi (2014) carried out an assessment of credit procurement and usage among small-scale farmers in Mopamuro Local Government Area of Kogi State. The study revealed that the total sum of ₦4,456,209 was procured by 78 farmers in the study area. The amount of credit received varied from ₦21,000 to ₦100,000, with an average credit of ₦57,128.21 received. Of the total amount procured, 43.16% was invested in agriculture, mainly in the purchase of chemicals and farming implements, while 26.41%, 19.41%, and 11.02% were used to sponsor

children's education, fund wedding ceremonies, and construct buildings, respectively.

Similarly, **Mohammed** (2016) conducted a study on microcredit usage among farming households in Kabba/Bunnu Area of Kogi State. The study revealed that farmers received an average loan of ₦167,000 per household, and only 40.83% of the funds obtained were invested in agriculture. The amount of microcredit received was influenced by age, educational level, farm size, ownership status, and annual farm income ($P < 0.05$).

Mohammed, Ekenta, Ayanlere, Oloniruha, and Mohammed (2013) conducted another study on the analysis of credit procurement among farmers in Ife-South Local Government Area of Osun State, Nigeria. The study observed that the Taungya farming system was practiced, with kola nut, cocoa, oil palms, citrus, cassava, and maize being the major crops grown. The farmers mainly patronized non-institutional sources of credit. Farm size and farm experience positively influenced the amount procured ($P < 0.05$).

Mohammed, Yusuf, Tunku, and Dutse (2009) analyzed the sources and accessibility of credit to rural women in Kabba/Bunnu Local Government Area of Kogi State. They found that 55% of the rural women sourced credit through formal sources. Level of education and farming experience were the factors influencing access to credit ($P < 0.01$). The major problems women faced in accessing credit included costs of transportation, small amounts of credit provided, delays in getting sureties, and risk of crop failure.

Ayanlere and **Mohammed** (2012) conducted a study on gender access to credit in Adavi Local Government Area of Kogi State. The findings revealed that 55% of males and 40% of females had access to credit from formal sources. Farming experience and age influenced access to credit among males ($P < 0.01$), while age significantly influenced access to credit among females ($P < 0.10$).

Food Security Research

Vice Chancellor, Sir, having explored the dynamics of agricultural production, I turned my attention to food security, a critical component of global well-being. Food security encompasses availability, access, utilization, and stability. The World Food Summit (1996) defines food security as "when all people at all times have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life."

Moving from agricultural production to food security, the question is how to ensure that all people have access to sufficient, safe, and nutritious food. My research explores this nexus, focusing on food security status, factors determining food security, and how households cope with food insecurity.

Using a linear goal programming approach to food security, **Lawal** and Ibrahim (2006) found that the optimal plan to ensure food security among agropastoralist households in Giwa Area of Kaduna State is to devote 0.68 and 0.89 hectares of farmland to producing maize and maize/cowpea, respectively.

Lawal, **et al** (2008) analyzed household food security among agropastoralist. The results revealed that 66% of the agropastoralist were food-secure. Household size and crop diversification were the major determinants of food security. The study also showed that the major food security crops among agropastoral households are maize, sorghum, and millet.

Furthermore, **Mohammed**, **et al** (2013) examined the optimal farm plan and food insecurity situation among agropastoralist households. The findings revealed that the agropastoralist have large farmlands acquired mainly through rent. Using the calories and protein required approach, 35% of households were food-insecure. Food insecurity among agropastoral households is a result of poverty, not a shortfall in crop production.

Mohammed (2019) analyzed the contribution of maize towards farming household food security in Mopamuro Local Government Area of Kogi State, Nigeria. The findings revealed that most households (88.5%) have access to farmland, 29% were food-secure, and maize contributed most to food security relative to other crops, such as yam, sorghum, millet, and rice. Insufficient capital and inadequate processing and storage facilities were the major factors affecting household food security.

Another study by Ayanlere and **Mohammed** (2019) revealed that 35% of small-scale farmers are food insecure, while 65% are food insecure. Food-insecure households consumed 52% less than the recommended daily calorie intake, while food-secure households consumed 2.5% in excess of the recommended daily

calorie intake. Household size, level of education, and expenditure on food were significant factors affecting the level of food insecurity ($P < 0.05$).

With the aid of the food security index, **Mohammed** (2020) analyzed the food insecurity status among rural households in Mopa Muro Area of Kogi State. The findings of the study revealed that 64% of households were food insecure. Buying food on credit, having no food at home, begging for money, feeling weak, and malnutrition were the effects of food insecurity among households. However, in coping with food insecurity, farming households reduced the quality and quantity of food eaten, bought food on credit, and skipped meals.

Health Economics and Crop Production Research

Vice Chancellor, Sir, having established the critical role of agricultural production in ensuring food security, I turned my attention to the intricate relationship between health and crop productivity. Malaria, a pervasive and debilitating disease, poses significant threats to human well-being and economic development. In the context of crop productivity, malaria can have far-reaching consequences, from reduced Labour to decreased crop yields.

To investigate the impact of malaria on crop productivity, our study employed a novel approach, incorporating malaria testing into a cohort longitudinal household survey methodology. Test for malaria were carried out on the members of household using a Rapid Diagnostic Test (RDT) based upon the detection of *Plasmodium*

falciparum Histidine rich protein ii antigen. This allowed us to directly assess the incidence of malaria and its effect on crop productivity.

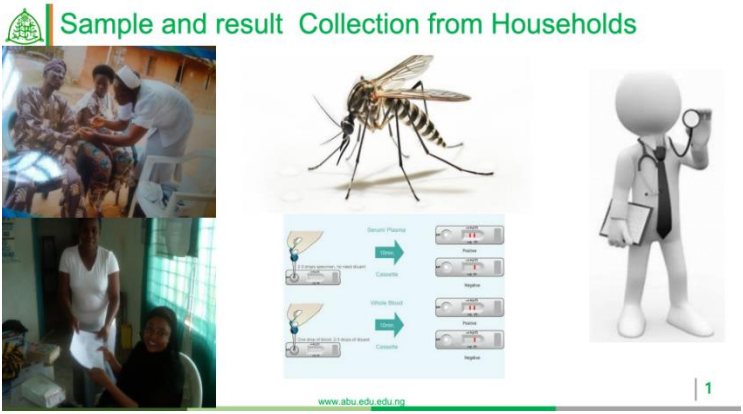

Plate 2: Testing for Malaria Morbidity Among Fabrie Household Members

Against this backdrop, **Mohammed**, **et al** (2016) studied the economics of malaria-affected farming households in Kabba/Bunnu Area of Kogi State. The study revealed that majority (86.11%) had high malaria incidence, while 13.89% had low malaria incidence. It was observed that there was no variability in the level of variable input used by low and high malaria-incidence households, except for seed. Crop productivity of high-incidence malaria households was 25% lower than those of households with low malaria incidence ($P < 0.05$). Equally, low malaria incidence households recorded a higher gross revenue of ₦202,679.25 compared to high malaria incidence households (₦153,119.36). High malaria-incidence households lost 39.07% of their gross margin to malaria,

while low malaria-incidence households lost 4.27%, respectively. Crop output was affected by the cost of treatment and prevention ($P < 0.05$).

Mohammed, **et al** (2016) conducted a study on malaria incidence and determinants of welfare loss among farming households in Kogi State. The study revealed that the incidence of malaria among the households was high, with an average of 8 episodes in a year. Households spent an average of ₦10,515.28, ₦1,801.38, and ₦3,955.56 on treatment, caregiving, and prevention of malaria per annum, respectively. Findings showed that 38 man-days in the farming year were lost to malaria incidence. Welfare loss was estimated as ₦69,930.55 (US$411.36) per farming season, from a total estimated income of ₦175,046 per ha. Households lost 40% of their income to malaria incidence. Household size and malaria incidence were the major determinants of welfare loss.

Another study, based on an assessment of malaria incidence and crop productivity, was carried out by **Mohammed et al**. (2018). Data collected from 72 households, selected randomly from 12 villages across Kabba/Bunnu, were monitored for 8 months in a longitudinal manner. Households were classified based on malaria incidence as low, moderate, and high, respectively. Using descriptive statistics and analysis of variance (ANOVA), findings revealed that 93% of the household heads were male and practiced intercropping. High malaria incidence households were observed among 75% of household members. The study established a great variation in the output of crops produced and in the use of

labor, seed, land, and fertilizer input among households. Crop output was higher for low morbidity households.

Mohammed, **et al** (2019) conducted a study to establish a direct link between malaria incidence and rainfall pattern on farmers' productivity: Evidence from North-Central, Nigeria. Malaria diagnosis was confirmed among 432 febrile household members using the Plasmodium falciparum Histidine-Rich Protein 2 (PfHRP2) malaria diagnostic test (mRDT) kit (Paracheck). Results revealed that most farmers operated on a small scale and majorly cultivated cassava as a sole crop (79%) and cassava/yam intercrop (40.28%). Malaria affected three-quarters of the household members. An average malaria prevalence of 103 per 1000, 7 rainy days, and 256 mm of rainfall was recorded in the study area. Rainfall days and intensity were highest in the month of October (17) and July (446.5 mm), respectively. The study revealed that the number of rainy days is important for mosquito breeding, which translates to increased malaria incidence, thereby having a negative effect on crop productivity. Land, seed, and fertilizer influence crop productivity positively ($P < 0.05$), while family labor had a negative effect on output ($P < 0.01$). Cassava, yam, maize, and pepper output were higher for households with low incidence of malaria compared to high incidence households ($P < 0.05$).

Health Status of Farming Households and Crop Productivity: Evidence from Malaria-Infected Households in Nigeria was investigated by **Mohammed**, **et al** (2019). The results revealed that 83% of household members had malaria. Malaria was more prevalent among

children (55%), followed by male adults (25%) and female adults (20%). The findings showed that output was higher for low malaria-infected households (LMIH) by 25% compared to high malaria-infected households (HMIH). Similarly, crop output for LMIH was significant ($P < 0.05$) for all crops except sorghum, likely because less labour is required for its production.

Household heads who were educated and used mosquito nets had decreased odds of malaria infection ($P < 0.05$ and $P < 0.05$, respectively). The estimated welfare loss was ₦148,888 (US$409.03). Adjusted household size and malaria incidence were the major determinants of welfare loss. The study area employed protective measures such as using mosquito nets, clearing bushy environments, using anti-malaria drugs, using homemade medicinal herbs, and sleeping under mosquito nets.

Given the varying incidence and prevalence rates of malaria in different parts of Nigeria, there is a high tendency of reduction in crop productivity and efficiency among small-scale farmers. **Mohammed**, **et al** (2019) conducted a study on efficiency analysis of malaria incidence farming households in Kogi State. The results showed that farming households had a mean farm size of 1.83 ha and primarily cultivated cassava, yam, pepper, maize, and sorghum. Day loss to malaria, medical expenses, and age of household heads had a negative effect on the efficiency of crop production. In contrast, the frequency of using insecticide-treated mosquito nets and the level of education of household heads had a positive

effect on the technical efficiency of farming households ($P < 0.01$).

Low malaria-infected households (LMIH) had a mean technical efficiency of 0.84, while high malaria-infected households (HMIH) had a technical efficiency of 0.48. The results indicate that LMIH are more efficient than HMIH ($P < 0.01$).

MY CONTRIBUTION TO THE UNIVERSITY AND COMMUNITY

Vice Chancellor, sir, in addition to my research contributions, I have undertaken various administrative responsibilities and community service. Throughout my academic career, I have supervised to completion over 50 undergraduate projects, four Master's dissertations, and two PhD theses. And I am currently supervising two PhD students, two Master's students, and four undergraduate students. I have taught over fourteen undergraduate courses and two postgraduate courses.

I have published over seventy journal articles and conference proceedings and has recorded 224 citations, with an h-index of 7 and i10-index of 8 on Google Scholar. Also reviewed scholarly articles for several reputable journals in Agricultural Economics.

I have also served in numerous capacities and committees during my 14 years at Kabba College of Agriculture, Division of Agricultural Colleges, ABU, and 5 years at Samaru College of Agriculture.

Notably, I was the pioneer female Provost of Kabba College of Agriculture from 2016 to 2020. During my tenure, I oversaw significant development and achievements. We provided training for the Kogi State Government and supplied quality cashew seeds and seedlings to the Federal Ministry of Agriculture, which were distributed across the country.

Prior to my provostship, I held various roles, including Deputy Provost, Deputy Director of the Entrepreneurship Center, and Director of the Entrepreneurship Center at KCA/ABU. I taught skills to students, developed entrepreneurship programs, and aired programs on entrepreneurship development at NTA Kabba, Kogi State. I also served as Student Affairs Officer, SIWES Coordinator, and Head of the Agricultural Technology Program at Kabba College of Agriculture.

Furthermore, I have been a member of several boards and committees, including the Board of Governors, DAC/ABU, DAC Professional and Academic Board, DAC Management Committee, DAC Tender Board, and DAC Central Board of Examiners. I currently chair the Examination Misconduct Committee, SCA/ABU, DAC Strategic plan committee, DAC, IGR/ Business committee and I am a member of the Senate, ABU.

In addition to my administrative roles, I have facilitated various workshops, conferences, and training programs. I hosted the Horticultural Society of Nigeria Conference (HORTSON) in 2017 and served as a resource person for the National Board for Technical Education (NBTE). I also served as a member of the Review Committee for the

HORTSON Conference held at Samaru College of Agriculture in 2024 and was the Editor of the conference proceedings. In 2025, I served on the Local Organising Committee (Welfare Sub-Committee) of the Nigerian Association of Agricultural Economists Conference held at the Department of Agricultural Economics, Ahmadu Bello University, Zaria.I have also worked as an instructor, facilitator, and project supervisor at the National Open University (NOUN), Iyara Center, Kogi State.

As part of my community service, I supervised and coordinated the Joint Matriculation Examination (JAMB) and University Tertiary Matriculation Examination (UTME) from 2010 to 2016. Additionally, I served as an ad-hoc staff member for the Independent National Electoral Commission (INEC) from 2010 to 2016.

I also coordinated the Interim Joint Matriculation Board (IJMB) Programme at Kabba College of Agriculture from 2016 to 2020. Furthermore, I facilitated the production and packaging of viable and certified cashew seeds, producing 109,091 seedlings in collaboration with the Federal Ministry of Agriculture from 2017 to 2020. These seedlings were distributed to 18 states across the federation.

Plate 3: Fadama guys training

Plate 4: Production of 109 019 cashew seedlings

In recent years, I have been involved in various projects, including training youth in the Fadama graduate unemployed youth programme. Fadama III, GUYS, and additional funding in collaboration with the World Bank this featured the training of 350 participants in various agricultural enterprises across production, processing, preservation and marketing value chain. Equally I facilitated the Agro-processing, Productivity, Enhancement, and Livelihood improvement Support

Project (APPEALS) featuring the training of 1,800 participants in badges of men, women and people living with disabilities on livestock, cassava, cashew, and Fisheries across production, processing, preservation and marketing value chain in 2019 and 2020. I also provided training and services on Gender-Based Violence (GBV) and Environmental and Social Safeguards (ESS) in 2020.

Plate 5: Training of Women and Youth for Appeals Project

Lastly, I have worked as a consultant for the Kogi State Government on the Women and Youth Empowerment Programme (WYEP) and conducted an output survey on Cassava Value Chain for the APPEALS Project in Kogi State in 2022. I am currently a Principal Investigator for

the NRF concept note titled Development and Performance Evaluation of Self-Healing Polymer Composites for Critical Components in Agricultural Machines (2025). And also served as Co-Principal Investigator on the following concept notes:

- Development of Smart Self HealingHydroxyapatite/Kaolin-Based Ceramic Filter for Sustainable Access to Safe Drinking Water in Rural Communities in Nigeria

- Development of Bio inspired Self HealingPolymer Composites Reinforced with Agricultural Waste Fillers for Sustainable Power Plants and Turbine Applications

- Empowering Physically Challenged Persons through Agricultural Production: Implications for Food Security and Poverty Eradication in Nigeria

which were accepted for full proposal writing in 2025 and 2024 respectively.

Plate 6: At ANH Academy week Accra Ghana 2018

Plate 7: Presenting my paper at ANH Academy week Hyderabad, India 2019

Plate 8: At the Plenary session, Hyderabad, India 2019

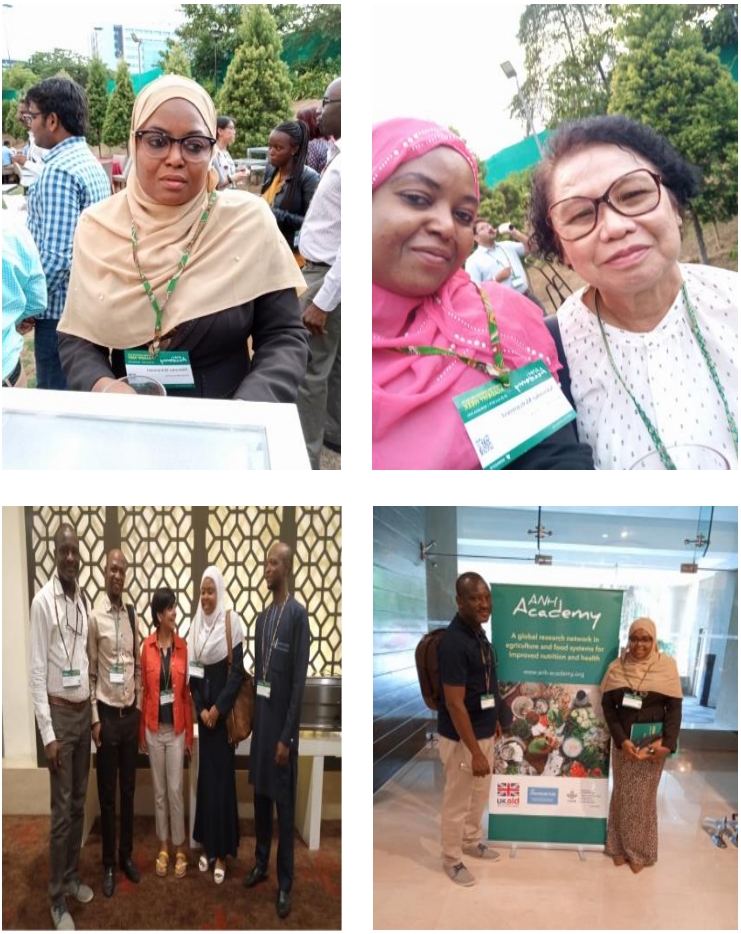

Plate 9: With Colleagues at ANH Academic week conference

Plate 10: With Awardees from Africa ANH 2019

Plate 11: At Kenya for an Agricultural Tour in Collaboration with NACHCARD and ARMTI

Plate 12: At the Park Kenya

Plate 13: At the 8th Africa Nutritional Conference 2018 Addis Ababa Ethopia

CONCLUSION

This inaugural lecture emphasizes the vital role of agricultural economics in advancing agricultural production, food security, and health. Key findings have examined input-output relationships, allocative efficiency, and profitability across a range of crops. It also highlighted the importance of optimizing resource use, improving technical efficiency, and addressing constraints such as capital, extension services, and malaria incidence. To achieve sustainable agricultural practices, improved health outcomes, and enhanced food security, policymakers, researchers, and practitioners must collaborate to develop innovative solutions that prioritize:

- Sustainable agricultural practices, production and economic development.
- Intercropping and Mixed farming
- Livestock production and aquaculture
- Food security through improved crop productivity and access to nutritious food.
- Malaria control and health interventions

By adopting a multifaceted approach, we can address the complex interrelationships between malaria, crop productivity, economic development, and food security, ultimately promoting a more sustainable, food-secure, and healthy future.

Recommendations

Vice-Chancellor Sir, Effort should be made to improve Agricultural productivity, food security and malaria

incidence in Nigeria to ensure economic growth by all stakeholders (government and non-governmental organizations, Policy makers, researchers, extension service providers, and farmers taking the following measures

Agricultural productivity:

1. Strengthen extension services to provide timely and accurate information to farmers on best practices new technologies, and market trends, enhancing their technical efficiency and productivity.
2. Facilitate access to credit for small-scale farmers to enable them invest in modern input and technologies to improve productivity.
3. Advocate for policies that support sustainable agricultural practices, climate-resilient
4. Provide training and capacity-building programs for farmers, extension agents, and other stakeholders to improve their skills and knowledge.
5. Encourage private sector investment in agriculture to improve access to markets, technology, and finance.
6. Promote climate-resilient agriculture practices and support farmers in adapting climate change.

Food Security:

1. Promote mixed farming and intercropping practices to enhance food security, sustainability and crop diversity

2. Emphasize the importance of nutrition and food security, and promote agricultural practices that improve the quality and quantity of food available to rural communities.
3. Implement policies and programs that provide rural households with access to farm land, as this is crucial for agricultural productivity and food security.
4. Design and implement targeted interventions, such as food assistance and livelihood support, for households that are food insecure,
   particularly those with large household sizes and low levels of education
5. Implement programs that promote household resilience, including cash transfer programs and food assistance, to help households cope with food insecurity.
6. Encourage Farming households to adopt optimal farm plans, such as devoting specific hectares to producing food and cash crops to ensure food security.

Malaria incidence and Crop productivity

1. Implement malaria control measures, such as the use of insecticide-treated mosquito nets, to reduce malaria incidence and its impact on crop productivity.
2. Implement integrated management strategies that combine insecticide-treated nets, indoor residual spraying, and larval control measures to reduce mosquito populations and malaria transmission.

3. Establish robust surveillance systems to track malaria cases, monitor vector populations, and evaluate the effectiveness of control measures.
4. Integrate malaria testing and treatment into agricultural extension services to ensure prompt diagnosis and treatment of malaria cases among farming households.
5. Educate farming households on malaria prevention, diagnosis, and treatment, and promote awareness on the importance of malaria control for agricultural productivity.
6. Use of anti-malaria vaccines

Future Research Direction

Vice chancellor sir, as I conclude my research on Agricultural production economics, food security and health. I am excited to expand my focus. Over the past two decades, the field of agricultural economics has played a pivotal role in advancing food security, improving farm productivity, and enhancing livelihoods across rural communities. Yet, as global challenges become more interconnected and complex, there is a pressing need to move beyond siloed approaches and toward more integrated, inclusive, and context-specific solutions. My research journey and the future I envision sit at this intersection.

At the heart of my agenda is a deep commitment to climate-smart agricultural systems, especially for smallholder farmers who remain most vulnerable to

climate variability. As shifting weather patterns increasingly disrupt yields and food availability, my work will focus on adaptive technologies, cost-benefit analyses of drought-resilient inputs, and practical risk mitigation strategies that are economically sustainable for rural populations.

Another key dimension of my work is the agriculture**,** nutrition and health nexus. Too often, discussions of productivity overlook the crucial link between what we grow and how it nourishes our communities. My future research will examine how interventions like crop diversification, home gardening, and biofortified foods can improve nutrition, particularly for women and children, and how these strategies can be economically justified and scaled.

But agriculture's future also depends on who is at the table. We must do more to empower youth and women not only as beneficiaries, but as innovators and leaders. My research will explore the economic and social impacts of youth-led agribusinesses and investigate how targeted skills-building and inclusive models can reshape the agricultural landscape.

In this era of digital transformation, technology offers powerful tools to reimagine farming. From mobile advisory services to precision agriculture, my work will delve into how digital innovations can close information gaps, improve input efficiency, and reduce costs, especially for small-scale producers navigating limited resources.

To tackle these challenges meaningfully, I strongly believe in interdisciplinary collaboration. No single discipline holds all the answers. Working alongside agronomists, nutritionists, health professionals, and ICT experts, I aim to produce research that is both analytically sound and practically relevant.

Ultimately, my role as a scholar, collaborator, and advocate is to lead research that is grounded in economic theory, but firmly rooted in real-world impact. Through empirical evidence, policy engagement, and actionable insights, I hope to contribute to a future where agricultural systems are not only productive, but equitable, resilient, and nourishing.

Thank you and God bless

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