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Drivers and Constraints to the Adoption of Organic Leafy Vegetable Production in Nigeria: A Livelihood Approach

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Abstract: Nigeria, the seventh most populous country in the world, is plagued by livelihood challenges such as poverty and food insecurity, which are more pervasive among farming households and rural communities. Organic farming is being promoted by some domestic non-governmental organizations as a means of addressing the problem of poverty and food insecurity among farming households and rural communities in the country. Promoters consider organic farming to be well-suited to smallholder farmers' socio-economic conditions in Nigeria, and that it can help improve their livelihood conditions through increased agricultural productivity and farm income. However, the adoption of the technology by smallholder farmers has been underwhelming, for reasons yet to be studied. Using a livelihood framework and through a case study of farmers in Ibadan, Oyo State, this study qualitatively explores and provides insights into the factors that influence, constrain, and gender the adoption of organic farming in Nigeria. Overall, it was found that a mix of factors, which include institutional considerations, farmers' livelihood assets and vulnerability contexts, their livelihood activities, and gender-related variables shaped adoption decision-making. The policy implications of the findings were outlined.

Keywords: organic farming; adoption; non-adoption; livelihood framework; Africa; Nigeria; qualitative

1. Introduction

In sub-Saharan African (SSA), smallholder-based agriculture is the main source of livelihood, especially in the rural areas, where most of the population live. Livelihood challenges such as poverty and hunger are prevalent among farming and rural households in the region, and they are largely attributed to low agricultural productivity [1]. Some local non-governmental organizations (NGOs) and international development agencies are promoting organic farming as a pro-poor strategy for improving agricultural productivity and the livelihood conditions of rural and farming households on the sub-continent [2,3]. They argue that organic farming management practices can help address poor soil fertility and severely degraded soils, two major underlying factors for low agricultural productivity in SSA [2]. They also contend that organic farming can open financially rewarding differentiated domestic and international markets, with livelihood enhancing opportunities for African smallholder farmers [2,4,5]. For excluding the use of synthetic inputs, advocates characterize organic

farming as a labor-intensive, low-cost, and low-input technology, and claim that it is well-suited to the socio-economic conditions of smallholder farmers in SSA [2,4,6]. As a result, they expect a widespread adoption of the technology by smallholder farmers in SSA [6].

However, apart from Uganda, Tanzania, and Tunisia, the adoption of organic farming in Africa has been generally low, for reasons yet to be well-investigated [4,6]. While Tunisia's organic farming success story is state-driven [4], Uganda's and Tanzania's are driven by strong local organic farming non-governmental organizations (NGOs) and support from international development agencies such as the Export Promotion of Organic Products from Africa (EPOPA) [2,4,5]. Other factors that explain the status of organic farming in the three countries include the creation of domestic organic farming certification bodies, as well as locally adapted and internationally oriented organic farming regulatory frameworks/standards, organic farming export market linkage, and growing domestic markets for organic farming [2,4]. The generally low adoption of organic farming in SSA may be connected to the shortage and nutrient limitations of the soil organic materials on smallholder farms in SSA [7,8]; the difficulty of keeping weeds under control in organic production; the competing uses of organic matter materials as fodders for animals, as materials for building construction, and as fuel for cooking [8,9]; a poor awareness of the technology; and a lack of supportive institutional environments [6]. Through a Nigerian case study, we attempt to bridge the existing gaps in the understanding of the factors affecting the adoption of organic farming by smallholder farmers in SSA.

Over a decade ago, participatory guaranteed systems (PGS)-certified organic agriculture was introduced to farmers in southwestern Nigeria by some local non-government organizations, which include the National Organic Association of Nigeria (NOAN), the coordinating body for all organic farming stakeholders in the country. The PGS is a locally focused, group-based, and smallholder farmer-oriented quality assurance first-party certification system [10]. It guarantees and certifies a farm to be organic through a participatory and peer-review process involving a range of stakeholders, which include NOAN, agronomists, and farmers. In January 2014, NOAN worked with stakeholders in the Nigerian organic farming sector to develop the PGS for certifying a farm and its products as organic in Nigeria [11]. NOAN believes that the inability of most of the farmers in Nigeria to afford synthetic herbicides, pesticides, and fertilizer [12], and the growing domestic urban market and demand for organic products, especially leafy vegetables, in Ibadan and some parts of southwestern Nigeria, will stimulate adoption [13–15].

However, the adoption of organic farming by smallholder farmers in Nigeria has been limited and low [11]. Except for a newsletter article [16] and a "research report" [17], the reasons for the low adoption status of an OA in Nigeria have not been studied. Existing studies mostly explored the market for organic farm produce [15,18,19] and of farmers' perceptions of practices, which are related but not unique to OAs [20,21]. Thus, using a livelihood framework and a mix of qualitative data collection techniques, we studied the factors driving and constraining the adoption of an OA in Nigeria. By adoption, we mean farmers who have adopted and are still practicing PGS-certified OAs. We delimited our study to southwestern Nigeria and organic leafy vegetable production (OLVP) for the following reasons: Southwestern Nigeria is the part of the country where an OA was first introduced, and it is widely promoted and the most established, yet has low adoption rates [11]; a high market potential exists for organic leafy vegetables in southwestern Nigeria [14,15,18,19,21,22]; and OLVP is the major organic cropping system in southwestern Nigeria [23]. We also explored the role of gender and gender-related constraints, such as control over household resources, on the adoption of OLVP.

2. Delineating and Characterizing Adoption Decision-Making

Adoption decision-making is characterized by non-linearity and complexity [24,25]. According to Meijer et al. [24], this is due to the non-linear interactions of extrinsic (e.g., innovation attributes) and intrinsic variables (e.g., knowledge of the innovation), which inform adoption decisions, and the difficulty in teasing out the interdependencies of the mediating variables. To disentangle the complexity, their study proposed a comprehensive framework that captured the interactions between

the extrinsic and intrinsic variables and the adoption decisions [24]. Nazziwa-Nviiri and colleagues attributed the complexity to the interactions of several push and pull factors associated with adoption decision-making [26]. These include institutional and access-related variables, agroecological factors, and farm household characteristics. To Fisher et al. [27] and Dinh et al. [28], the complexity exists partly because the livelihood impacts of a technology cannot be determined a priori, and sometimes not even after its adoption. Framing adoption from a behavioral change viewpoint, Straub argued that it is a complex decision-making process, because it is mediated by cognitive, affective (emotional), and contextual factors, which no one theory can account for [29]. Others ascribed the complexity to the embedding and intersection of an adoption decision environment with gendered norms and culture, differentiated access to and control over resources, and heterogeneous intrahousehold decision-making dynamics [30–32]. Adding new insight, Olabisi et al. [25] contended that adoption decision contexts are not only complex, but are also inherently dynamic, as farmers' choices and the decisional criteria informing their choices are not static; they may change from year to year. Unlike Olabisi et al. [25], van den Broeck et al. [33] and Pedzisa et al. [34] used adoption intensity to operationalize their construction of the dynamic nature of the adoption decision context. Agent-based modeling (ABM) was used to explore the dynamic complexity associated with adoption decision-making [25]. To deal with the complexity, some studies have proposed livelihood-based multidimensional frameworks, which integrated technology attributes, the various facets of rural livelihood systems, and their institutional embedding [28,30,35].

The above discussion suggests that the adoption decision-making context is inherently dynamic and complex, as it is influenced by multiple factors, which are characterized by interdependencies and non-linear behavior [24,29]. This implies a need for tools that can help capture and disentangle the dynamic complexity. From the review, this could be done by using systems modelling tools such as ABM [25], or multidimensional comprehensive analytical frameworks that account for different factors that intersect with decision-making to inform adoption studies [24,28]. Appropriating insights from the foregoing, we construed technology adoption as a dynamic livelihood strategy choice made by farmers within a complex and multi-factorial decision environment, by drawing on their livelihood assets, mediated by their institutional and vulnerability contexts. We also recognized that gender per se [36], the gendered nature of farmers' livelihood, and intrahousehold decision-making contexts and technology-specific attributes can mediate an adoption decision [30,31,37]. Therefore, to be able to capture and disentangle the complexity of the decisional phenomenon, akin to Meijer et al. [24] and Dinh et al. [28], we developed a multi-dimensionally linked gender-aware framework to inform this study, data collection, and analysis. We also draw on the literature that used adoption intensity to embody the dynamic characterization of the technology adoption process as a non-static discrete choice made by farmers [33,34]. So, we defined adoption intensity as the proportion of a farmer's cultivated land allocated to PGS-certified OLVP.

3. Conceptual Framework

This study was informed by a gender-aware livelihood framework, which is named the Technology Adoption Livelihood Assets Framework (TALAF), and was developed by drawing on existing modifications to the sustainable livelihood framework (SLF) [28,38]. The TALAF retains the following constitutive elements of SLF: livelihood assets, vulnerability context, institutional and policy context, livelihood activities, and livelihood outcomes. The TALAF accounts for the intersectionality of the multidimensional the factors that are associated with adoption decision-making [38,39]. Akin to the SLF, at the core of the TALAF (Figure 1) is a pentagon of five capital assets (human, natural, financial, social, and physical capital assets), considered to be imperative to the livelihood pursuits of farming households [38]. To develop the TALAF, we integrated factors beyond livelihood assets into the original SLF, which can affect and gender technology adoption decision-making. These include factors such as intrahousehold decision-making dynamics, culture, gendered division of labor, access to and control over resources, and technology attributes [31,37,38]. By explicitly including components such

as intrahousehold decision-making dynamics, access to and control over resources, and household head gender in TALAF, our goal was to capture gender and the power relation factors that can affect adoption decision, but that were left out of SLF [38].

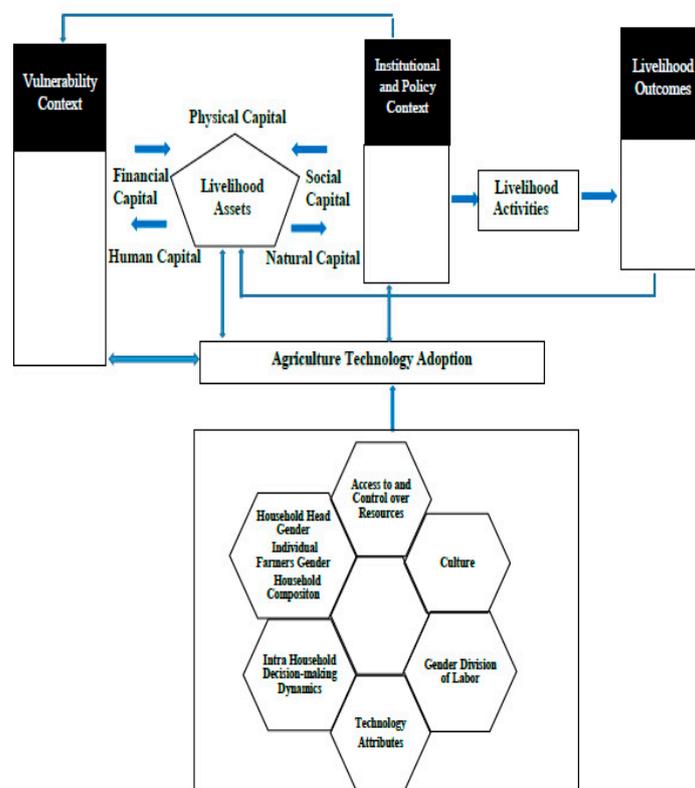


Figure 1. Technology adoption livelihood assets framework (TALAF).

In developing TALAF, it was assumed that farmers' decisions about whether to adopt a technology as a livelihood strategy choice, or not, will be made by drawing on their livelihood assets base, in anticipation of certain livelihood outcomes [30,35]. The livelihood outcomes comprises a complex mix of economic and non-economic outcomes, such as improved soil fertility status, improved household food and nutritional security, expanded marketing opportunities, increased farm income, and enhanced health conditions [3,35,40]. It was also supposed that farmers' adoption decision-making will be mediated by their vulnerability contexts (e.g., fluctuation in prices and market opportunities and a farm's declining profitability), the institutional factors of their embedding, and their livelihood activities (farm/off-farm) [35,38].

It was further assumed that factors such as household composition, technology attributes, access to and control over resources, and gendered division of labor and culture will intersect with farmers' adoption decision-making. Here, insights were appropriated from the claim that the adoption of a technology can be affected by its attributes [41], and from the literature on the factors that gender the adoption of a technology by men and women [31,42]. Following studies such as Adato and Meinzen-Dick [38], we chose not to frame and integrate culture as a form of livelihood capital in TALAF. This is because, as aptly argued by some studies, the term cultural capital or asset is problematic, given that capital assets are economic-oriented [35,38]. Consistent with our definitional delineation of adoption decision-making as a dynamic phenomenon, it was further assumed that the decision to continue using a technology, and to intensify or scale down the extent of use of the technology (adoption intensity), will be affected by the technology livelihood outcomes, including on a farmer's livelihood assets and vulnerability contexts. This was captured in the TALAF by the double-headed arrows, connecting one component of the framework to the other. The double-headed arrows foreground the

role of feedbacks and learning in this study's conception of technology adoption decision-making. Here, the conception of feedbacks builds on the authors' of [43] definition, as including "the information that is obtained about the outcomes, characteristics, and/or consequences of" adopting a technology (p. 109).

4. Methods

4.1. Study Sites

This study was conducted at Ajibode, Akinyele, and Elekuru (Figure 2), the three areas where PGS-certified OLVP takes place in Ibadan, Oyo State, Nigeria. They experience between 1200 to 1600 mm mean annual rainfall [44], and a bimodal rainfall pattern (March/early April, and October/mid-November) [45,46], with a brief dry spell in August [47]. At Ajibode, an urban area, PGS-certified OLVP takes place along the bank of River-Ona (henceforth referred to as Ona), on a stretch of land behind the University of Ibadan Botanical Garden. At Akinyele, PGS-certified OLVP occurs in a peri-urban. At Elekuru, a rural setting and the remotest of our study sites, PGS-certified OLVP takes place across different swampy areas.



Figure 2. Map of the study sites (Ajibode, Akinyele, and Elekuru).

4.2. Respondent Selection

We collected data from (1) adopters, (2) non-adopters, and (3) NOAN officers and government organic desk officers in our study areas. Adopters are farmers that have adopted and are still practicing PGS-certified OLVP. Non-adopters are farmers who grow their leafy vegetables using synthetic inputs and have never adopted certified OLVP. Familiarization visits were undertaken to our study sites and to NOAN's office at the University of Ibadan, during which the lists of adopters were collected and later merged. Some adopters were purposefully selected from the merged list for semi-structured interviewing, based on criteria such as gender, age, their year of adoption of organic farming, marital status, and the positions held in their organic farmer groups. The gender criterion was to help understand how the adoption of OLVP may be gendered. The year of adoption was to help ensure that respondents have a rich information on the issues to be discussed. The age consideration was to reflect

the heterogeneity of the age group of the adopters' population, especially in Ajibode, and the possible differences in the value-orientation, which may have informed adoption decisions. The inclusion of the leaders and ordinary members of the organic farmers group in Akinyele and Ajibode was to help capture disconfirming opinions on issues such as the challenges associated with the adoption of OLVP in our study areas. All of the four adopters in Akinyele were interviewed. The non-adopter's selection was based on snowball sampling. Adopters in Ajibode and Elekuru helped to identify non-adopters, who, in turn, introduced us to other conventional leafy vegetable farmers in their areas. In Akinyele, we were unable to interview any non-adopters, including females, because of time and logistic constraints, as well as the unavailability of respondents. However, from the individual interviews and focus group with adopters in Akinyele, we gathered some information on why some farmers in the area did not, or were yet to adopt organic farming.

4.3. In-Depth Semi-Structured Interviews and Focus Groups

As shown in Table 1, we conducted a total of 15 in-depth, semi-structured interviews with adopters ($n = 10$ males; $n = 5$ females) and 9 with non-adopters ($n = 8$ male; $n = 1$ female). Where possible, the female spouses of the male respondents were interviewed. The interviews were structured to reveal the motivations, household-decision making dynamics, institutional and vulnerability factors, and other underlying considerations that shaped respondents' adoption decisions. The interviews also probed the barriers and gendered issues affecting the adoption of OLVP, with non-adopters asked under what conditions they would re-consider their decisions about OLVP. Care was taken to ensure that adopters spoke to the factors that influenced their decision at the time they adopted OLVP. Five gender-differentiated and two mixed-sex focus groups were also conducted with adopters ($n = 38$) and non-adopters ($n = 11$). Of the 49 farmers who participated in the seven focus groups, 22 were males and 27 were females (Table 2). The focus groups explored how reproduction, production, the sexual division of labor, and the labor-intensive nature of organic farming affected its adoption. The constraints limiting the adoption of OLVP and the interplay of vulnerability and institutional issues with adoption decisions were also discussed.

Table 1. Number of adopters, non-adopters, and experts interviewed. NOAN—National Organic Association of Nigeria.

Location	Total	Adopters		Non-Adopters			Experts	
		Male	Female	Total	Male	Female	NOAN	Gov.
Ajibode	6	3	3	3	2	1	3	2
Akinyele	4	4	0	0	0	0	0	0
Elekuru	5	3	2	6	6	0	0	0
Total	15	10	5	9	8	1	3	2

Table 2. Participants by gender in focus group discussions (FGDs).

Group	Location	Participants in FGDs	Total	Female	Male
Adopters	Ajibode	Male only	5	0	5
Adopters	Ajibode	Female only	15	15	0
Non-Adopters	Ajibode	Mixed	5	3	2
Adopters	Akinyele	Male only	4	0	4
Adopters	Elekuru	Male only	7	0	7
Adopters	Elekuru	Female only	7	7	0
Non-Adopters	Elekuru	Mixed	6	2	4
Total			49	27	22

4.4. Participant Observations, Field Visits, and Group Discussions

To obtain on-farm dynamics information, participant observation visits to adopters and non-adopters' farms in Ajibode were undertaken. During the visits, farmers' on-farm challenges were discussed, with attention paid to their on-farm social-capital bonding relational dynamics, and who was doing what farm operations. Detailed notes were taken. Two of the participant observant field visits to the organic farmers morphed into group discussions, enabling us to gather multiple views on pest and weed infestation, and on other difficult issues in OLVP. Thrice, observational visits were undertaken to Elekuru market, during which the marketing aspects of organic and conventional farming were explored. The issues discussed were used to inform the focus groups in Elekuru.

4.5. Expert Interviews and Data Analysis

Five expert interviews were conducted to gain deeper insights into the institutional factors affecting the adoption of organic farming in our study areas, and to explore some of these issues raised by farmers. These included three officers of NOAN, the organic desk officers at the Oyo State Agricultural Development Program, and the Federal Ministry of Agriculture, Oyo State Directorate. The expert interviews and two individual interviews were conducted in English. All of the other interviews and focus groups were conducted in Yoruba, the native language in the study areas. The interviews conducted in Yoruba were translated verbatim to English. All of the interviews and focus groups were recorded, transcribed verbatim, and coded manually and electronically using NVivo (QSR International (Americas) Inc., Burlington Massachusetts, United States), together with the field notes. We drew on thematic analyses and our study's conceptual framework for our coding and data analysis.

5. Results

We organized our findings around the components of TALAF, based on the themes that emerged from the coding of our data.

5.1. Drivers of Adoption Decision

5.1.1. Livelihood Assets

Here, we only explain the specific livelihood capital assets, which, based on our data analysis, mediated adoption in our study areas. The knowledge of organic farming and the potential concerns with farm chemicals are the specific human capital asset that influenced the adoption of OLVP. When organic farming was introduced to adopters by NOAN and other promoters of the technology, they became aware and acquired knowledge of the probable human health adverse effects of weed killers and pesticides (human capital), with that influencing their adoption decision. Twelve out of the fifteen interviewed adopters (80%) also indicated that the knowledge of their forefathers' agriculture (human capital) profoundly enthused their adoption decision. They recalled that their forefathers lived a healthy and long life, linking that to how they grew their foods without using any synthetic inputs. They drew on that to make sense of why organic farming may be healthy and contribute to the longevity of life, as claimed by its promoters, with that feeding into their adoption decision. Three respondents also stated that their adoption decision was shaped by their personal experiences (human capital) growing cassava and yam, with and without applying farm chemicals. Prior to their awareness of organic farming, they observed that their yams grown without chemicals tasted better and had a longer shelf life, ascribing the perceived differences to the effects of farm chemical residues on their yams as follows: "We already had two farms. I have two farms, one where I apply chemicals and a yam farm where I do not apply chemical. The yams that I grow without chemicals were always sweeter. We that had tasted the products grown with and without chemicals knew that both were different. That informed my adoption decision" (EL1, male, Elekuru). All of the interviewed adopters also stated that access to information and knowledge of organic farming (human capital) emboldened them to adopt the technology, with only one respondent citing personal ill-health issues (EL4, female, Elekuru).

Social capital was pivotal in facilitating adoption. An existing reciprocal relationship of trust, social bonding, and religious social capital all combined to make the respondents in Elekuru become aware of organic farming and acquire the information that influenced their adoption decision. This is because the NOAN officer who introduced organic to Elekuru and helped respondents to acquire some knowledge about the technology was motivated by his ties to the place. He shared a religious identity and place of worship with the adopters in Elekuru, and also once lived with them in the same village for some years as a trusted acquaintance. All of this enthused the atmosphere of reception and trust that strongly influenced the decision of some respondents in Elekuru to adopt organic farming, as follows: “Many factors influenced our decision. The person who introduced organic to us was at a time living in this village. He was staying with one of us when he was at the university as a student. So, we have an existing relationship with him. That was why he introduced organic farming to us. He also educated us about organic farming, following which we started it little by little. More, importantly, we were attending the same church” (EL3, Elekuru). A female respondent in Elekuru also alluded to the interpersonal relationship of trust and respect (social capital) with a religious leader in her adoption decision. Two male respondents also stated that their social status and not wanting to be left out of the population of adopters in Elekuru in their adoption decision. Family ties (one respondent) and the relation of trust between fellow farmers who were promoting organic farming (six respondents) influenced adoption in Akinyele and Ajibode. Equally, but with a slight contrast, three male respondents in Ajibode alluded to a tie with some affiliates of NOAN, including a Professor of Agronomy, as a means through which they became aware of, were trained, and were motivated to adopt organic farming.

Financial capital constraints regarding difficulty finding money to buy chemical fertilizer, herbicides, and pesticides at the start of the growing season influenced the decision of four female farmers to adopt OLVP. Finally, adoption intensity was linked to the lack of money to hire labor (all of the five interviewed female respondents), available household labor (six respondents), personal physical capacity (three female respondents), limited knowledge of organic farming (one respondent), and land availability (five respondents, in Ajibode).

5.1.2. Vulnerability Context

Three male respondents from Akinyele and one from Ajibode averred that their adoption decision was shaped by livelihood activity-induced vulnerabilities (schematically captured in Figure 3). They were not making a good and stable income from their primary livelihood activities. So, they became indebted and financially constrained (livelihood outcomes). This negatively affected their household financial condition (financial capital), such that they could not cater to their personal, household, and children schooling needs. They adopted OLVP so as to salvage their households from being vulnerable to financial, food, and social insecurity. In Ajibode, a married female adopter also cited personal financial insecurity, ascribed to her tailoring work as a decisive factor in her adoption decision.

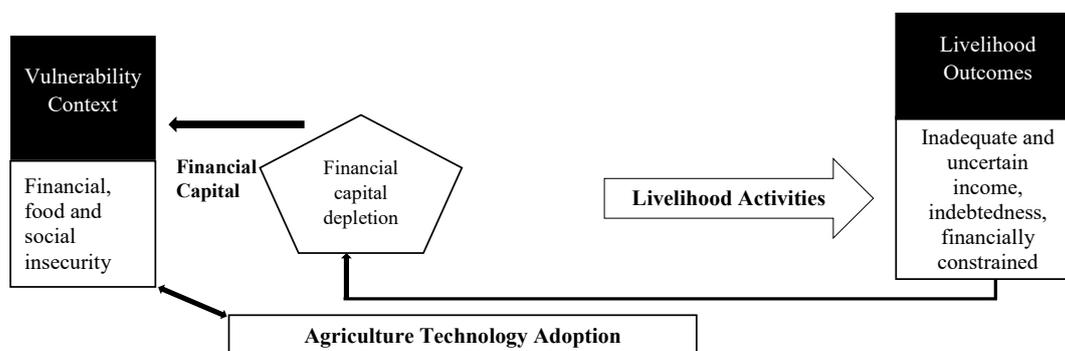


Figure 3. Schematic representation of the overlap between livelihood activity, vulnerability, and adoption.

Market-induced vulnerabilities shaped the adoption decision in Elekuru, and of one respondent apiece in Ajibode and Akinyele. Participants in the female-only FGD in Elekuru unanimously indicated that incidents of income loss, which they were experiencing because of adverse prices and market insecurity for their conventional leafy vegetables, were vulnerability issues they sought to overcome by adopting or advising their husbands to adopt OLVP, as follows: “There were occasions that our farm produce was not selling well in Elekuru market. We were losing money. We were told that organic produce will sell at higher prices than the produce grown with chemicals. That was the reason I became an organic farmer and why others advised their husbands to do organic farming” (EL12, female farmer).

Furthermore, during Ajibode female-only FGD, social and financial vulnerability was identified as pivotal to why they adopted OLVP. Majority of the female adopters in Ajibode were concerned about being looked down upon by their husbands as contributing nothing to their households. “We didn’t want to be looked down upon by our husbands. Adopting organic agriculture was to enable us to help ourselves, to save us from being belittled and financially vulnerable” (AJ11, female farmer). Finally, most adopters indicated that perceived vulnerability to ill-health issues, which may arise from using chemicals to grow their foods contributed to why they adopted OLVP.

5.1.3. Institutional and Policy Context

Support for extension and training, and markets for organic products are the institutional and policy context factors that influenced adoption in this study. All of the interviewed adopters participated in at least a training that was organized by NOAN before and after they adopted organic farming. However, only five respondents explicitly stated that the training and extension technical support influenced their adoption decision. Through the training and extension support, respondents acquired some technical knowledge on organic production techniques (human capital), and developed the conviction that emboldened them to start and continue using the technology, namely: “Access to extension support was one of the reasons I started organic farming. The training they did for us made me confident and become more dedicated to adopting organic farming” (AJ4, female). Also, all of the respondents pointed to the prospect of organic “premium” market access as a key factor in their adoption decision. Finally, at different times, four respondents in Elekuru increased and reduced their cultivated land in OLVP as a result of market availability.

5.1.4. Livelihood Activities

Eleven (73%) of the fifteen interviewed adopters were combining farming with at least one off-farm livelihood activity (Table 3). Of those, four male respondents (three from Akinyele and one from Ajibode) stated that issues related to their primary livelihood activity (automobile repair/carpentry/livestock trading) were a major reason they adopted OLVP. They were struggling with irregular and low consumer patronage. This made them penurious for the most time, a problem they sought to overcome by adopting organic farming. Two married female farmers from male-headed households in Ajibode also expressed a link between their adoption decision and livelihood activities. Of the duo, one was combining tailoring with conventional vegetable farming (AJ3), while the other, a 35-year mother of four was trading in petty grocer and provision items as her other livelihood activity (AJ4). The income from their farm and off-farm livelihood activity were not good enough for them. They adopted organic farming, believing that it availed them the prospect of making sufficient income to help meet their personal needs and support their households: “The money I was making from my provision business and especially vegetable farm and was not always sufficient for me. That was a major reason I started organic farming. I thought that there was no way that I will not make a good money from my harvested organic vegetables” (AJ4, female). Two respondents, which included a married male (AJ6) and a female adopter in Ajibode (AJ4), adopted organic farming in order to make money to strengthen an existing livelihood activity/start a new one, respectively.

Table 3. Livelihood activities of the interviewed adopters.

Livelihood Activities	% of Total Respondent	Number of Respondents	Distribution Across Study Areas		
			Ajibode	Akinyele	Elekuru
Farming only	27	4	Nil	Nil	4
Male		2	Nil	Nil	2
Female		2	Nil	Nil	2
Farming and off-farm	73	11	6	4	1
Male		8	3	4	1
Female		3	3	Nil	Nil

5.1.5. Livelihood Outcomes

Livelihood outcomes refer to the motives and goals underlying the decision to undertake a livelihood activity [30,48]. They also include the tangible and intangible outcomes and benefits anticipated to be achieved through a livelihood activity [49,50].

All of the interviewed adopters (15) identified economic and health-related motivations as being decisive in their adoption decision, with only three respondents mentioning soil–environmental health benefits: “I adopted organic agriculture to improve my soil health and make our environment healthy, as poisonous ingredients will not be transported to the environment, nor pollute our water” (AK1, male, Akinyele). All but two adopters explicitly expressed a desire for living a long life as being integral to their underlying adoption motivations: “The main reason I adopted organic is that eating healthy food will make someone to stay healthy and live long” (EL2, male, Elekuru). Ten (67%) out of the fifteen interviewed adopters cited economic motivations as their main goal for adopting OLVP. The remaining five adopters (33%, all males) highlighted health–food safety motivations as their main underlying goal.

The economic/financial motivations that undergird adopters’ decision mainly revolve around earning a high and profitable farm income through access to high price paying markets for organic produce. This expectation was influenced by how organic farming was pitched to adopters by NOAN. It was said that the food choices of urban elites were shifting from conventional to organic produce, and that they were willing to pay more for organic farming for its perceived quality and health attributes. By gaining access to the emerging markets, adopters expected to earn a profitable farm income that would enhance their financial capability to cater to their personal and household livelihood needs.

Health-wise, the goal of all of the adopters was a desire for a long life and improved personal and household health status by growing and consuming healthy foods and protecting themselves from health problems that may arise from food safety concerns. Underpinning this desire was the perception that synthetic farm inputs, especially, inorganic pesticides and herbicides, are poisons, with harmful effects to human health and food safety risks. On this basis, adopters ascribed the rise of many diseases and a lower life expectancy in the country to the chemicals used in growing foods. So, they resolved to keep themselves and their households safe from agrochemical induced ill-health issues from food production and consumption that could shorten their lifespan, for example: “There are many reasons that made me adopt organic farming. It gives us the opportunity to ensure that we will grow and harvest what will contribute to my household well-being and keep us healthy. There won’t be poison in what we produce” (AJ1, male, Elekuru). In addition, all but two adopters explicitly specified that the desire to help cultivate a healthy society by growing and making safe and healthy foods available to consumers was intrinsic to their adoption decision. The opinions from the FGDs with adopters was not any different: “I became more interested in organic farming because of people so that I can assist them to be living fine” (AJ2, male, Ajibode). This motive was shaped by the notion that the benefits of growing foods that will make people live longer and stay healthy are a morally and socially sacrosanct responsibility that trumps profit-making. To some adopters, growing safe foods for public consumption was indicative of their faithfulness to God. They equated growing foods organically as farming in God’s way, because it excludes the use of chemicals that cause harm, for example: “Organic foods are natural foods grown the way God created what we eat. But in modern

time, we no longer follow the directives of God. We are always in a hurry for quick results. Organic farming is safer and healthier, [...] adopting organic gives me the assurance that one is growing healthy foods for the society and ... doing agriculture as God desires" (EL5, female, Elekuru).

Regarding adoption intensity, three respondents (two males and one female) from Ajibode expanded their land under OLVP, because they were making a profitable and increased income.

5.1.6. Technology Attributes

Generally, adopters viewed organic farming as a low-cost technology, because of excluding the use of synthetic inputs. This perceived attribute influenced four female farmers to adopt organic farming, as they considered it well-suited to their financial situation: "I was so happy when he told us about organic farming because as a person it was a little difficult for me to get money to buy fertilizer. I was happy that I didn't not have to worry about buying fertilizer anymore. I thought to myself that the money to be spent on fertilizer will be used in buying seeds" (AJ3, female, Ajibode). For reasons hitherto elucidated, the perceived health attributes of organic farming were cited by all of the interviewed adopters as a contributory factor to their adoption, with 87% (13 out of 15) mentioning its compatibility with their forefathers' agricultural tradition: "I adopted organic farming because I considered it is good and similar to what our forefathers did" (AK2, male Akinyele). Adoption was also because of the perceived relative economic advantage of OLVP, vis-à-vis the prospects of attracting higher prices compared with conventionally grown vegetables.

5.1.7. Culture

Almost all of the adopters considered organic farming as the agricultural heritage that their forefathers passed down to them. That made organic farming attractive to them for adoption. They valued and ascribed a culture of good food and healthy eating with their forefathers' farming heritage. In their view, this is also inherent in organic farming because of its exclusion of synthetic inputs and its emphasis on healthy living. By adopting organic farming, four adopters sought not to only to revive the farming heritage of their forefathers, but also to promote the culture of healthy food, which, according to them, people should strive for: "We also thought that organic agriculture is the heritage that our forefathers, which our fathers bequeathed to us; but we have neglected and almost forgot it. We resolved that it was better that we go back to organic to reclaim what our forefathers taught us, which we have been forgetting. That is one of my reasons for doing organic farming" (EL1, male Elekuru). Table 4 summarizes the various factors that interacted to influence respondents' decision to adopt OLVP in this study.

Table 4. Summary of the factors that facilitated adoption of organic farming in this study.

TALAF Component	Caused/Facilitated by	Related to	
<i>Livelihood Assets-Human Financial, And Social Capital</i>	Awareness/knowledge of organic farming and of ill-health with farm chemicals (human capital)	Contact with the promoters of organic and extension access/technical support (institutional)	Social capital, e.g., family ties, church membership, and relationship of trust with fellow farmers and the promoters of organic farming
	Experiential knowledge (human capital)	Awareness of the ill-health issues with farm chemicals	Knowledge of forefather's agriculture and experience growing some crops with(out) chemicals
	Difficulty getting money to buy chemicals (women; financial capital)	Financial situation	Cost of chemical inputs
	Social status in the community (social capital)		Religious/community leadership
<i>Vulnerability Context</i>	Indebtedness, financial problems, and food insecurity	Off-farm livelihood activities not generating a stable and good income	
	Farm income losses	Market insecurity/adverse prices for conventional produce (institutional)	
	Social insecurity (women)		Financial situation and spousal household relations
	Susceptibility to sickness		Ill-health with farm chemicals
<i>Institutional and Policy Context</i>	Training/extension technical support on organic farming	NOAN; social capital ties	
	Organic "premium" market opportunity		
<i>Livelihood Activities</i>	Farm and off-farm livelihood activities		Insufficient income from livelihood activities
<i>Livelihood Outcomes (Expected)</i>	Economic motivations, e.g., raise money, obtain profitable income, and gain access to "premium" markets		Access to high price-paying markets for organic farming (institutional)
	Health–food safety motivations-improved personal, family, and societal health condition; food-safety concerns; and longevity of life		Awareness of perceived health benefits of organic/ill-health issues with farm chemicals (human capital)
	Improved soil health and preventing environmental pollution		Exclusion of synthetic inputs
<i>Technology Attributes</i>	Low-cost	Exclusion of synthetic inputs (institutional)	Women financial situation
	Compatibility with forefathers' agriculture and perceived health benefits		
	Relative profitability		Access to high price-paying markets for organic farming (institutional); exclusion of synthetic inputs
<i>Culture</i>	Forefather agricultural heritage		Notion of ideal agriculture, good and healthy food, and organic farming attributes/perceived health benefits

5.2. Factors in Non-Adopters' Decision-Making

5.2.1. Livelihood Assets

Human and social capital were obstacles to adoption. Four respondents cited limited awareness and lack of knowledge about organic farming (human capital) as a barrier to adoption. A similar opinion was expressed by some discussants during Ajibode and Elekuru FGDs with non-adopters. This constraint was linked to a lack of access to extension officers, who could have educated them about how organic farming can be economically viable. Among the four respondents, two further

alluded to household labor limitation (human capital) as a major factor that deterred them from going organic. Of the duo, one had a household size of nine and the other, of seven. They ascribed the household labor constraint to their household size and the fact that their children were not always available to support their farm work as a result of their educational commitments. From the FGDs in Ajibode and Elekuru, five female farmers from male-headed households stated that they did not adopt organic because they lacked the physical capacity (human capital) for the work in organic farming, for example: “When I heard about organic farming, that people are not allowed to use chemicals on organic farms, I said it will be a difficult and physically challenging work. I said I cannot do it . . . because as a woman I do have the power to manage an organic farm” (EC11, Elekuru FGD). In addition, social capital constraint vis-à-vis the membership of different church groups dissuaded a male respondent in Elekuru from going organic: “I did not care or commit to adopting organic farming at all when I first heard about it because, first of all, I was not attending the same church as those who introduced it to me” (EC3, Elekuru).

5.2.2. Vulnerability Context

Most of the interviewed farmers (67%, six out of nine) cited perceived vulnerability to poor yield and financial loss as their primary reason for not adopting organic farming. For disallowing chemical pesticides, respondents opined that organic farming will amplify their vulnerability to insect pest problems. This was also because they did not believe that organic pest control measures could address their insect pest problems: “A major challenge we are facing is insects. We have to use chemicals over and over again to get rid of the insects. You have toured our farms and have seen that insects have eaten a lot of our leafy vegetables, despite using chemicals. If we do not apply chemicals to deal with the insects, instead, using neem, how do we survive without losing all the crops and becoming indebted. That is why we are not doing organic farming” (AJC2, 45-year old, Ajibode). This perceived vulnerability is also related to the barring of synthetic fertilizers and herbicides in organic farming. About this, five respondents (three from Ajibode and two from Elekuru) held that their leafy vegetables would neither establish nor grow well without using chemical fertilizer because their farms were in waterlogged areas: “Because we are growing our Corchorus on the bank of a stream, the water that is logged in our soil does not allow our crops to grow fast and develop on time. So, we need to apply fertilizer. That constrained us from doing organic” (EC4, Elekuru). In Ajibode, two respondents also felt that adopting organic farming would expose them to avertible losses from harmattan and occasional heavy downpour during the dry season, which causes their soils to be waterlogged: “When harmattan starts, the vegetable seeds that we sow may not grow. . . . That is a debt. After sowing our seeds, it may start raining. . . . The water may stay afloat on our soil . . . making our soil to be waterlogged. . . . Those are part of the reasons I did not do organic farming, for if I am not allowed to apply fertilizer my crops will not establish on time. But if I apply herbicide and fertilizer, and if it rains, even if there would be harmattan, the chemicals would have helped my crops to establish and grow faster. So, I won’t have to suffer big losses” (AJC2, Ajibode).

Perceived vulnerability to hunger and marketing problems also inhibited adoption. Specifically, two non-adopters from Ajibode linked their decision to perceived susceptibility to hunger, which may arise from the days to maturity for the harvest of organic leafy vegetables: “The fear of hunger is linked to why I did not do organic farming because I was like it takes time to prepare land and harvest for sales in organic. And if one’s leafy vegetables are not ready for harvest by the time they will be profitable, one can be in debt and hunger” (AJC1, Ajibode). Three respondents from Elekuru were concerned that adopting organic farming would worsen their existing marketing problems: “One of our worries is that we may not get market for our organic produce. We do not always get buyers and good prices for our vegetables grown with chemicals. I was afraid that the problem will worsen if I do organic farming” (EC3, male, 40 years old). In Ajibode, vulnerability to market losses that may arise from the quality of the leaves of vegetables being undermined by the insect pest problems in organic farming constrained two respondents from going organic.

5.2.3. Institutional and Policy Context

Non-adopters unanimously identified the dearth of specialized/high price paying markets for organic produce as the foremost obstacle to adoption. In Ajibode, non-adopters sold on the same markets as organic farmers, a disincentive to adoption: “The main reason we did not adopt organic is that there is no market for organic produce. Organic farmers take their produce to Bodija where we take our own nonorganic produce to as well. So, if one is to do organic farming, it makes no economic difference with what I am doing” (AJC1, Ajibode FGD). In Elekuru, adoption was constrained by a dearth of reliable access to high price paying markets for organic in urban locations and a lack of demand for organic in the Elekuru periodic rural market: “Market is the most important reason we did not do organic. People that patronize Elekuru market will not buy organic because they do not understand the reasons those who buy organic buy it at certain prices. They do not understand the health benefits in organic. The market in town for organic is not also guaranteed” (EC7, female, Elekuru FGD). Furthermore, non-adopters unanimously indicated that the market factor that constrained their adoption decision was also because consumers in the market were either not aware of, or poorly informed about the benefits of organic products. Other key obstacles to adoption are a lack of government and institutional financial support to hire labor, and a lack of access to organic inputs (three respondents); distrust in the organization promoting organic (one respondent); a lack of extension support/information provision about organic farming (five respondents); and certification rules barring burning and the use of synthetic inputs (five respondents).

5.2.4. Livelihood Outcomes

From the FGDs and individual interviews with non-adopters, seven respondents averred that the yield and income that they would make from OLVP strongly dissuaded them from adopting the technology. Their desire was for a quick, high, and profitable leafy vegetable yield, which, as they argued, would require applying synthetic inputs. Their construction of a high and profitable yield embraces a yield that is high enough to maximize profit. It also includes leafy vegetables with broad and shiny green leaves that will attract and oblige retailers and consumers to pay well for their produce. They felt that might not be possible with organic farming. Despite their marketing and production challenges, they felt that they were making a higher income, and so, decided against adopting OLVP: “Another reason for my decision is that, I have seen their farms before and they were not as good as the farms of those of us that are not doing organic. We cannot compare their yields and profits to mine. If I do organic farming, I will not be able to make the yield and money that I want to achieve on my farm on time. I do not think there is anything that anybody can produce without chemicals that can make farms to generate a high profit” (AJC2, Ajibode FGD). However, from the FGD and individual interviews with non-adopters in Elekuru, six farmers asserted that it was possible to make a higher profit from OLVP compared with what they were making as conventional farmers. They were yet to adopt OLVP because they had not seen adopters in Elekuru make a steady and higher income from organic farming: “I heard and know that the money from organic, the price of for organic produce in the town is higher, but I am yet to see people make that money regularly. So, for now I am sticking to what I am doing now as I am making a good sales” (EC1, Elekuru).

5.2.5. Technology Attributes

All but two out of the nine interviewed non-adopters (78%) considered organic farming to be physically exacting, difficult, and burdensome, attributes that inhibited them from adopting the technology: “Because weed killers are not allowed, I thought that it was going to be too demanding and straining for me to do organic farming. That is one of the reasons I did not join them to do organic farming” (EC6, Elekuru). Mostly, the characterization was in relation to bush clearing and weeding in swampy soils without chemicals, which according to AJC2, “amounts to purposely punishing oneself”. It was argued that weed killers, which are outlawed in organic farming, help to reduce the burden in

land clearing in swampy soils. Among the nine respondents, four related their depiction of organic as burdensome to the difficulty they thought that they would face finding money to hire labor for the work in organic farming. During the FGDs in Ajibode and Elekuru, the female discussants particularly emphasized that the main factor that deterred them and many women from adopting organic was its perceived difficulty and physically demanding nature, arising from the prohibition of burning and the use of chemicals, particularly, weed killers. Moreover, six respondents viewed organic farming as a high-risk and low crop yielding technology, and as labor-demanding and time-intensive, attributes that contributed to their non-adoption decision. Organic was characterized as a high-risk and low yield technology, because it was said to be highly susceptible to yield and income losses from insect pest infestation. They characterized organic farming as a high-cost technology, because they felt that it would cost more to meet the labor requirement in organic farming compared with burning and buying chemicals for weeding and land preparation on a conventional farm. It was averred that pesticides reduced the total labor manpower needed for farm operations; the cost of hiring labor; and, in effect, production cost. Moreover, organic farming was viewed as only well-suited to small-scale farming. This discouraged three male respondents from adopting the technology: “Anyone doing organic farm cannot cultivate 10% of my farm size. They dare not and if they do, the person will incur losses and that is a major factor in my decision not to do organic.” (AJC1)

5.2.6. Gender Division of Labor, Intrahousehold Decision-Making Dynamics

A major finding from the FGDs with female adopters in Ajibode and the non-adopters in Elekuru was that the domestic division of labor and men’s decision-making authority over women can discourage female farmers from adopting organic farming. Women farmers in male-headed households were solely responsible for preparing meals for the family and for other time-consuming daily domestic chores. Inferring from their personal experiences, some female farmers stated that the time-consuming nature of organic farming might conflate with the performance of such domestic chores by women, thereby constraining their adoption decision: “Women handle house chores all alone. To combine that with organic will be too tasking because organic farming by itself requires a lot of work. For that reason, many women are not adopting organic farming” (EC11, female farmer, Elekuru FGD). Another stated, “some women are not doing organic because a woman will do house chores, they will work on organic farm, there will not be no time left for them to do other things because organic consumes time” (EC7, female farmer, Elekuru FGD). As further evidence suggests, this may also be informed by the intrahousehold decision-making authority of men over women’s time. As the main decision-making authority in the household, men have an expectation of the time women should return from their farms to prepare dinner for the family. By adopting organic farming, women might not be able to comply with such a time-bounded expectation, with this being likely to degenerate into a conflict situation. To forestall such a domestic conflict, women farmers might decide not to adopt organic farming: “From personal experience, one challenge that I observed is that when a woman is engaged in organic farming and the husband is not, at a stage during the growing season, one would have to go to farm around 16:00/18:00 to work till late in the night. When it is 19:00, he will call you, asking why you are staying that long on the farm. Do you want to pass the night over there? You are not supposed to stay that long? A crisis may start from there. That, in my opinion, is a particular challenge that is preventing some women from doing organic farming” (AJC11, Ajibode female-only FGD).

A summary of the major factors that interlocked to influence the decision of respondents not to adopt organic farming are captured in Table 5.

Table 5. Summary of the factors that inhibited the adoption of organic farming in this study. PGS—participatory guaranteed systems.

	TALAF Component	Caused by/Related to
<i>Livelihood Assets : human and social capital</i>	Limited awareness/knowledge of organic farming	Lack of extension access about organic farming (institutional)
	Household labor limitation	Family size/children education (household composition)
<i>Vulnerability Context</i>	Limited physical capacity for manual weeding and land clearing in organic farming (women)	Technology attribute-exclusion of chemicals in organic farming, and domestic gender division of labor, e.g., cooking
	Church membership	Different church affiliation
	Perceived susceptibility to yield and financial losses, and hunger	Insect pest problems; exclusion of chemicals in organic farming (institutional), farm location in swampy areas (natural capital), harmattan and occasional heavy rainfall in dry season, and dearth of markets for organic farming (institutional)
<i>Institutional and Policy Context</i>	Perceived susceptibility to hunger	Duration for organic crops to mature for harvest and sales
	Dearth of organic farming “premium” markets	Conventional and organic farmers selling on the same markets, and poor consumer awareness of organic farming, especially in rural Elekuru
	Organic farming market access/marketing problems (Elekuru)	
	Lack of extension support	
	Prohibition of burning/chemical in organic	NOAN PGS certification rules
	Lack of financial support to hire labor/access organic farming input	Labor need/cost in organic farming, perception that organic farming is not economically rewarding, and limited household labor
<i>Livelihood Outcomes</i>	Distrust in the organization promoting organic farming	
	Low crop yield, and low/unprofitable income in organic farming	Exclusion of chemicals in organic farming, dearth/lack of market for organic produce (institutional), desire for quick and high income, and higher yield and income from conventional farming
	Lack of observable economic benefits from organic farming	Income, profit, and price obtained by organic farmers for their produce, and market access by organic farmers
<i>Technology Attributes</i>	Physically challenging, and labor- and time-intensive	Exclusion of chemicals in organic farming (institutional), and gendered domestic role by female farmers
	High-risk (income/financial losses); low crop yielding technology	Vulnerability of organic crops to insect pest attack, and exclusion of farm chemicals
	High-cost	Labor need and labor cost in organic farming, and exclusion of weed killers
<i>Gender Division of Labor</i>	Domestic role played by women, e.g., cooking	Intrahousehold gender relations via decision-making authority of men over women’s time, organic farming as time-intensive, and lack of time due to domestic roles

6. Discussion and Conclusions

Our findings revealed that exposing farmers to information about the economic viability of organic farming, the potential health effects of chemical pesticides and herbicides, and to the knowledge of organic pest and soil fertility management can motivate adoption. Our study also suggests that adopters’ existing social capital, such as their ties with non-adopters and religious formations, can serve as a means of disseminating information and knowledge about organic farming, and for aiding institutional linkages that can spur adoption. This highlights one way through which the linkage between social capital and institutional context variable (NOAN) in TALAF can help create the knowledge (human capital) that can motivate adoption. Therefore, encouraging adopters and organic farmers groups to cultivate improved bonding and linkage ties with non-adopters may enhance adoption in our study areas.

The finding that farmers' subjective experiential knowledge (human capital) of the distinctions in their crops grown with and without synthetic fertilizer influenced adoption aligns with the literature [51]. This may mean that expert-based information about organic farming may not be adequate to foster adoption. Where possible, it seems imperative to identify and broadly frame issues around explicit farmers' experiential knowledge when promoting organic farming to farmers. This may enable them to contextualize, relevantize, and trust expert information, which is likely to motivate adoption.

As conceived in TALAF, the concern that organic farming could worsen farmers' vulnerability conditions was a major barrier to adoption. The finding relates to respondents' lack of knowledge about the efficacy of organic pest control techniques. According to TALAF, this connotes a lack of human capital, which can be addressed by training farmers on organic pest management. The perceived vulnerability to the yield and financial losses from occasional heavy precipitation during the dry season, which hindered adoption, was associated with the swampiness of the respondents' farms. From a TALAF perspective, this connotes an obstacle to adoption by respondents' natural capital asset. The finding is also related to a lack of awareness and knowledge about the suit of practices in organic farming, such as composting and cover cropping, which can help reduce vulnerability to crop and financial losses from weather vagaries and waterlogging [10,35]. Therefore, increased attention to human capital building training aimed at reducing vulnerability to yield and financial losses in organic farming, while enhancing and sustaining productivity, can help spur adoption.

Specific capacity building needs identified and stressed by adopters and non-adopters include training and providing farmers with information on organic pest, weed, crop, and soil health management, and the provision of information on how organic farming could fetch farmers higher prices and increase their stock of financial assets through increased productivity and profitability. This becomes imperative given that the lack of knowledge about the economic viability of organic farming and its production techniques was not only evident, but also inhibited adoption in this study. As further indicated by the respondents, particularly non-adopters, the required capacity building should be provided by NOAN and government agricultural agencies, such as the Oyo State Agricultural Development Program (OSADEP).

Farmers whose on-farm livelihood activities were not competing for time for their farm work were more likely to adopt organic farming [39]. This fairly conforms to our findings on the linkage between adoption and the circumstances of some respondents' off-farm livelihood activities, which left them with a lot of idle time. The authors of [52] reported that income from off-farm activities stimulated the adoption of organic farming. Our study suggests otherwise, as lack of reliable income from off-farm activities made many respondents adopt organic farming. In accordance with TALAF, this finding was also because the respondents felt that organic farming offered them the prospect of improved livelihood conditions through increased and profitable farm income (financial capital). This implies that farmers whose livelihood activities make them financially vulnerable may more likely adopt organic farming if it guarantees them a prospect of earning a good and stable income.

Our study also suggests that accentuating only the economic livelihood benefits of organic farming to farmers may not be sufficient to stimulate adoption. The potential non-economic benefits of organic farming mediated adopters' decision-making, and should be emphasized when introducing the technology to farmers. Incentivizing the non-economic motives may be a way to increase the attractiveness of OLVP for adoption. The finding aligns with studies that reported that adoption decision-making was shaped by multiple intertwined motives, ranging from economic/financial to market, environmental, food-safety, as well as personal, family, and community health considerations [3,40].

The finding that some farmers who were satisfied with the livelihood outcomes of growing their leafy vegetables conventionally on their financial condition were opposed to organic farming is consistent with the literature [3]. Such farmers may not find organic farming attractive for adoption [3]. This study further suggests that organic may be less attractive for adoption by farmers who considered it not attributively amenable to relatively big farms. From a TALAF perspective, this implies that

farmers' natural capital asset vis-à-vis their farm size is likely to affect the adoption of organic farming in the study areas. So, targeting organic at farmers who are cultivating relatively large farms may decrease the likelihood of adoption.

That lack of financial support to hire labor or access organic inputs constrained adoption, and was partly related to the dearth of lucrative markets that can make organic farming economically viable and self-sustaining, without any financial support. Nevertheless, the finding suggests that institutional credit access or financing support for organic farming may be necessary in order to enable farmers to overcome financial obstacles to adoption [53]. These conventional and organic farmers were selling on the same markets, with conventional leafy vegetables attracting better prices discouraging adoption because of the relatively low consumer awareness of organic farming, and because the market for organic farming in Ibadan is still small and underdeveloped, despite its potential for growth [14,15]. In Elekuru, the market factors that inhibited adoption pertain to its remoteness, as well as transportation and telecommunication constraints, which made it difficult to reach Elekuru organic farmers to notify them of the demand for their produce in urban locations. The finding was also related to the reliance of Elekuru organic farmers on NOAN to access the lucrative markets for organic farming in urban locations, a role which NOAN lacks the capacity to discharge effectively. The market constraints implicate a need for increased consumer awareness creation about the benefits of patronizing and consuming organic products, the expansion of existing pricier markets for organic in Ibadan and the creation of newer ones in the rural areas, and building the capacity of the organic farmers group in Elekuru to facilitate market linkage with buyers in urban locations.

We found mixed evidence about gender and the adoption of organic farming. Consistent with the authors of [36], we found more female adopters than males, and that women farmers were more likely than men adopt organic farming, based on the perception that it is a low-cost technology. This is because, compared with their male counterparts, female adopters experienced greater financial difficulties buying chemical inputs to grow their leafy vegetables. Many female conventional leafy vegetable farmers in the area were facing the same problem. As envisioned in TALAF, our study also showed that the domestic gender division of labor and intrahousehold decision making authority of men over women's time could discourage women from adopting organic farming. The findings were related to women situatedness in male-headed households, patriarchal gender cultural norms, and the attribute of organic farming as a time-consuming technology. This study further revealed that the physically demanding nature of organic farming may discourage women more than men from adopting the technology. This finding is related to the exclusion of synthetic herbicides in organic and women's domestic role. From a TALAF perspective, this illustrates that women have limited physical capacity for the arduous work in organic farming, and their lack of financial capital to hire labor. The findings provide an empirical justification for TALAF, underlying the proposition that gender-related and technology-specific factors could gender technology adoption decision-making. They also show that TALAF can permit a gendered analysis of the adoption of agricultural technologies.

As anticipated in TALAF, this study showed that the multifaceted interplay of many factors, such as farmers' livelihood assets, their vulnerability contexts, and livelihood activities and gender-related variables, simultaneously shaped adoption decision-making. The findings reflected most of the factors and the causal linkages that were theorized in TALAF as being responsible for shaping and gendering adoption decision-making. Nonetheless, this study indicated that some respondents' primary livelihood activities influenced their adoption decision-making, a linkage that is not captured in TALAF. The fact that some respondents adopted organic farming because producing safe foods for public consumption was, to them, indicative of their faithfulness to God, implies a direct linkage between livelihood outcomes and adoption decision-making. This linkage is also missing in TALAF. Aside from the omissions, our findings suggest that TALAF has the conceptual capability to inform a comprehensive understanding of the multiple factors that interact to influence adoption decision-making. More studies in other geographic and/or sociocultural contexts are required in order to affirm this and reveal the limitations of TALAF in relation to adoption decision-making.

As the first empirical research that investigated the factors that affect the adoption of organic farming in Nigeria, our findings have broader implications for the promotion of the technology in the country. Our findings offer useful insights about the factors that can be drawn upon to develop policies and interventions intended to stimulate the adoption of organic farming in Ibadan and Nigeria. Such policies and programs should account for the arrays of motivations and underlying factors, which synchronously and non-linearly interact to inform adoption decision-making. Finally, demonstrating the utility of TALAF, our study shows that the conceptual framework can assist in visualizing and accounting for the different multifaceted and interconnected factors that interact to influence and gender adoption decision-making.

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