doi: 10.5191/jiaee.2017.24202

Small-Scale Farmers' Decision-Making for Crop Selection and Production Practices in Northern Haiti

Priscilla Zelaya
Amy Harder
T. Grady Roberts
University of Florida

Abstract

Decision-making is an essential aspect of farming. The decisions farmers make affect their overall yield and, ultimately, impact their livelihoods. Understanding the different factors impacting farmer decision-making can provide insight for extension providers to improve the quality of service. In Haiti, the vast majority of farms are smallholder farms averaging less than 1.5 hectares (Ministry of Agriculture, Natural Resources, and Rural Development [MARNDR], 2010). The purpose of this study was to determine the decision-making practices of small-scale farmers in Northern Haiti related to crop production. The following research objectives guided the study: (a) identify the factors associated with crop selection, and (b) identify reasons farmers engage in specific practices for crop production. Results from this study found that small-scale farmers in the North Department reported using the following factors to determine crop selection: financial security, familial traditions, concern for family, and availability of financial resources. When determining practices for crop production, farmers relied on the following drivers: financial limitations and previous learning experiences. Recommendations include increasing the availability of resources to the farmers in this region in order to create a solid foundation for behavior adoption and increased farmer capabilities.

Keywords: Haiti, Food Security, Small-Scale, Farmers, Decision-Making

Introduction

Decision-making is an essential aspect of farming. The decisions farmers make affect their overall yield and, ultimately, impact their livelihoods. Decisions can be made on the basis of past experiences, newly presented information, financial pressures, and even imposed regulations (Ilbery, 1978). Extension in the developing world faces increasingly complex challenges; this is particularly true in Haiti (Arias, Leguía, & Sy, 2013; Ponnia, Puskur, Workneh, & Hoekstra, 2008). Rural farmers may base their decision-making on culturally-held beliefs, which may differ from one region to the next. Understanding the different factors impacting farmer decision-making can provide insight for extension providers to improve the quality of service.

In Haiti, the vast majority of farms are smallholder farms averaging less than 1.5 hectares (Ministry of Agriculture, Natural Resources, and Rural Development [MARNDR], 2010). The majority of smallholder farms are polyculture in nature. Producing diverse crops allows the farmer to increase economic benefits by cutting losses (Fuller-Wimbush & Fils-Aimé, 2014). Haiti's agricultural landscape has gone through changes in the past few years. Despite the reforms instituted by the government, little change has come to the small-scale farmers in Haiti. Haiti's extension services are barely seen throughout the country (Arias et al., 2013). Although regional agricultural assistance offices do exist within each of the ten departments, services are rarely provided to small-scale farmers (Zelaya, Harder, & Roberts, 2016). With little assistance, many farmers must independently make important decisions which will affect the outcomes of their livelihoods.

The process of making agricultural decisions has been of interest for many years (Asante, Sefa, & Sarpong, 2011; Ilbery, 1977; Öhlmér, Olson & Brehmer, 1998). The decision-making process small-scale farmers use in Haiti is not well documented. By identifying the factors which impact the decisions of farmers in Haiti, extension service providers and nongovernmental organizations (NGOs) can create programming which addresses the current practices of farmers, debunk myths that could have negative impacts on farmer yields, and create learning experiences that affirm the cultural nuances of the farmers while teaching new practices to improve their livelihoods. The focus of this study is to understand small-scale Haitian farmers' decision-making processes for crop production.

Literature Review

Ilbery (1977) conceptualized the decision-making process in agriculture as being influenced by three categories of factors: socio-personal, economic, and physical. Socio-personal factors included items such as personal risk, free time, personal experience, personal preference, and agricultural training. Economic factors included market/demand, capital, income, labor, or under-used land available. Physical factors included soil type, soil drainage, amount of rainfall, and temperature variations. In Ilbery's (1977) study, farmers were given a list of 19 factors and asked to rank each factor from irrelevant to essential in their decision-making process. Results indicated farmers felt as though market/demand and income were extremely important influences in their decision-making process, highlighting the "importance of social and personal considerations in the decision-making process" (Ilbery, 1977, p. 71). Therefore, decision-making is linked to the contextual situations of farmers.

Similar factors as the ones identified in Ilbery's (1977) study can be linked to the decision-making practices of small-scale farmers in developing countries (Asante et al., 2011). Comoé and Siegrist (2015) found that farmers considered their decisions in light of their potential economic benefit in Cote d'Ivoire. The farmers in this study based their decisions on income and potential for financial gain in the future. The climate change perceptions of farmers were also significant factors in the decision to adopt practices that would improve the climate, such as planting more trees on their land (Comoé & Siegrist, 2015). Wealth was a factor impacting farmer decisions in other studies (Sebatta, Mugisha, Katungi, Kashaaru, & Kyomugisha, 2014; Wood, Jina, Jain, Kristjanson, & DeFries, 2014). Farmers were also less likely to participate in new farming practices if the financial resources available were needed for familial responsibilities. This finding highlights an important factor in diffusion practices: monetary constraints will create barriers for small-scale farmers to adopt an innovation (Meijer, Catacutan, Sileshi, & Nieuwenhuis, 2015).

In addition to money, access to information emerged as a significant factor in Sebatta et al.'s (2014) study on small-scale farmers' decisions to participate in the potato market in Uganda. Small-scale farmers who had limited access to information sources, or who were further away from central markets, experienced deficits in effective practices in crop production. The impacts of social interactions in the decision-making process of farmers are seen through Sebatta et al.'s study (2014). Farmers were more likely to adopt practices if they were a part of farmer organizations (Sebatta et al., 2014).

Although these findings are similar to Valente's (1996) findings of social thresholds, connection to information sources is also significant for decision-making processes. Social thresholds refer to the extent to which a particular innovation is diffused through a social system (Valente, 1996). Farmers who are a part of organizations have more contact with peers who may use different practices and may therefore base decisions on previous knowledge of farmers' peer successes (Meijer et al., 2015). The social capital achieved through these contacts impacts farmers' practices.

The previously discussed factors leading to farmers' decisions can be perceived in different ways by service providers. Local knowledge can often be seen as backwards or contrary to popular practices (Beckford, Barker, & Bailey, 2007). However, the importance of local knowledge in the decision-making practices of small-scale farmers has been noted in the literature (Beckford et al., 2007; Nyong, Adesina, & Elasha, 2007; Segnon, Achigan-Dako, Gaoue, & Ahanchédé, 2015). Masere and Worth (2015) found small-scale farmers in Zimbabwe were more likely to consider adopting computer-based modeling for crop production when they believed indigenous systems were no longer sufficient.

Findings from a study by Kiros-Meles and Abang (2008) led to recommendations for extension agents to use farmers' indigenous knowledge and practices associated with local knowledge of crop disease management in future programs. Similarly, a study by Obetta and Asogwa (2013) found farmers were better able to apply sustainable agricultural practices in Nigeria when agricultural training incorporated indigenous knowledge practices. Saito, Linquist, Keobualapha, Shiraiwa, and Horie (2006) studied farmers' knowledge of soils in relation to cropping practices. In their study, Saito et al. (2006) found farmers' indigenous knowledge could help "facilitate collaboration between

farmers, extension workers, and researchers to improve crop production" (p. 64). Indigenous knowledge related to production has an impact on farmer decision making. By utilizing this knowledge in future programming, farmers in developing nations may adopt different practices in the future (Saito et al., 2006).

Purpose and Objectives

The purpose of this study was to determine the decision-making practices of small-scale farmers in Northern Haiti related to crop selection and production. The following research objectives guided the study: (a) identify the factors associated with crop selection, and (b) identify reasons farmers engage in specific practices for crop production.

Methodology

This qualitative study sought to explore the experiences and practices of small-scale farmers in the North Department of Haiti using a constructivist approach. Constructivism holds to the belief that individuals reconstruct "understandings of the social world" (Lincoln, Lynham, & Guba, 2011, p. 92) in order to build their own knowledge. Therefore, a constructivist approach was appropriate because the small-scale farmers in the North Department of Haiti hold knowledge which they have constructed through their interactions and experiences in the social world and use this knowledge as a basis for their decisions.

Population

Haiti is separated into ten departments, which are large areas of land with distinct characteristics. The participants of this study were located in the North Department of Haiti. The North Department is approximately 251 kilometers by road from the nation's capital, Port-au-Prince. The distance between the North Department and the capital, compounded by poor road conditions, creates a unique situation for the Northern farmers due to the separation they face from centralized resources located in Port-au-Prince.

Each department in Haiti is further separated into *arrondissements* or districts. Within the North there are seven arrondissements. The arrondissements in this study were Cap-Haïtien, Acul-du-Nord, and Grand Rivière du Nord. Farmers from the following communes within the arrondissements participated in the study: Milot, Limonade, and Grand-Riviere du Nord. These areas were selected for the study on the recommendation of a local Haitian agronomist on the basis of each area's agricultural productivity and accessibility to the target populations.

The population for this study was comprised of small-scale farmers in the North Department of Haiti. For the purposes of this study, small-scale refers to farmers who have two or less hectares of land (United States Agency for International Development, 2011). The distinction of two or less hectares of land was selected for this study in order to include more participants within the study. The parameter of small-scale was chosen due to the current farming demographics in Haiti. The majority of farmers in Haiti fall into the category of small-scale (Philius, 2013).

Specific descriptive statistics for the agricultural sector in Haiti are very limited. The lack of information is also true of specific information about the North Department of Haiti. According to a 2014 report conducted by MARDNR, 49% of the population resided in rural Haiti. There were approximately 1,018,951 farms in Haiti, 74.35% operated by men and 25.3% operated by women (Philius, 2013). Over half (52%) of farmers were between the ages of 35 and 54 years old (Philius, 2013). In 2014, 38.1% of the farmers in Haiti grew

grain crops and 26.5% of farmers grew legumes. Together, grain crops and legumes make up the majority (64.6%) of agricultural vegetation in Haiti.

Sampling Methods

A combination of convenience and snowball sampling (Ary, Jacobs, Sorensen, & Walker, 2014; Merriam, 1998, 2009) were used to recruit participants for the study. In order to accomplish the task of gaining access to the population and based on lessons learned from prior experience interviewing farmers in the North Department, a native Haitian male research assistant was employed to conduct interviews. Initial contact was first made with a willing farmer and an interview was conducted. Then, the farmer would physically walk the research assistant to the next potential participant. The farmer would then introduce the research assistant to the new farmer and initiate friendly conversation. The research assistant would then commence the interview with the new farmer. Using peers to gain access to other small-scale farmers increased trust and allowed for greater ease in interviewing.

Interview Guide

The semi-structured interview method was selected in order to allow for greater interaction between the interviewer and farmer as well as to allow for added information which would supplement the data. The interview guide used for this study was conceptually framed based on the decision-making factor categories suggested by Ilbery (1977): economic, socio-personal, and physical. Open-ended questions covered choice in farming practices related to crop selection and production, familial and communal responsibilities, barriers faced, and underlying reasons for making specific choices on their land. Close-ended questions gathered demographic information, while the open-ended questions explored farmers' decision-making processes. The interview guide was then given to a Haitian agronomist, who was consulted about the specific experiences of small-scale farmers in the North of Haiti. Following consultation, the questions in the interview guide were revised to reflect the cultural and contextual nuances of the North Department in Haiti. For example, many older people in Haiti struggle to identify the year they were born. As an alternative, it was suggested to ask who Haiti's president was when they were born.

Sample Size

According to Merriam (1998), sample size for a qualitative study relies on the purpose of the study, the type of data being collected, and the resources available. For this study, a sample size was determined based on the extent of saturation within the data, following Lincoln and Guba's (1985) guidance that redundancy (e.g. farmers repeatedly mentioning the same factors influencing their decision-making) is a cue that saturation has been reached. The sample size for this study was 14 small-scale farmers spread throughout the three arrondissements of interest. Participants in the study were males between the ages of 32-67 years old. Eleven participants were married. All members in the sample had children. The farmers in this study engaged in polyculture and farmed combinations of plantains, corn, pigeon peas, sugar cane, black beans, cassava, sweet potatoes, rice, and malanga.

Data Collection

Data collection occurred in two stages. The first stage was in March 2016 and the second stage occurred in June 2016. Data were collected in two stages due to time constraints which limited the amount of interviews conducted in March 2016. Data

were collected through semi-structured personal interviews with small-scale farmers. The interviews were conducted on the farms of the participants. The interviews ranged from 10 - 24 minutes and were conducted in Haitian-Creole. As non-Haitians, the authors did not accompany the research assistant to the interviews due to the potential to influence participant responses. Previous experience conducting research with farmers in the North Department showed cultural beliefs held towards members outside of the native Haitian community created potentials for biases in responses and limited participation in the study if an outsider was present. The research assistant audio recorded the interviews with participant permission.

The research assistant was a current student at a local university in his third year studying agronomy. The lead researcher trained the research assistant through modeling exercises to conduct the semi-structured interviews. The research assistant was also trained in appropriate probing questions. The semi-structured interviews were conducted by first explaining the purpose of the study and the rights of the participant. A time for participant questions about the study was allowed. Following the introduction to the study, the interviewer began asking questions from the interview guide.

Subjectivity and Bias

Since the researcher is a critical element of qualitative research (Merriam, 2009), a certain level of subjectivity may occur within a study. The experiences and perspectives of the researchers lead to certain interpretations of the data which may conflict with the intended viewpoints of the participants. The potential biases present within the researchers should be addressed.

The lead researcher had spent considerable time within the North Department of Haiti through involvement in a local non-governmental organization (NGO). The lead researcher's involvement with the NGO has allowed for extensive experience with individuals who have not received outside help from governmental agencies, including extension service providers. Leading in to this particular study, the lead researcher believed the lack of resources available to small-scale farmers would cause them to rely on cultural practices in crop production. One of the researchers in this study had over 10 years of experience in U.S. Extension. The third researcher in this study had significant experience in Agricultural Education and had been involved in capacity development in Haiti.

The research assistant was an agronomy student at a local university in the North Department. He grew up working on his parent's small-scale farm in Cap-Haitian. His experiences brought a depth of knowledge to the study as well as certain biases which come from experiencing the work of his parents. Additionally, as a male, his presence may have impacted the willingness of females to participate in the study.

Data Analysis

Data were analyzed using the constant comparative method (Merriam, 2009). Glaser and Strauss (1967) described the four stages of the constant comparative method as including comparing incidents, integrating categories, delimiting the theory, and writing the theory (Glaser & Strauss, 1967). Since the study was not conducted to develop grounded theory, only the first two stages of the constant comparative method were used.

The recordings of the interviews were transcribed into Haitian-Creole by an English professor in Haiti. After the interviews were transcribed, recognizable

information was removed in order to protect the identities of the participants. The lead researcher is proficient in Haitian-Creole and analyzed the data in their original language. Selected quotes within this paper were translated in the analysis. The analysis was then confirmed with the transcriber to confirm the accuracy of the analysis with the audio transcription.

The lead researcher aimed to become well-acquainted with the data (Ary et al., 2014). To accomplish this task, the lead researcher read the transcriptions several times. After achieving a substantial level of comfort with the data, the lead researcher began to use phrase-by-phrase open coding. This means that when a sentence ended, a code was assigned to the phrase (Strauss & Corbin, 1990). These open codes formed the basis of the initial categories. Once the initial categories were created for all transcriptions, the lead researcher created a digital spreadsheet of the initial categories and quotes which applied. This spreadsheet was used to compare the data and create larger categories and subcategories. The data was analyzed using coding a total of three times.

Trustworthiness

Lincoln and Guba (1985) established the concept of trustworthiness for quality measures in qualitative studies. The concepts that make up trustworthiness in qualitative studies are credibility, transferability, dependability, and confirmability (Lincoln & Guba, 1985). In this study, credibility was achieved through the triangulation of data through multiple sources of data collection. Data were collected using interviewer notes, pictures, and audio recordings. After the data were transcribed the lead researcher consulted with the Haitian research assistant who conducted the interviews in order to establish accuracy in the transcription. Peer debriefing among the researchers was also helpful in establishing credibility. The methods used for establishing credibility can also be used to establish dependability. In order to establish transferability, the researchers used thick description to explain the results of the study. Confirmability was accomplished through an audit trail consisting of notes, reflective practices, and analysis.

Results

Themes identified from the interviews were categorized into two major categories: factors related to crop selection and factors related to crop production. Coding was used for direct quotes from the farmer interviews. Participant interviews were assigned pseudonyms in order to protect their privacy.

Factors Related to Crop Selection

Financial security. Farmers in the study were concerned with their financial security. The amount of financial uncertainties they faced caused many of the farmers to feel as though they were at the "mercy of God" (Andrel) and had "no assurance" (Ronal) for the outcome of their current harvest. These uncertainties drove farmers to find ways in which to ensure some vestige of security with their harvest. When speaking of the decision to choose maize as the main crop for their land, Jean stated "other crops take too long, maize I wait three months and it is ready." Jean went on to describe how the quick turn-around from the maize allowed him to gain more money than other crops.

The quick turn-around times were not the only factors leading to crop selection as many farmers also stated they knew they could "make the most money" (Julio, Isaac, Yves) from investing in sugar cane. One farmer, Isaac, also stated being "obligated" to take the market prices into consideration

when selecting what to plant in a particular season. Farmers were conscious of what their neighbors were planting and would decide to "buy the same [seed] in order to also make a gain" (Joslen). In the same way, farmers avoided the risk of planting crops which they were not confident in the outcome, choosing to rely on familiar crops which they knew how to plant. As Andrel stated, "I know how to plant the pigeon peas so I chose to plant them again." Andrel went on to explain, "I know I made money with [the seeds] in the past." Another farmer, Joslen, noted that if his "crop did not succeed enough, all the food" would go to feed his family and he would not make any money.

Familial traditions. When asked about reasons for selecting certain crops to plant, farmers readily mentioned what their family or community typically produced (Ronal, Isaac, Stenio, Mytto). Stenio stated, "my parents have always grown corn so I grow corn." Another farmer, Luckson, boasted of growing crops which he had grown since being "a child watching" his parents. Farmers expressed a sense of pride in their adherence to familial practices (Ronal, David) and desired to continue these practices into the future (Mytto). Pride was seen in the following comment made by Mytto, "you see me, I grew up learning from my parents, I do this now the way my parents did."

Concern for family welfare. In addition to citing familial traditions as sources for decision-making, farmers also referenced the size of their families as drivers for crop selection. Farmer families, within this study, ranged in size from 4-14 members. Farmers claimed nutritional responsibility for these family members by addressing who they fed on a daily basis. Farmers continually mentioned the "responsibilities" (Andrel, Isaac, Getro, Luckson) of feeding their family members. One farmer, Julio, stated that he "plants enough for his family and a little to sell." Similarly, Andrel stated, "the size of my family makes a big impact, the amount of food you need to eat, you cannot find." Delekson stated the need to choose crops which had high yields to ensure his "family had food to eat." In addition to providing food for their families, some farmers mentioned the responsibility for sending their children to school. Yves mentioned, "I have two children in school now, I must have money for them to go to school." The concern for the future of their families weighed heavy on Yves who said, "I want my children to learn and I have to make sure they are able [to learn]."

Availability of financial resources. The scarcity of some resources influenced farmers' crop selection in this study. The vast majority of farmers cited money as one of the most influential factors in crop selection (Jean, Stevenson, Mytto). The lack of money influenced the type of seeds the farmers selected. One farmer, Yves, stated, "I did not have the money to buy sugar cane this year" since it was more expensive for him. Ronal noted, "if I don't have the money, I don't buy" excess seeds. Isaac also noted the difficulty of finding enough money to "buy yam plants to grow." When asked why he selected to grow cassava in a particular area on his land, Stenio mentioned, "if I have only this money, I cannot do anything else. I must grow what I can with my money."

Drivers Related to Crop Production

Financial Limitations. In addition to money directly affecting the type of crops farmers selected, farmers also noted the difficulty of hiring help with limited money. Jean noted, "if God gives me the money, I can pay for three people to help me." Jean continued to explain how the amount of workers impacts how well he can clean the

land and prepare the land for production. One farmer, Mytto, mentioned how sometimes he does not have time to maintain his crops so he needs "pay someone to come and help." The money Mytto could have used for tools or irrigation, was instead used "to find workers." Lack of money directly impacted access to specific resources, such as water. When asked about their irrigation practices, an overwhelming majority of farmers stated that they had "no practice" (Jean, Ronal, Julio, Stenio). When probed further, Julio noted, "well, I wait for the rain" and described how the weather was his only source of water. With the lack of money to provide irrigation sources, Stevenson noted "the rain is our water." Another farmer, Andrel, went on to say that lack of money made him "live at the mercy of the rain."

Previous learning experiences. Farmers regularly mentioned learning from their parents when asked to explain where they learned the practices they implement on their land (Ronal, Stenio, Getro, Delekson). Getro explained how his mother and father taught him all the practices he currently uses and said he "always holds on to" what they taught him. When describing the method he used to clean the land prior to planting, Stenio mentioned "my father woke up every morning and I worked with him, he taught me." Additionally, when probed further to describe the practices they learned from their parents, Delekson stated, "the way I am now is how my parents worked."

Farmers also mentioned different sources of information for how they grow their crops. Andrel said he learned how to diversify his land from his personal networks by finding "people that have the knowledge to give me the information." Farmers noted working with other groups of farmers with whom they share information on how to grow their crops (Isaac, Luckson, Stevenson). The data revealed a lack of learning experiences from NGOs or other organizations, including the government. Joslen stated, "I am by myself, the only information I have is from my hands."

Conclusions, Implications, and Recommendations

The Haitian farmers in this study based their decision-making on a variety of factors. These factors include needs for financial security, familial traditions, concern for family welfare, availability of resources, financial limitations, and previous experiences. The factors identified in this study were consistent with previous research conducted with other small-scale farmer populations in developing countries (e.g. Ilberry, 1997; Meijer et al., 2015; Sebatta et al., 2014; Wood et al., 2014).

Many of the farmers in this study were the main income earners in their homes. The pressures to meet their families' needs were a driving force for decision-making. Farmers thought critically about how their money was spent and what benefits their crop selection would reap to meet the financial responsibilities of their families. In addition to feeding the family, the farmers were responsible for sending their children to school and having enough resources to ensure their futures. The connection to family as a driver for decision-making is not surprising for the Haitian community where the culture emphasizes familial financial responsibility and familial tradition (Smith, 1963).

Ilbery (1978) stated "an individual farmer makes decisions with respect to the available resources at his disposal" (p. 454). Farmers in this study had difficulty acquiring the necessary funds to purchase all the seeds which they would require, could not pay for irrigation technologies, and lacked funds to hire adequate help during the production cycle. These findings are consistent with Comoé and Siegrist's (2015)

assertion that financial resources impact farmer decisions. The financial limitations of small-scale farmers are evident; 80% of individuals in rural areas in Haiti live in poverty (World Bank, 2013). Rural development practitioners focused on improving the livelihoods of small-scale farmers in Haiti's North Department should take into consideration financial constraints when planning interventions.

In Haiti, the reliance on God to bring about successful crops is an example of a strong indigenous knowledge system (Beckford et al., 2007). These strongly held beliefs are valued within Haitian culture (Drexler, 2008) and permeate the agricultural atmosphere. Similarly, adherence to traditional family crop production practices was noted. In order to fully address the needs of small-scale farmers, service providers must acknowledge the tightly held beliefs and offer suggestions to increase farmers' perception of control (Obetta & Asogwa, 2013). Connecting new information to local indigenous knowledge would help to increase adoption rates (Saito et al., 2006).

Additional research is needed to expand upon the localized findings of this qualitative study in order to determine the extent to which other small-scale farmers in Haiti consider the same factors when making decisions regarding crop selection and production. In particular, the frequency with which this study's farmers felt constrained by financial limitations warrants further investigation into how these constraints influence Haitian farmers' willingness to adopt new crop varieties or production practices. Understanding decision-making practices is an essential part of the broader goal to improve farmer livelihoods in the North Department and achieve increased food security in the region.

References

Arias, D., Leguía, J. J., & Sy, A. (2013). *Determinants of agricultural extension services: The case of Haiti* (LCSSD Occasional Paper Series on Food Prices). Retrieved from http://documents.worldbank.org/curated/en/2013/05/18170053/determinants-agricultural-extension-services-case-haiti

Ary, D., Jacobs, L. C., Sorensen, C., & Walker, D. A. (2014). *Introduction to research in education* (9th ed.). Belmont, CA: Wadsworth.

Asante, B. O., Sefa, V. A., & Sarpong, D. B. (2011). Determinants of small scale farmers' decision to join farmer based organizations in Ghana. *African Journal of Agricultural Research*, *6*(10), 2273-2279. Retrieved from http://www.academicjournals.org/AJAR

Beckford, C., Barker, D., & Bailey, S. (2007). Adaptation, innovation and domestic food production in Jamaica: Some examples of survival strategies of small-scale farmers. *Singapore Journal of Tropical Geography*, *28*(3), 273-286. doi: 10.1111/j.1467-9493.2007.00301.x

Comoé, H., & Siegrist, M. (2015). Relevant drivers of farmers' decision behavior regarding their adaptation to climate change: a case study of two regions in Côte d'Ivoire. *Mitigation and Adaptation Strategies for Global Change*, *20*(2), 179-199. doi: 10.1007/s11027-013-9486-7

Drexler, M. J. (2008). Haiti, modernity, and U.S. identities. *Early American Literature*, *43*(2), 453-465. doi: 10.1353/eal.0.0004

Fuller-Wimbush, D., & Fils-Aimé, C. (2014). *Feed the future investment in Haiti: Implications for sustainable*

food security and poverty reduction. Retrieved from http://www.oxfamamerica.org/publications/feed-the-future-investment-in-haiti

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago, IL; Aldine.

Ilbery, B. W. (1977). Point score analysis: A methodological framework for analyzing the decision-making process in agriculture. *Tijdschrift voor Economische en Sociale Geografie*, *68*(2), 66-71. doi: 10.1111/j.1467-9663.1977.tb01396.x

Ilbery, B. W. (1978). Agricultural decision-making a behavioural perspective. *Progress in Human Geography*, *2*(3), 448-466. doi: 10.1177/030913257800200303

Kiros-Meles, A., & Abang, M. M. (2008). Farmers' knowledge of crop diseases and control strategies in the regional state of Tigrai, northern Ethiopia: Implications for farmer–researcher collaboration in disease management. *Agriculture and Human Values*, *25*(3), 433-452. doi: 10.1007/s10460-007-9109-6

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage.

Lincoln, Y. S., Lynham, S. A., & Guba, E. G. (2011). Paradigmatic controversies, contradictions, and emerging confluences, revisited. *The Sage Handbook of Qualitative Research*, *4*, 97-128.

Masere, T. P., & Worth, S. (2015). Applicability of APSIM in decision-making by small-scale resource-constrained farmers: A case of Lower Gweru communal area, Zimbabwe. *Journal of International Agricultural and Extension Education, 22*(3), 20-34. doi: 10.5191/jiaee.2015.22302

Meijer, S. S., Catacutan, D., Sileshi, G. W., & Nieuwenhuis, M. (2015). Tree planting by smallholder farmers in Malawi: Using the theory of planned behaviour to examine the relationship between attitudes and behaviour. *Journal of Environmental Psychology*, *43*, 1-12. doi: 10.1016/j.jenvp.2015.05.008

Merriam, S. B. (1998). *Qualitative research and case study applications in education*. San Francisco, CA: Jossey-Bass.

Merriam, S. B. (2009) *Qualitative research: A guide to design and implementation*. San Francisco, CA: Jossey-Bass.

Ministry of Agriculture, Natural Resources, and Rural Development [MARNDR]. (2010). *Haiti: National Agricultural Investment Plan*. Retrieved from https://www.gafspfund.org/sites/gafspfund.org/files/Documents/Haiti_NationalAgricultureInvestmentPlan.pdf

Nyong, A., Adesina, F., & Elasha, B. O. (2007). The value of indigenous knowledge in climate change mitigation and adaptation strategies in the African Sahel. *Mitigation and Adaptation Strategies for Global Change*, *12*(5), 787-797. doi: 10.1007/s11027-007-9099-0

Obetta, C. O., & Asogwa, V. C. (2013). Utilization of indigenous knowledge (IK) by farmers for sustainable agricultural production in Enugu State, Nigeria. *International Journal of Agriculture Innovations and Research*, *1*(5), 146-155. Retrieved from http://www.ijair.org/administrator/components/com_jresearch/files/publications/IJAIR_93_Final.pdf

Öhlmér, B., Olson, K., & Brehmer, B. (1998). Understanding farmers' decision making processes and improving managerial assistance. *Agricultural Economics*, *18*(3), 273-290. doi: 10.1016/S0169-5150(97)00052-2

Philius, R. (2013, June). *The census of agriculture in Haiti: Overview*. Paper session presented at the meeting of Workshop for the Caribbean by the FAO/ UNFPA, Trinidad & Tobago. Retrieved from http://www.fao.org/fileadmin/templates/ess/documents/meetings_and_workshops/IICA_2013/Linkages_TT_10-12June2013/Presentations/Haiti_10-12_June_2013_Integrated_Censuses.pdf

Ponnia, A., Puskur, R., Workneh, S., & Hoekstra, D. (2008). *Concepts and practices in agricultural extension in developing countries: A source book*. Retrieved from http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/125973

Saito, K., Linquist, B., Keobualapha, B., Shiraiwa, T., & Horie, T. (2006). Farmers' knowledge of soils in relation to cropping practices: A case study of farmers in upland rice based slash-and-burn systems of northern Laos. *Geoderma*, *136*(1), 64-74. doi: 10.1016/j.geoderma.2006.02.003

Sebatta, C., Mugisha, J., Katungi, E., Kashaaru, A., & Kyomugisha, H. (2014). Smallholder farmers' decision and level of participation in the potato market in Uganda. *Modern Economy*, *5*(8), 895-906. doi: 10.4236/me.2014.58082

Segnon, A. C., Achigan-Dako, E.G., Gaoue, O. G. & Ahanchédé, A. (2015). Farmer's knowledge and perception of diversified farming systems in sub-humid and semi-arid areas in Benin. *Sustainability, 7*(1), 6573-6592. doi: 10.3390/su7066573

Smith, R. T. (1963). Culture and social structure in the Caribbean: Some recent work on family and kinship studies. *Comparative studies in society and history*, *6*(1), 24-46. Retrieved from http://www.jstor.org/stable/177885

Strauss, A. L., & Corbin, J. M. (1990). *Basics of qualitative research*. London, UK: Sage.

United States Agency for International Development [USAID]. (2011). *Haiti: FY 2011-2015 multi-year strategy*. Retrieved from the Feed the Future website: http://feedthefuture.gov/resource/haiti-feed-future-multi-year-strategy

Valente, T. W. (1996). Social network thresholds in the diffusion of innovations. *Social etworks*, *18*(1), 69-89. doi: 10.1016/0378-8733(95)00256-1

Wood, S. A., Jina, A. S., Jain, M., Kristjanson, P., & DeFries, R. S. (2014). Smallholder farmer cropping decisions related to climate variability across multiple regions. *Global Environmental Change*, *25*, 163-172. doi: 10.106/j.gloevcha.2013.12.011

World Bank. (2013). *Investing in people to fight poverty in Haiti*. Retrieved from http://www.worldbank.org/content/dam/Worldbank/document/Poverty%20documents/Haiti_PA_overview_web_EN.pdf

Zelaya, P., Harder, A., & Roberts, T. G. (2016). Small-scale farmers' perceptions of agricultural information sources in Northern Haiti. *Journal of International Agricultural and Extension*

Education, 23(2), 63-77. doi: 10.5191/jiaee.2016.23205