



Influences of religious belief and cultural values and norms on climate-smart agriculture (CSA) adoption: Insights from Northern Ghana.

Stephen Uwumbordo Nachibi^{1*}

Eugene Muobom Ganee^{**}

Anthony Kwame Morgan^{***}

Abdul Wahid Arimiyaw^{***}

Abstract: *Agricultural decision-making processes and the uptake of farming practices are often driven by assets, resource ownership and access, including cultural values, and religious beliefs. Yet there are limited studies on how the religious belief and cultural value systems affect the adoption of CSA practices among farmers in Ghana. This study examined the influences of religious belief and cultural values on CSA adoption among farmers in Nandom District of Ghana's Upper West Region, Ghana. A qualitative approach involving 35 in-depth interviews and 4 Focus Group Discussions (FGDs) was used to gather data from farmers. We found that: people's belief system about climate change affects their adoption of CSA practices; value systems influence their willingness to adopt certain CSA practices; religious belief and traditional values are essential factors with greater influence in agricultural decision-making process. Working with belief and value systems is crucial for scaling up CSA practices.*

Key words: *Climate-smart agriculture, adoption, religious beliefs, traditional values and norms, Northern Ghana.*

Stephen Uwumbordo Nachibi is from the School of Environmental Sciences, University of Hull, Hull, UK; **Eugene Muobom Ganee from the Department of Sociology and Social Work, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana; * Anthony Kwame Morgan and Abdul Wahid Arimiyaware from the Department of Geography and Rural Development, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. The authors can be reached at : uwumbordostephen@gmail.com*

Introduction : Globally, evidence abounds that the average temperature has become warmer and the precipitation has become more variable and uncertain (Niang et al., 2014). For the future, the General Circulation Models continues to provide a grim and disturbing projection about future conditions (Girvetz et al., 2019). Recent sophisticated models predict that Africa's temperature will

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continue to increase and reach 1.7 °C by the 2030s and 2.7 °C by the 2050s under the current emission trajectory (Hunter and Crespo, 2019; Girvetz et al., 2019). Other studies have concluded that even under the low emission scenario, the global temperature will still increase and the conditions to be experienced will be much different from the historical conditions (Girvetz et al., 2009).

Precipitation on the other hand is rather characterised with a lot of uncertainties (Sylla et al., 2016; Ramirez-Villegas et al., 2013). Climate models do not agree on the direction and magnitude of precipitation for Africa, but majority of the literature (e.g. Girvetz et al., 2019; Sylla et al., 2016; Niang et al., 2014) agree that it will most likely increase for Eastern Africa and decrease for Northern and Southern Africa. A recent study by Almazroui et al. (2020) confirmed these projections in precipitation when they established that under high emission scenario, Eastern and Central Africa will experience increased precipitation whereas Southern and Western Africa will experience decreased precipitation.

The impact of climate change on agriculture is immense and now visibly far reaching than initially thought (Arora, 2019). This has become an issue of major concern because agriculture is one of the sectors that contribute substantially to African economies (Teye, and Torvikey, 2018). For example, agriculture contributes about 20% of Ghana's gross domestic product (GDP) (Ghana Statistical Service [GSS], 2016) and employs a significant number of Ghana's population. In 2015, 9.3 million people were formally employed in Ghana. Of this number, 3.3 million were in the agriculture sector, and of the rural areas, 70.6% are employed in the agriculture sector (GSS, 2015; World Bank, 2018). Agriculture's role in Ghana's development, especially, in rural poverty alleviation is critical and as such the need to adapt agriculture to climate change is imperative. Climate-Smart Agriculture (CSA) is the new approach that is widely embraced by multinational organisations (for example, Food and Agricultural Organisation-FAO, International Fund for Agricultural Development-IFAD) and governments as the transformational antidote needed to make agriculture resilient to climate change (Chandra et al., 2018; Lipper et al., 2014). FAO, the principal architect of the concept, defined CSA as the agricultural practices that "sustainably increase productivity, resilience (adaptation), reduce/removes greenhouse gases (GHG) (mitigation) while enhancing the achievement of national food security and development goals" (FAO, 2010). Thus, CSA has the potential of minimising the impact of climate change on vulnerable farmers, especially smallholder farmers. It is the recognising of this potential that national governments in the developing world need to reprioritise their development agendas to make resources available for CSA policies, programmes, and projects (FAO, 2015).

Despite the stunning international financial support (from multilateral financial donor agencies: FAO, World Bank, Green Climate Fund etc) geared towards mainstreaming the uptake of CSA agricultural production systems, the implementation of CSA projects and programmes have proven difficult in

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sub-Saharan Africa (Davies et al., 2019). Studies have pointed out several challenges that often hamper the implementation of climate-smart agriculture adaptation projects. Barnard et al. (2015) and Sibanda et al. (2017), for example, categorised these barriers into technological, financial, and human resources. Other scholars such as Ampaire et al. (2017), Meinzen-Dick et al. (2012) have identified institutional dimension of the challenges. However, it is not clear how the religious and cultural norms, values and beliefs affect CSA adoption (Davies et al., 2019; Thomalla et al., 2015; Schwartz, 1992). Hence, it is imperative to investigate how religious belief and cultural norms and value systems affects people's willingness to, and the adaptation measures they take towards agricultural sustainability (Sachdeva, 2016; Murphy et al., 2016; McNeeley and Lazrus, 2014).

Perceptual studies about climate change have established that many people think climate change is caused by God and/ gods as a curse for their disrespects towards traditions and sacred values, norms and beliefs (Jellason et al., 2020; Hameso, 2018). This has somehow affected the uptake of seasonal forecast by some group of farmers. For example, in Namibia, Christians believe that rainfall and crop productivity cannot be predicted, but are solely dependent on the will of God (Angula et al., 2016; Selato, 2017; Davies et al., 2019). The works of Schuman et al. (2018), Murphy et al. (2016) McNeeley and Lazrus (2014) provide more elaboration on culture, religion, tradition and climate change and the associated adaptation measures deemed appropriate.

Individuals' adaptation choices to climate change are often influenced by their perceptions on the causes of climate change (Azong, 2021; Adesina and Zinnah, 1993). Whether people will adopt certain CSA practices or not in some cultures will, certainly, be influenced by the prevailing beliefs and value systems (Davies et al., 2019). For example, in some cultures and among the pastoralists, livestock (especially cattle) are a symbol of significance, affluence, prestige and status of power (Hegga et al., 2016). In such cultures it is unlikely that the people will sell their livestock to acquire technologies needed for CSA. For them, livestock serve as an economic buffer against climate induce crisis (Hegga et al., 2016; Stroebel et al., 2008; Fafchamps et al., 1998). Moreover, in some settings, people tend to listen to the custodians of tradition for their livelihood activities and related information (Chishakwe et al., 2012; Reid et al., 2010). In this context, traditional values and norms will deeply affect the adoption and implementation of CSA practices. To this end, this paper examined religious belief, cultural values and norms and CSA adoption in the Nandom District of Ghana's Upper West Region. The findings will greatly influence CSA policy, practice.

Study Setting and Methods

Study Setting

The study was conducted in the Nandom District. The district is located within the Sudan Savannah of the Larger Savannah agro-ecological zone which covers the entire northern part of Ghana. It faces

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weather extremes (drought and high temperature), as well as increasing deforestation, erosion, bushfire and unsustainable land management practices (Abass et al., 2018). Politically, the district is bounded to the South by Jirapa, to the East by Lambussie and to the North and West by the Republic of Burkina Faso. The total land area of the district is 567.6 square km, with 86% of its inhabitants living on agriculture in the rural areas (Abass et al., 2018).

Study Approach

We applied the qualitative exploratory approach to the study using in-depth interviews and focus group discussions (FGDs) to gather the data. We adopted this approach because we were interested in gathering an in-depth information to provide a comprehensive in sight that will illuminates the experience (Sofaer, 1999)of religious belief and traditional values and norms on CSA adoption. The method is useful in providing a rich description and explanation about a complex phenomenon (Bradley et al., 2007; Sofaer, 1999).

Participants Recruitment Procedure

Purposive and convenient sampling techniques were used to select the study participants. For convenient sampling, farmers who were around and willing to participate were interviewed, and for purposive sampling, using the age factor, some farmers, were purposively selected and interviewed.

In all, a sample of 35farmers were interviewed. The sample of 35 farmers were use since a point of saturation was reached during the data collection process. Of the total participants, those of Christian faith were 27, traditionalists8, males 26 and females 9 (see table 1). The dominance of participants who profess the Christian faith is not suppressing as it collaborates the idea that the study area is typically Christianity dominated. The area is patriarchal in nature and, as such, most women were unwilling to participate, hence the reason for their low number in the sample. The age range of the participants was from 30 – 75years. Such age composition was necessary for varied experiences and opinions regarding how their belief and values systems affected the uptake and up scaling of CSA practices.

In addition, a total of four (4) focused group discussions (FGD) were held. We did that because it provided a reach complimentary data (Kitzinger, 2005). In order not to affect the willingness and ability of women to articulate their views, especially if that is divergent from the males, we held two discussions for men and two for women. The use of more than two focus groups has been found to capture close to 80% of themes on a specific topic using a semi-structured guide (van den, 2019). For rigour and data saturation, we involved 8 participants in each group discussion (Kitzinger, 2005). For the participants in the FGD to freely express their opinions, an age factor was used to construct the FGDs.

Table 1. Demographic Data of the Study Participants

Participants	Age Range	Religion
Males	30 - 70	Christians = 21
		Traditionalists = 5
Females	32 - 67	Christians = 6
		Traditionalists = 3

Data Collection Procedure

A face-to-face interview with a semi structured interview guide was used in the data collection process. Key thematic questions guided the interviews and the FGDs. Respondents were asked questions such as: how do religious beliefs and legacies affect the implementation and adoption of CSA practices? How do respect for culture and tradition (traditional norms and values) affect CSA adoption?

The data was collected in 2020 from July to August. The interviews were held at the homes of farmers, and FGDs under a convenient shade for each group. Dagara and English were the languages used to collect the data based on the farmer`s ability and preference. FGDs were held only in Dagara because it`s the native language and almost everybody could articulate the views in it. The interviews lasted between 45minutes to one hour, and FGDs between 1hour-to-1hour 45minutes. The interviews and FGDs were audio recorded using the researchers` cell phones with the participant consent.

Data analysis

The audio recordings from the interviews and the FGDs were listened to several times and portions of the audios that addressed the research were transcribed by two of the authors (Stephen Uwumbordo Nachibiand Eugene Mobom Ganee). The transcripts were subjected to rigorous iterative approach, where all the authors independently read the transcripts repetitively and took notes. Collaborative coding sessions were held to discuss the transcripts. We report the findings by means of consolidated criteria for reporting qualitative research (COREQ) (Tong et al., 2007). According to this method, multiple quotations from different participants should be presented to increase the trustworthiness and the interpretation of data (Tong et al., 2007; Côté and Turgeon, 2005). To that end, multiple quotations are presented.

Ethical Considerations

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Formal ethical review was not sought for because the study data collected was not sensitive (Tri-Council Policy Statement, 2018; University of Manchester, 2021). However, standard ethical procedures relating to informed consent was followed. Individual participant's consent was sought for and, participation in the study was voluntary. Participants remained anonymous by using codes to represent them in reporting the findings. For example, the first male farmer interviewed is identified as 'male farmer 1'. For the first female, it is 'female farmer 1'. The process is repeated for all the farmers.

Results and Discussions

Religious Beliefs and CSA Adoption

Religious beliefs, and traditional norms and values drive social structures and livelihood choices. As Murphy et al. (2016) indicated, the belief and value systems play a crucial role in climate change adaptation and disaster risk reduction. Culture, conceptualised in this context as the religious beliefs, and traditional norms and values that drive social structures, livelihood choices and risk (Thomalla et al., 2015), is a fundamental concept that explains adaptation behaviours. According to Thomalla et al. (2015), risk is socially and culturally constructed and culture is the root of all behaviours. Thus, people's response to risk/hazard including those in agriculture due to climate change may be socially and cultural constructed (Adger et al., 2013). Schipper (2008, 2010) and Schuman et al. (2018), for example, describes how religion influences the way people understand the causes and nature of a hazard. Moreover, to understand why different group of persons react differently to climate change adaptation practices requires an understanding of local beliefs, norms and values (Schuman et al., 2018; Schipper and Dekens, 2009).

Farmers' decision to adapt their agriculture to climate change because of the perceived or the actual experienced changes is not simple and direct. The decision-making process is far more sophisticated and shaped by an array of complex factors such as income, family/household size etc. While assets and resource ownership and access are the main drivers of decision-making, the actual decision to adopt some practices are influenced and mediated by cultural norms and values, religious ties and beliefs (Singh et al., 2016; Armitage and Connor, 2001), beliefs by influential persons like opinion leaders, religious leaders, spouses and parents (Martínez-García et al., 2013; Reser and Swim, 2011) and social identity (Jones and Boyd, 2011; Frank et al., 2011).

For example, a significant number of farmers across Africa believe that rain is solely the will of God and cannot be predicted by man (Azong, 2021; Spear et al., 2019; Spear and Chappel, 2018; Selato, 2017; Angula et al., 2016). This belief system affects individuals' and communities' willingness to adapt to climate change and what kind of adaptation measures to take (Veldman et al., 2013). Whilst

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religion is seemingly a crucial tool for promoting climate change adaptation, it may also, more often, limit adaptation as indicated (Schuman et al., 2018).

From our findings, respondents who profess Christian faith reveals that God is the sole giver of rain and possess the power to either or not bless their crops. To these farmers, God is the only determinant of farms success. Some farmers expressed the following;

“Nobody has the ability to tell us when it will rain, the duration of the season and the behaviour of the rain. The same way nobody knows when the drought will come during the season and where it will be severe. We can adopt all the new crop varieties, stop tiling the land and adopt all the farming practices that they say are smart, but if we don’t seek the face of God our farms will still fail woefully” (Male farmer 4, 55years).

Another farmer had this to say during the FGDs;

“The only person in this whole universe who can change things is God, and he alone has the power to let rain fall, when it should fall, how it should fall and how much of it should fall. If God does not permit the rain to fall it will not fall, and one cannot predict it. So, whether you change your planting date or even used the so-called drought resistant and high yield varieties if the God in heaven do not protect the crops during drought they will die and if God do not bless your crops, trust me, they will not magically give you a bumper harvest”(43years old man in a FGD).

For some farmers, climate change is a natural phenomenon and to live with less of its impact is to seek natural solutions. A male farmer had this to say;

“There is so much going around in the system right now. People should stop attempting to confuse us the more. For me, climate change is something that is created by God. It a natural thing that we are born into. These new drought resistant varieties that they are always saying we should use, if God say it will not yield it will not yield” (Male farmer1, 40 years).

Even though some participants acknowledged the ability of the CSA and smart farming practices, they still maintained the overriding power of God in the success of farms:

“You know drought here is very common and it has been affecting our crops almost every year whether we like it or not. So, I started using the drought resistant ones and I realised my crops don’t die much like they used to do when I was using only local crop varieties. But I still strongly belief that is the making of God and not necessarily the ability of the crops though they are drought resistant. Christians would have to pray more seriously” (Male farmer 23, 34 years).

“High yield varieties will not magically give you bumper harvest, strictly following the farming instructions by experts will not necessarily protect our crops from drought and just turn around

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harvest for us. Yes, it is all good, but I believe protection of crops and bumper harvest is always the blessing of God! (Female farmer 6,39 years).

Among the traditionalists, religious belief is at the centre of the climate change and will play the most effective role in agricultural adaptation, especially to the frequent droughts:

Yes, climate change has become more apparent now than it used to be in the past 30years. I very much think the gods of rain are angry with us. We just don't want to see the traditional practices. We say they are demonic. Meanwhile, these practices never disappointed us. Anytime we performed the rituals and sacrificed to our ancestors we had adequate rain and bumper harvest (Male farmer 15, 70 years).

Our forefathers used to make sacrifices and perform all the needed rituals before the start of season and they usually had good rains, no serious drought and they used to get bumper harvest. Now we are so much Christians that we don't do those rituals and sacrifices. So why will the gods of rain and our ancestors protect our crops, bless us with rain and give us good harvest (65yearsold man, FGD).

Not surprisingly, these findings collaborate the empirical findings of Azong (2021), Davies et al. (2019), Spear et al. (2019), Spear and Chappel (2018), Murphy et al. (2016) and support the theoretical works of Schipper (2008, 2010), Sachdeva (2016). Farmers' beliefs systems affect their adaptation decisions (Singh et al., 2016). As such, those who believe in gods sought protection from the gods through rites, rituals and appeasement of the gods, and those of Christian faith sought protection from God through prayers as a respondent posited ;*usually, before I start planting, I take my seedlings to pastor to pray over them (35years old woman, FGD).*The fatalists depend on prayers in disaster management because: 1) to them, it provides some sense of protections from the negative impacts of disaster (Sachdeva, 2016) and, 2) they believe that it can prevent re-occurrence of disaster in the future (Mitchell, 2003). People believe that disasters are caused by God and/ gods and its only God or gods who can protect them (Sachdeva, 2016; Mitchell, 2003).

This belief system makes religious leaders one of the most important stakeholders for the promotion of CSA. The belief systems regarding climate change and the capacity to adapt means that the religious bodies and its leaders have a considerable influence in agricultural decision-making process and, could, therefore, be influential in CSA adoption through the use of religious narratives to educate on climate smart technologies and farming practices (Jellason et al., 2020; Kassam et al., 2014).

Traditional Norms Values, practice systems and CSA Adoption

Culture certainly plays a very crucial role in CSA adoption. Cultural norms and values give an individual or group of persons a sense of identity, and any adaptation practice that is not in line with that social identity may not be adopted (Frank et al., 2011). The cultural identity of an agricultural

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population is tied to their agricultural practice. For example, in pastoral cultural settings of Africa, livestock is a symbol of wealth, prestige and status of power (Hegga et al. 2016). In these settings, even when temperatures become unfriendly for livestock, they will still fail to sell their livestock to acquire CSA technologies because of the symbolic significance their culture attach to livestock (Doran et al., 1979; Hegga et al., 2016; Stroebel et al., 2008).

Also, respect for cultural values norms and practice systems will, more often, limit adaptation. Where traditional practices are performed to allow for the start of planting (Selato 2017), it will equally influence CSA. For example, some communities in Africa perform certain rituals such as offering prayer and making sacrifices before planting season can begin. Jellason et al. (2020) found this to be more prevalent in North-Western Nigeria. Our findings are congruent with theirs.

In our time, thus the olden days, the chief, the oldest man and the chief priest will perform some rituals and sacrifices and then declare the start of the planting season, but you know because of the spreading of Christianity most communities around don't do it again. But I still strongly believe that there are some isolated communities that still practice this system. So, if you are from these communities how will you plant early as some Agric people have been telling us (Male farmer 3, 70 years).

Jellason et al. (2020) and Hameso (2018) indicated that disrespect for indigenous practices and local values and norms is an important dimension of farmers' perception of the causes of climate change. To their (study participants) minds, adoption of CSA practices and technologies without respect for customary norms and values, paying sacrifice and praying for rain will not protect their farms. In the context of local areas, CSA projects should follow the development paradigms that incorporate local values, norms, practices, views and knowledge with the scientific knowledge (Chambers, 1983).

The cultural importance of some traditional or local crops such as guinea corn for events like funerals and festivals in some communities in Northern Ghana makes it difficult to do away with them. Whilst some of these crops are low yielding, there are no improved varieties that are both high yielding and drought resistant.

You see, some traditional crops are really of cultural importance to our identity. We have noticed that the increasing drought is affecting their cultivation. We can't do without them. We still have to plant them. They are of ritual significance. Leaving them means losing our values, norms and our identity as people (Male farmer 11, 65 years).

In sub-Saharan Africa, women generally do not have any significant power in household's agricultural decision-making process (Deininger et al., 2017; Udry, 1996). Some other cultures prohibit their access to resources (Murray et al., 2016). In such cultures, their knowledge about the

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agricultural systems will not be put to use. For example, Gilligan et al. (2014) argued that women in farming rural settings have rich experience in farming practices, but their lack of access to resources due to the prevailing traditional values, norms and practices prevents the utilisation of such knowledge and experiences in agricultural decision-making process. Climate change interventions that target women as one of the most vulnerable groups to climate change must be conscious of these social norms.

I am a woman and I have been in the community for the past 50 years. I don't decide what form of farming systems we adopt as a family, my husband does. That is the rule here..... and it is only a privilege if your husband consults you for your opinion. You know, because everybody is now talking church, church and church it has reduced, but it is very dominant among us the traditional households. So, if you are a woman from these traditional households and you have good plans about the drought resistant and high yielding crops and the form of farming practices to practice, as long as the tradition remains, the plans remain useless (Female farmer 4, 67years).

Even among the Christians, traditional values still play a very crucial role in their decision to adopt CSA. Spear et al. (2019) found that many youths, who were predominantly Christians, in agricultural decision-making process was still significantly influenced by the value systems. In Namibia, Davies et al. (2019) found that Christian's agricultural decisions were significantly influenced by respect for culture norms values and practices. People do not want to lose their identity (Frank et al., 2011) - they want to continue to farm the way of their forefathers (Spear et al., 2019).

As for my family, we go to church and we don't believe in most traditional practices again, but there are some cultural values that define us. I start using these drought resistant and high yielding varieties and change my methods of farming for the past 3 – 5 years. Since then, I realised that the effects of the drought have reduced, but there are some farming methods that I still practice. I can't leave them. They define us from any other tribe (Male farmer 16, 47 years).

I'm a Christian and I will be very frank with you. I go to church but that does that mean I should lose my identity; the tradition and values of this community is what defines me. There are some key crops and method of farming that I can't leave. I won't be the one to deprive the next generation the right to know their traditional farming practices (Male farmer 8, 38years).

Despite the important roles the traditional authorities play in climate change adaptation, they have been conspicuously missing and neglected as one of the important champions of CSA (Davies et al., 2019). *They should start involving our leaders in agricultural decision making at all levels (45 years old man, FGD). We are not saying what the Agric people come to tell us is not good, but the truth is that it does not bear in mind what define us as a people (50 years old man).* Chishakwe et al. (2012) and Reid et al. (2010) highlighted the role of traditional leaders in building and improving the

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adaptive capacity of their local communities to climate change. Making traditional authorities and leaders central in CSA adoption promotion is essential as it makes the practices culturally sensitive. Also, the integration of traditional authorities in CSA decision making influences the use of forecasted rainfall information and the use of climate-smart farming practices, and in the case where traditional practices allow for the start of planting (Selato 2017). If the seasonal forecast indicates early onset of rainfall, they will perform the tradition early to allow farmers prepare for early planting.

Implications for Practice

Despite the increasing consideration that has been given to belief systems and cultural values in climate change and climate change adaptation (Azong, 2021; Murphy et al., 2016; Sachdeva, 2016; Frank et al., 2011; Mitchell, 2003), such has not been done in terms of CSA (Davies et al., 2019; Spear et al., 2019). For practice, CSA practices must be framed and communicated in ways that resonate and appeals with people's identity, beliefs, values and norms. CSA practices and technologies should be promoted in ways that appeal to the belief and cultural identity of communities, because "people can take extraordinary measures to protect that which they view as sacred" (Sachdeva, 2016, p.1). Incorporating CSA with the belief and value systems of local communities appears to hold far more potentials in encouraging the adoption of smart farming practices because evidence from Southern Africa showed values and belief systems of local communities have a tremendous role in the uptake of CSA (Davies et al., 2019).

Strengths and Limitations

We recognise that this study was not without limitations. As such, we acknowledged the following limitations to the study. First, the study was conducted in only one district of entire northern Ghana, which currently is made of five regions with several districts. This has affected the geographical representativeness of the study and the generalisability of its findings for the region. Second, the sample size is too small for the generalisability of the findings. With that said, future studies should include more districts and use large sample size. Specifically, future studies should employ mixed method paradigms to examine how cultural norms, values, practice systems and religious beliefs influence CSA practices adoption and implementation among farmers. Second, future studies should explore the willingness of traditional authorities and religious leaders as agents of CSA information dissemination to guide CSA policies and future plans.

Conclusion

The study examined how religious beliefs, and cultural values and norms affect the adoption of CSA in the Upper West Region, Ghana. Belief systems, and cultural values and norms were found to prevent some group of farmers from adopting CSA practices. Some local crops that are not high

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yielding were still cultivated because of their cultural significance and, the farming practices passed down to them were still preserved because they were seen to be associated with their identity. We argue that for effective uptake of CSA practices, it will be far more helpful to work with the religious and traditional value systems. Such an approach is necessary because the value systems play important role in agricultural decision-making process. However, there is the need to empirically test this – how working with the religious and value systems will promote the uptake of CSA at scale.

Authors' contributions

Stephen Uwumbordo Nachibi was involved in the design of the study, data collection and analysis, drafting, reviewing and final preparation of the paper. Eugene Muobom Ganee was involved in data collection, data organization and analysis. Anthony Kwame Morgan and Abdul Wahid Arimiyaw was involved in analysis and critical review of the manuscript. All the authors read and approved the final version of the paper for publication.

Data Availability

The data that support the findings of this study are openly available in Harvard Dataverse (view at <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/YA3HXR>).

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