



# An Exploratory Sequential Mixed Methods Research Design to Evaluate Stakeholders' Perspectives in Promoting Angola Small-Scale Farmers' Resilience to Climate Change

José Vinevala<sup>1</sup>  Keith Halcro<sup>2</sup>  Madhu Acharyya<sup>3</sup> 

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## Abstract

The exploratory sequential research design is useful for studies that call for in-depth knowledge of the research problem and wherein data on the phenomenon are unavailable. This article involved the use of an exploratory sequential design to evaluate stakeholders' roles and perceptions in improving Angolan smallholder farmers' resilience to climate change. This approach consisted of three phases. The first phase comprised in-depth semi-structured interviews with 20 smallholder farmers and 4 experts. Five themes emerged from the qualitative data. These themes resulted in the development of a new research instrument in Phase 2: the Agriculture Stakeholder Questionnaire. In the third phase, the Agriculture Stakeholder Questionnaire was administered to survey 181 stakeholders. The aim is to use results to generate practical socioeconomic solutions for Angola's farming communities.

**Keywords:** exploratory sequential design, mixed methods, data integration, stakeholders, small-scale farmers, Angola.

## An Exploratory Sequential Mixed Methods Research Design to Evaluate Stakeholders' Perspectives in Promoting Angola Small-Scale Farmers' Resilience to Climate Change

This article discusses the exploratory sequential mixed methods research design used to evaluate stakeholders' role and perception in improving Angolan small-scale farmers' resilience to climate change. Climate change constitutes a major threat to global food security (Ayal & Filho, 2017). Farmers in Angola particularly are vulnerable to the impact of climate change due to their dependence on rain-fed agriculture and resource constraints. Climate change impacts socially and economically on individuals, families, and communities and helps to explain declining incomes, food shortages, curtailed education, and growing health and well-being issues in Angola (Fagbemi et al., 2023; Mekonnen et al., 2021). Farmers' agricultural production relies mainly on conventional practices but increasing temperatures and erratic rainfall present mounting challenges. Research suggests that growing crops and raising livestock is becoming more difficult (Niang et al., 2014). This change impacts small-scale

<sup>1</sup> **Corresponding author:** Dr José Vinevala, Department of Finance, Accounting and Risk, Glasgow Caledonian University (GCU), 40 Fashion St, London E1 6PX, UK. E-mail: [jvinevala@outlook.com](mailto:jvinevala@outlook.com), ORCID: <https://orcid.org/0009-0008-4462-3943>

<sup>2</sup> Dr. Department of Management and HRM, Glasgow Caledonian University, E-Mail: [Keith.Halcro@gcu.ac.uk](mailto:Keith.Halcro@gcu.ac.uk), ORCID: <https://orcid.org/0000-0001-7836-6043>

<sup>3</sup> Department of Finance, Accounting and Risk, Glasgow Caledonian University (GCU), London, UK, E-mail: [Madhu.Acharyya@gcu.ac.uk](mailto:Madhu.Acharyya@gcu.ac.uk), ORCID: <https://orcid.org/0000-0002-1668-2881>

farmers disproportionately because they lack the necessary resources and skills to cope with the effects of climate change. The result is falling production and rising prices (Niang et al., 2014). Consequently, food insecurity is a growing threat to Angola. It is potentially a threat that might only worsen, because so much Angolan agriculture is still, mostly at subsistence level. Angolan farming largely is saddled with very low-level resources whether in the form of education, infrastructure, or technology. Therefore, stakeholders need to understand better farmers' resilience to their changing environment, especially small-scale farmers, if Angola is to address the complex and multi-dimensional issues posed by climate change.

It is recognised that this outcome has to involve the small-scale farmers' stakeholders in generating relevant data (Dentoni et al., 2017; HLPE, 2018). The dilemma is Angola lacks relevant data on these existing stakeholders. This data gap suggested that a mixed methods research approach offered a robust choice (Creswell & Creswell, 2018; Creswell & Plano Clark, 2017). In fact, this approach is useful in a context wherein either the existing data are limited or the topic under investigation is unexplored. Unsurprisingly, this is challenging in most developing nations like Angola, where data are scarce.

### **Agriculture and Climate Change Literature**

The agriculture and climate change literature suggests that one of the best ways to tackle food insecurity is to build small-scale farmers' resilience. This requires involving a broad range of stakeholders, including consumers, policymakers, civil society, suppliers, processors, formal and informal financial institutions, environmental bodies, seed and fertiliser merchants, traders, farmers' organisations, and scientists (Dentoni et al., 2017; HLPE, 2018; HLPF, 2017). Yet, the low engagement of these multi-stakeholders in addressing agricultural development and growth remains a huge concern for researchers and policymakers, particularly in low-income countries (Otieno & Nakweya, 2015). The reality is that members of these stakeholders often deny smallholders access to certain products and services, opportunities, and resources. Consequently, these farmers rely increasingly on informal financial sources to fund their businesses and to use mostly informal coping and adaptation strategies, but this contributes to their sense of powerlessness and vulnerability.

To understand the relationship between small farmers and stakeholders, and ultimately build good farm management practices and procedures, a pragmatism philosophy was used that involved combining qualitative and quantitative research approaches, rather than a purely positivist or interpretivist approach (Fetters, 2019; Morgan, 2007; Saunders, et al., 2019). This philosophy fits research problems that seek to find the best management practices, procedures, or processes within a context like Angola farming, wherein there are many unexplored social issues, and the existing data are limited (Vinevala & Halcro, 2023). Saunders et al. (2016, p. 143) state "For a pragmatist, research starts with a problem, and aims to contribute practical solutions that inform future practice". Adopting the pragmatist paradigm could allow access to, and understanding of, the complex processes that hamper and shape smallholder farmers' resilience to change (Morgan, 2007). The complex issues of the smallholder sector have not been explored in Angola. This is coupled with little evidence of the role of stakeholders in enhancing the resilience of the small-scale farmers in Angola. This gap has contributed to the scarcity of data. Hence, framing the study within a pragmatic perspective could allow the collation of both smallholders' and stakeholders' views on smallholders' resilience to climate change.

Various studies within a similar socio-economic setting to Angola have adopted this stance (Apata et al., 2009; Belle et al., 2017; Bryan et al., 2013; Dowsing & Cardey, 2020; Khoza et al., 2019; Mbengwa et al., 2019). The aim of these studies was to generate practical solutions

that improve food security and reduce poverty among farming communities and poor people. Equally, Angola needs good, practical farm management procedures not only to scale up the agriculture sector to feed its population, but also to provide export earnings (Vinevala & Halcro, 2023). Worryingly, an estimated 7.3 million Angolans, approximately 20% of its population, experience food insecurity (INE, 2016; UNICEF, 2021).

### **Mixed Methods Research**

A mixed methods research approach allows the researcher to draw on qualitative and quantitative research techniques to understand better a problem, whereby neither a qualitative nor quantitative research approach alone is suitable (Creswell, 2014; Creswell & Plano Clark, 2017; Creswell & Creswell, 2018; Denscombe, 2021; Nzabonimpa & Prozesky, 2021). Fetters (2019) claimed that integrating qualitative and quantitative data ultimately improves the findings' validity, hence its growing popularity in various disciplines, from health to the social sciences. Its use though within a sub-Saharan African setting has been limited (Alatinga & Williams, 2019); yet, it has been argued that when data are limited and suitable research design instruments are absent, a mixed methods research approach is invaluable in tackling a complex research problem (Munce et al., 2021). Creswell and Plano Clark (2017) categorise the following three research designs: the exploratory sequential design, the explanatory sequential design, and the convergent design. Each of these core designs provides a specific framework that guides the researcher in implementing their own research methods and ensuring that the resulting design is rigorous and of high quality (Creswell & Plano Clark, 2017).

Munce et al. (2021) suggest that an exploratory sequential design aligns well with a setting wherein there is no suitable research instrument. This is particularly helpful where the research problem is unexplored, sensitive, or complicated (Vinevala & Halcro, 2023). Furthermore, fusing quantitative and qualitative research approaches allows the qualitative and quantitative data to be triangulated, thereby strengthening the quality of the findings (Plano Clark & Ivankova, 2016). By contrast, the explanatory sequential mixed methods design favours a problem wherein plentiful data exist (Vinevala & Halcro, 2023), a situation more evident in developed economies.

An exploratory sequential design initially involves collecting data through unstructured or semi-structured interviews. Interviews are crucial in understanding participants' experiences, thoughts, feelings, and behaviours regarding the research problem. These interviews produce data that typically are unstructured and require analysis to group data into meaningful themes or categories. Theming allows a survey questionnaire to be built (Curry & Nunez-Smith, 2015). This quantitative research instrument subsequently is used to collect and to analyse quantitative data; in effect, the researcher is building the results from qualitative data collection phase to inform the subsequent quantitative data collection phase (Fetters, 2019). This two-step process also provides a more comprehensive understanding of the research problem (Creswell & Plano Clark, 2017).

## **Method**

### **Study Design**

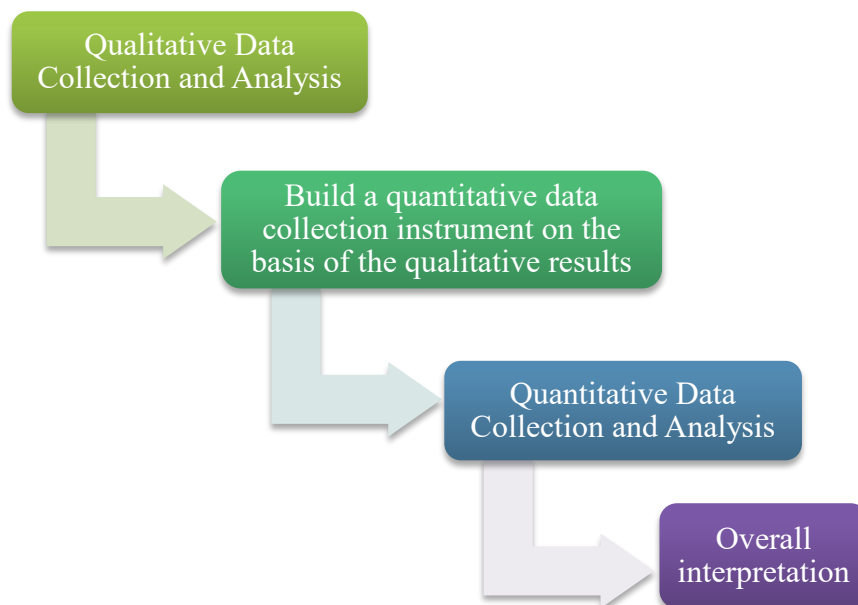
The study followed the three phases of the exploratory sequential mixed methods design suggested by Creswell and Plano Clark (2017). The purpose of these three phases consists of initially exploring participants' views and experiences. The intention was to use the results from this qualitative exploration to develop and to score-validate a quantitative survey instrument

that met the criteria of a specific population. The first phase thus focused on collecting Angolan smallholders' and stakeholders' views to understand the relevant issues affecting them. In the second phase, a quantitative data collection instrument was created on the key themes identified during the first phase (Creswell, 2014; Denscombe, 2021). This instrument was called the Agriculture Stakeholder Questionnaire (ASQ). In the third phase, the ASQ was administered. Creswell and Plano Clark (2017) state that this process can enrich the details and can provide a more comprehensive understanding of the research problem.

The integration of both qualitative and quantitative components occurred at this stage (see Figure 1), whereby the significant findings from the qualitative phase helped to design a quantitative data collection technique for further analysis (Fetters et al., 2013). Thus, the combination of both qualitative and quantitative research approaches provided data that were used to develop a more thorough understanding (both top-down and bottom-up) of the changes needed to enhance farmers' resilience, in contrast to using a single data approach. This understanding was essential because it could inform appropriate policies to develop small-scale farmers' capacity to respond to change and to improve the country's food and nutrition security.

**Figure 1**

Diagram of the Three Stages of the Exploratory Sequential Mixed Methods Research Design



**Source:** Adapted from Creswell and Plano Clark (2017)

### Sampling and Recruitment

Although this study involved human interactions, it did not comprise experiments or collecting sensitive personal information from farmers. It adhered to ethical research standards (Mason, 2002) and obtained ethical approval from Glasgow Caledonian University's School of Ethics Committee (REF: 15-ANT-50) prior to beginning the research study. Following these ethical and legal practices helped participants trust the researchers, which improved the study's integrity and data collection procedures.

Sampling in the first stage, the qualitative phase, involved 24 purposively selected participants from Huambo's Department of Agriculture database. This database includes most farming families residing within the 11 municipalities of Huambo province. The sample size of 24 aligned well with Creswell's (2014) view that qualitative studies may involve sample sizes ranging from 1 to approximately 30 participants. The second stage, quantitative in nature, sought to map statistically 181 stakeholders' responses. This stage again involved the use of purposive sampling. This non-probabilistic sampling technique allowed us to use their knowledge in selecting potential participants who are best positioned to provide relevant information for the study (Denscombe, 2021; Etikan et al., 2016). It was recognised accessing these stakeholders was difficult because no suitable Angolan database existed. In some cases, the data exist but are not accessible because of cultural concerns, particularly political concerns (Vinevala & Halcro, 2023). These reasons, coupled with the ongoing COVID-19 pandemic, reinforced the rationale for a purposive sampling technique.

The inclusion criteria for this study were that the selected small-scale farmers should have been engaged in agriculture activities for at least 5 years, in which time their income had been derived primarily from farming activities. Phase 3, Inclusion for the quantitative phase required the selected agriculture stakeholders to have worked for a financial institution, the Ministry of Agriculture, academia, agriculture, or a public company for at least 3 years. Also, the agriculture stakeholders should have had at least some knowledge of the agriculture sector in Angola. The reason behind the selected criteria is that 5 years of farming implies that a farmer not only had gained a competent level of farming knowledge and experience, but also had an awareness of climate change throughout this period. An agriculture stakeholder with 3 years experience suggests that the stakeholder can assess what directly or indirectly affects the farming community.

## **An Overview of Angola**

Angola is the fifth largest country geographically in Sub-Saharan Africa (SSA), with a territory of 1,246,700 km<sup>2</sup> (INE, 2015). It has long been noted for its plentiful natural resources, including fertile soil. In fact, Steiner (1977) observed that Angola's resources provided great economic and social potential. The agriculture sector employs approximately one half of the country's workforce. The majority, 70% are women or schoolchildren. Angola produces more than 80% of the food consumed locally, yet only exploits 10% of its approximately 58 million hectares of arable land. Angola's farms are overwhelmingly (95%) small holdings, averaging 2.34/ha per family (CEIC/UCAN, 2012; MINAGRIF, 2018; USDA, 2016). Angolan agriculture still is mostly practised at the subsistence level and uses very low-level technology. These fundamental problems mean that farmers lack the necessary resources and skills to deal with the systemic risks arising from climate change. The result is that production continues to worsen, and supply to the market continues to deteriorate because of under-investment in the infrastructure. The concern is that food security is a mounting challenge.

## **Exploratory Sequential Mixed Methods Research Design Used to Explore Angola's Small-Scale Farmers' Resilience to Climate Change**

The need to secure data on complex and multi-dimensional issues, such as food insecurity and climate change, required well-coordinated cross-sector partnerships. These partnerships comprise a wide range of government, private sector, and civil society stakeholders acting and collaborating with one another (Dentoni et al., 2017; HLPE, 2018). This complexity is exacerbated by the reality that Angola, like many Third World countries lacks suitable data or

research instruments to collect data on the perceptions and actions of these stakeholders. Therefore, an exploratory sequential research design was used to collect more contextually comprehensive data to understand the resilience of small-scale farmers in Angola. These qualitative findings subsequently led to the development of a quantitative survey instrument, the Agriculture Stakeholder Questionnaire (ASQ). The ASQ was piloted on a sample that met the criteria of small-scale farmers' stakeholders (see Figure 2). The key idea was to elicit the viewpoints of both small-scale farmers and stakeholders regarding how and what helps small-scale farmers to build resilience. It was hoped that this would facilitate the building of an appropriate policy to improve small-scale farmers' resilience to change.

This three-stage process sought to add depth to the small-scale farmers' views and better to elucidate their different contexts, particularly in deciding suitable actions to combat systemic risks. Figure 2 (below) depicts the integration process of this exploratory sequential mixed methods research design and the sequence of the three phases, wherein mixing occurs (Creswell, 2014; Fetters et al., 2013; Hesse-Biber, 2010). The sections that follow discuss in more details the three phases and the integration process.

The small-scale farmers recounted and explored their experiences of how they navigated climate change. Their data generated five themes, within which, various questions were created to test each theme. This resulted in a quantitative survey instrument named Agriculture Stakeholder Questionnaire (see Figure 2). Figure 2 outlines these three phases: qualitative data collection and analysis, quantitative instrument developed and score-validated, and quantitative instrument collection and analysis.

### **Phase 1: Qualitative Data Collection and Analysis**

This phase sought to produce qualitative data using in-depth, semi-structured interviews to gain an understanding of small-scale farmers' "knowledge, views, understanding, interpretations, experiences, and perception" of climate change, as well as their strategies to cope with these complex phenomena (Creswell, 2014; Mason, 2002). A series of in-depth semi-structured interviews explored the thoughts of 20 smallholder farmers and four knowledgeable experts. The interviews included questions regarding the following issues: the key risks they face from climate change, possible risk perception strategies used by farmers, the schemes available in case of losses due to climate shocks, and the principal barriers and challenges in acquiring new techniques that can help them to adopt climate-smart agricultural practices to build their resilience.

The interviews were conducted in Portuguese, Angola's lingua franca and one universally spoken and understood, even in rural communities. The local language Umbundu is spoken in the study areas, but it was believed that some of the experts had little grasp of the language. Furthermore, finding bilingual speakers in Umbundu and English would be problematic when subsequently translating the interviews into English. The decision to interview in Portuguese allowed the meaning of the data to be preserved and minimised the time needed to bulk translate data generated from Portuguese into English (Halai, 2007).

Each interview started with an explanation of the aims and benefits of the study for the research participants, before questioning the participants. Fourteen farmers were interviewed at the Farmer Field School (FFS)<sup>1</sup>, whereas six farmer interviews occurred on their respective farms. Three of the interviews with knowledgeable experts were conducted in their own offices, and the remaining one at a restaurant. There are benefits of interviewing participants in their own environment for three reasons: firstly, respondents tend to be more comfortable and relaxed

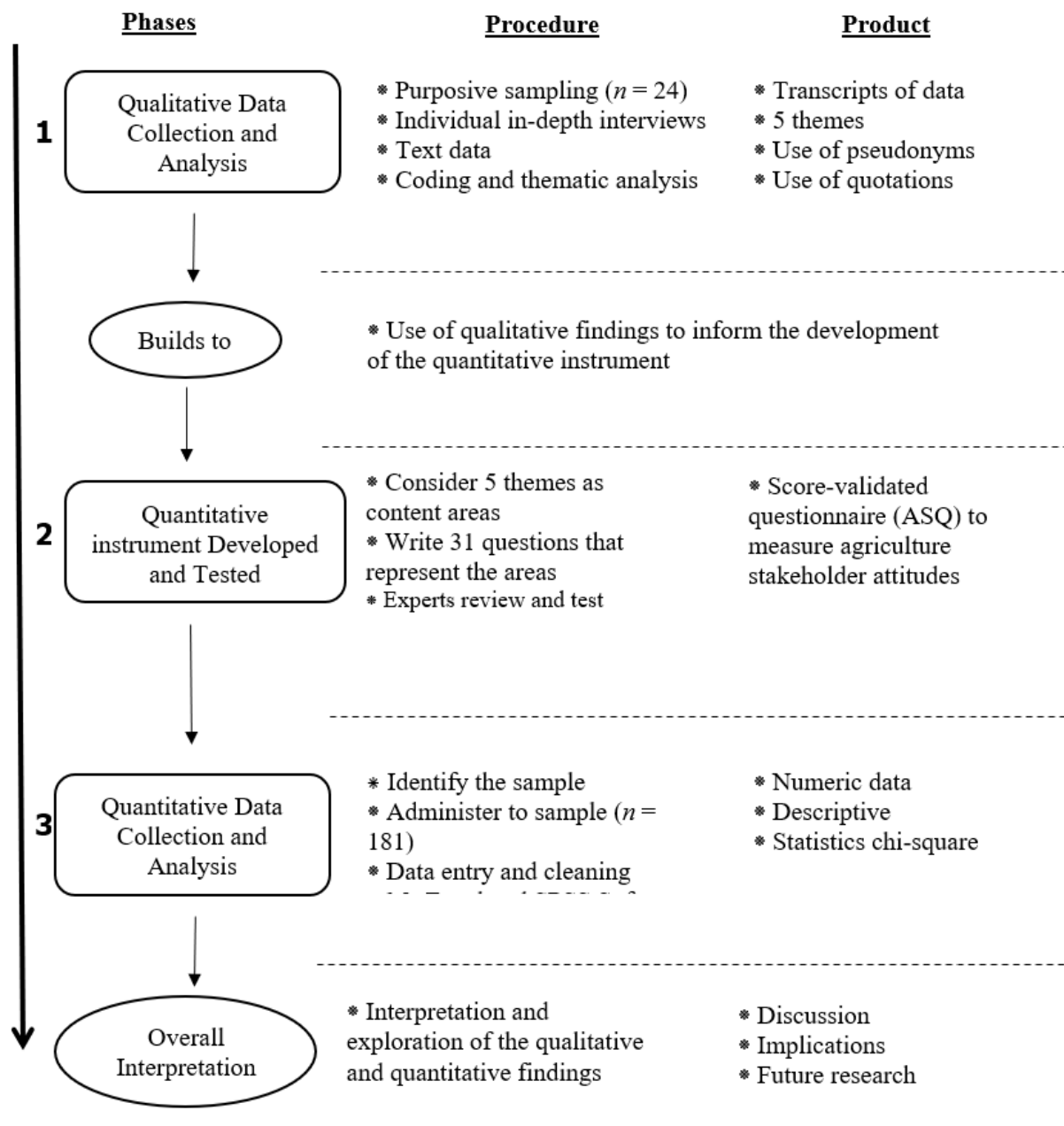
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<sup>1</sup> A local field setting and under the guidance of a trained facilitator.

in a setting that they understand; secondly, it demonstrates that the researcher is welcomed; and lastly, it helps the researcher observe and understand the participants' daily routines (Creswell, 2014; Denscombe, 2010).

**Figure 2**

*Depicts the Integration Process of this Exploratory Sequential Research Design and the Sequence of the Three Phases, Where “Mixing” Occurs*



Source: Vinevala and Halcro (2023)

Although farmers might not always be strategically astute, they are operationally skilled, and understand the practical demands that farming impose. It was important to begin with the farmers because they were the focus of the research study. The interviews with the smallholders and the knowledgeable experts were recorded, transcribed, and analysed. The goal of this analysis was to uncover patterns, themes, and holistic features, followed by a summary of the results to provide adequate answers to the research problem and to develop the quantitative survey questionnaire (Agriculture Stakeholder Questionnaire).

### ***Qualitative Data Analysis***

The qualitative data collected from smallholder farmers and experts were analysed following Braun and Clarke's (2006) thematic analysis because of its clarity. Their practical guidelines help to identify and to examine patterns or themes across data sets that are relevant to answering a particular research question or problem being explored. This data analysis technique offers a structured process that permits the analysis of a large amount of data collected from a semi-structured interview. This process led to the identification of quotations and key themes facing the farmers that subsequently were coded to frame a series of 31 items for the ASQ in Phase 2, as explained in the following section.

The stakeholders were not as familiar with the research problem as were the smallholders, but their opinions were important because they were embedded in the same context in which the smallholders operate. Their actions and decisions could influence the smallholders' adaptation strategies to climate change. Thus, the combination of both qualitative and quantitative research approaches provided data that could help develop more innovative strategies to cope with the effects of climate change (Bhave et al., 2014; Fujisawa, et al., 2015). This understanding was essential because it could help to build appropriate policies that will facilitate small-scale farmers' capacity to respond to climate change. It was argued that these responses would improve the country's food and nutrition security.

### **Phase 2: Developed and Tested Agriculture Stakeholder Questionnaire (ASQ)**

As noted previously, this second phase involved the ASQ. The opening items elicited information on the participants' backgrounds, such as gender and education, before seeking their general views about Angolan agriculture. The items then focused on the five themes that had emerged from the exploratory interviews that had been conducted in Phase 1. Each section of the questionnaire corresponded to one theme. Each theme's items were generated from the variables that emerged from a frequent word or phrase stated in the interviews and reflected the opinion and experiences of the respondents regarding the impact of climate change. This structure ensured the items created yielded a more holistic picture of the research problem. The following five steps were used in building a theme.

- Firstly, we immersed ourselves in the data set by reading and rereading transcripts in order to familiarise ourselves with the data while making notes.
- Secondly, we identified and examined a word or phrase that conveyed something about the data and started generating initial ideas that emerged through the transcripts. This enabled coding to occur based on participants' keywords or short phrases. A colour was used for each group with similar codes so that they could be tracked in the latter phase of the analysis (Appendix Table 1).
- Thirdly, we actively interacted with data by making notes of potential codes (a word or phrases stated in the interviews that were relevant to the research problem). We then grouped codes based on similarities and differences to assign patterns or themes that belong to specific research questions.



- Fourthly, the research team discussed these themes and codes, and collated extracts back and forth to explore whether there was a possible coherence and to check its relevance in answering one of the six research questions proposed in our research (e.g., How can adaptation strategies be improved to facilitate increased the resilience among small-scale farmers to climate change?).
- Lastly, we examined for recurring patterns within the dataset to identify variables that might elucidate further opinions from the participants. The examination focused on the following topics: environmental, socio-cultural, government attitudes towards the agricultural system in Angola, the economic issues that the farmers face from the stakeholders' standpoints, and the approaches small-scale farmers use to manage their daily risks. This process ensured that the five main themes that emerged from the qualitative analysis reflected farmers' shared understanding of climate change. This decision helped to answer the research's six research questions and thus achieve the research's aim and objectives. The ASQ was piloted before administering it to various stakeholders in Phase 3.

### **Phase 3: Quantitative Data Collection and Analysis**

In this final phase, the ASQ was distributed to collect stakeholders' perspectives and experiences about smallholder farming in Angola. However, in the meantime the British and Angolan governments had introduced travel restrictions because of COVID-19; this prevented travel to Angola. An alternative solution emerged in the recruitment of two researcher assistants familiar with data collection and the locations where the survey was to be administered. The researchers provided regular online training to the assistants through Microsoft Teams. The training explained the research's purpose, and how to distribute and subsequently to collect ASQ. The nominated assistants distributed 200 questionnaires in person, resulting in 181 usable questionnaires, a 90% response rate. This high response rate reflects the benefit of collecting data in person and the observation that the topic appeared to be of interest to so many stakeholders. The ASQ was administered to several stakeholders, including policymakers, suppliers, dealers, consumers, and academic. These stakeholders were chosen for three reasons. Firstly, it allowed the researchers to assess the cross-sectoral reach required to support the smallholders. This process would identify the resources and expertise necessary to address food security issues. Secondly, these stakeholders are embedded in the same socio-economic context as the smallholders and, therefore, should understand the challenges facing these smallholders. Thirdly, they play the lead role in providing farmers with practical solutions to food security. Accordingly, securing the points of view of both sides, small-scale farmers and stakeholders, helped to understand how and what helps small-scale farmers build resilience. It was hoped that these data would lead to the development of appropriate policies to improve small-scale farmers' resilience to climate change. Hence, the exploratory sequential research design made use of quantitative findings as an additional layer of explanation.

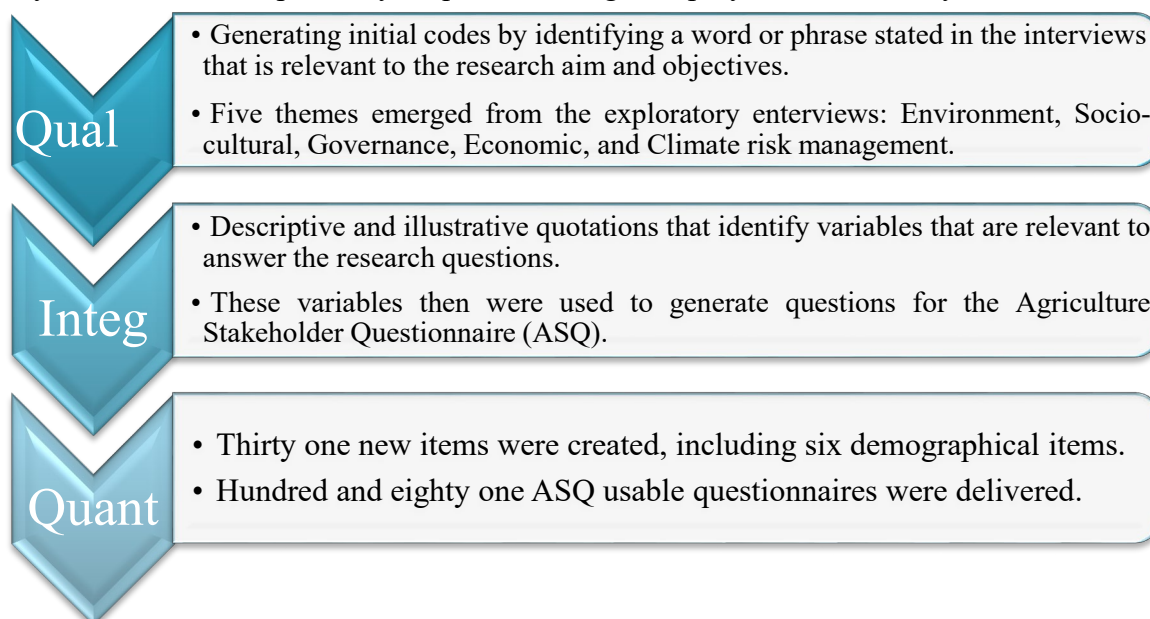
#### ***Quantitative Data Analysis and Findings***

Quantitative data were analysed using statistical inference and chi-square to determine the relationships between the demographic characteristics of the respondents and their views. This process enabled the quantitative results to be aligned with each qualitative theme and assisted in the integration of both qualitative and quantitative analyses (see Figure 2). Descriptive statistical analysis provided the stakeholders' socio-economic characteristics, whilst SPSS software subsequently facilitated the conduct of a series of chi-square tests to determine whether any relationship prevailed between the respondents' demographic characteristics and their views.

To ensure accuracy, the researchers shared both the English and Portuguese versions of the items with a bilingual professional who is proficient in both languages. This professional held a bachelor's and a master's degree in English and had more than 15 years of experience working at a multinational corporation wherein English was the primary language of communication. The quantitative data were analysed using statistical inference tools, including and chi-square analysis. Figure 3 summarises the results key results of the three phases of this explanatory sequential mixed methods research design.

**Figure 3**

Key Results of the Exploratory Sequential Design Employed for this Study



Source: Vinevala and Halcro (2023)

**Results**

**Phase 1 - Qualitative Findings**

The first phase questioned 16 male and 8 female participants. The findings revealed that 71% (n = 17) had no academic qualifications, whereas 29% (n = 7) had some formal education ranging from secondary school to degree level. Most of the participants (i.e., 75%) were aged 25 years or older, and 25% were aged below 25 years old.

Twenty-four, one-to-one interviews sought to capture the smallholders' and the experts' knowledge, skills, awareness, and experiences about the impact of climate change on farming. Five themes emerged from the interviews: Environmental uncertainty, Socio-cultural uncertainty, Governance uncertainty, Economic uncertainty, and Climate risk management. These themes reflected the participants' views and understandings of their experiences concerning climate change and its consequences. These themes emerged through recurring comments and stories. An example surfaced in the lack of financial credit or legal protection and how these problems left many small farmers financially and emotionally distressed, particularly if they had to sell valuable items to raise capital. The participants stated that this vulnerability and uncertainty was exacerbated when certain suppliers provided poor quality,

often unsuitable seeds for the local soils. This resulted in losses for which the farmers never received compensation. These examples helped to paint a picture of a power imbalance between the smallholders and their stakeholders. The paradox is that despite these smallholders being Angola's primary source of food production, the government often fails to protect them legally or financially from stronger, sometimes unscrupulous stakeholders. These five themes then were explored in the second phase (Figure 2) wherein mixing occurred.

## **Phase 2 – Integration**

The second phase involved the analysis and coding of the data to identify recurring descriptive quotations and illustrative examples. This process generated 31 items for the ASQ (see Appendix Table 2). The ASQ then was distributed to 181 stakeholders, and the data subsequently were analysed in Phase 3.

## **Phase 3 - Quantitative Findings**

The data revealed that 73.5% (n = 133) were men, whereas women (n = 48) represented 26.5%. Approximately 47% had completed a bachelor's degree, whereas 31% had a postgraduate qualification, 19% had a secondary school education, and only 3% had a PhD. The five themes revealed that slightly more than one half (50.3%) of the participants acknowledges that climate change had negatively affected farmers' living standards. They identified rainfall as providing the biggest risk (44%); ironically when it rained, sometimes it fell so heavily that it destroyed the crops and infrastructure. Other times, too little rain fell, crops withered, and livestock struggled and died. This risk was followed closely by food shortage (40%) and then education, and health and wellbeing (26%).

The most skewed response emerged under social and governance themes, wherein 179 out of 181 participants (98.9%) suggested that the government had incorrect financial priorities for agriculture. These respondents believed that government should increase investment in Angolan agriculture, rather than subsidising food imports, and that the agricultural sector should be viewed as a strategically important industry. More than three quarters of the respondents agreed that government funding had fallen over the years and that the funding often was not adequate because it failed to meet the specific needs of the farmers.

A series of chi-square tests revealed a relationship between the demographic characteristics of the respondents (e.g., age, gender, occupation, and qualifications) and their views on the following topics: the importance of small-scale farmers in Angola, the contribution of family farming, agribusiness and state farming to food security, and the challenges small-scale farmers face in obtaining formal credit. A statistically significant relationship emerged between both qualification ( $p < .001$ ) and occupation ( $p < .001$ ) and their view on these topics. This finding suggests that a farmer's level of education could have a crucial impact on their ability to make informed decisions on adapting to climate change. Based on both qualitative and quantitative analyses, it appears that small-scale farmers are struggling with a sense of helplessness and vulnerability aggravated by their weak relationships with stakeholders. Despite supplying most of the locally consumed food, small farmers have little relationship with stakeholders, many of whom view smallholders as being unimportant (Conway, 2014; IFAD, 2020). This might help to explain why government funding has decreased over time and why government policies inadequately meet the smallholders' needs. This disconnect between smallholders and their stakeholders is a growing concern because they coexist in the same country. If this trend continues, problems loom, including the country's inability to feed itself and potential social unrest, which would have significant implications for the Angolan government.



## Discussion

This study employed an exploratory sequential mixed methods research design, an approach used in similar sub-Saharan farming contexts (Dowsing & Cardey 2020; Khoza et al., 2019; Mbengwa et al., 2019; Mutunga, 2017). This exploratory sequential approach parallels these previous studies' thinking and practice in helping to gain a deeper, more complete understanding of a complex research problem wherein data are limited. This approach enabled the researchers to utilize both qualitative and quantitative research approaches to gain a more insightful understanding of the multifaceted issues related to climate change. The smallholders' and their stakeholders' experiences of climate change suggest that climate change is a reality; yet climate change still is a relatively unexplored topic in Angola. As farmers and stakeholders share the same environment, comprehending their interactions can aid greater resilience in the smallholder sector and, ultimately, eradicate poverty, "achieve food security, promote sustainable agriculture, and enhance nutrition" (HLPF, 2017).

Previous data have demonstrated that Angolan government funding has fallen over the years, a concern for smallholders that is reinforced by poor coordination and implementation. Consequently, these farmers feel dissatisfied with the government's seeming disconnect and disinterest. Angola is not unique. Thurow (2013) believed that part of the difficulty stemmed from policymakers in African countries having limited comprehension or experience of farming and, therefore, little enthusiasm to engage with smallholders' concerns. This observation that many African governments have little interest in their smallholders continues to appear (Hlophe-Ginindza & Mpandeli, 2021), and might help to explain why many African nations, like Angola, struggle to feed their citizens. Continued indifference in the guise of limited communication and understanding creates unsuitable agriculture policies.

In conclusion, the exploratory sequential mixed methods research design, involving use of a three-phase process, enabled the researchers successfully to elicit smallholders' and their stakeholders' opinions regarding the complex issues that smallholders face (Dentoni et al., 2017). This understanding, from bottom-up and top-down perspectives could help to reduce systemic risks and to reduce the impact on farmers' lives.

## Limitations

The main limitation was triangulating the findings to wider Angolan data because Angola lacks those data. Furthermore, some respondents were reluctant to participate because they were members of the ruling political party and feared that participation might jeopardise their jobs. This might reflect the fact that, in Angola, the lines between politics and other activities often are blurred, and the procedures for participation are complex and bureaucratic. As a result, the sample size for the quantitative data had to be kept relatively small. Despite this limitation, the mixed methods research approach employed in this study provided valuable data, which helped to address the research problem and to meet the study's objectives. Despite the previously cited political concern, the fact that 98.9% of the 181 survey participants were confident to state they believed that the government's weak support of the agricultural sector suggests that many participants believed that the research problem was too important to ignore.

## Summary and Conclusion

This study adopted an exploratory sequential design consisting of three phases (see Figure 2). Its design combined qualitative interviews and a quantitative survey using the newly created

research ASQ instrument. This combination provided data that can be used to help to develop a more thorough understanding of the changes needed to enhance farmers' resilience, in contrast to using a single data approach. This phase sought to collect and to identify data that could be used to create themes for further exploration. This phase also allowed the researchers to use the farmers' and the experts' opinions and experiences qualitatively to illustrate key issues surrounding climate change and its impact on Angola's smallholders. These issues led to the emergence of the following five themes: Environmental uncertainty, Socio-cultural uncertainty, Governance uncertainty, Economic uncertainty, and Climate risk management.

The qualitative data framed the ASQ, which was subsequently issued to 181 stakeholders. Initially, the threat of COVID-19 appeared problematic in issuing ASQ, but out of this problem arose a solution. The use of local research assistants allowed meaningful data collection and did not compromise the quality. The data revealed that, although the stakeholders interact regularly with smallholders, they were often unfamiliar with the research problem—the impact of climate change on smallholders. The evidence suggests that despite smallholders and their stakeholders existing in the same context, the relationship does not appear to be wholly productive. This undermines smallholders' ability to pursue strategies that will them to adapt to climate change, but, paradoxically, will generate long-term problems for these stakeholders.

The current situation suggests that there is a power imbalance between smallholders and their stakeholders that is manifest in their disinterest, lack of concern, and even questionable practices. This situation bodes badly not only for smallholders, but also for Angola in the short, medium, and long term, in the form of rural migration to overpopulated urban areas, foreign currency misspent on expensive imported foodstuff, and a growing economic and social disconnect between a disenfranchised rural population and an elite centred in urban centres. A more constructive partnership between these smallholders and their stakeholders is crucial if Angola is to develop sustainably in the face of climate change.

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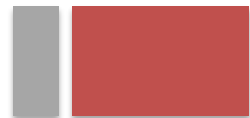
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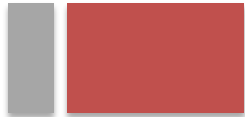
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**Appendix**

Table 1: Example of coded transcripts translated from Portuguese

Transcripts	Codes
<p><b>Q: Can you tell me, how has climate change been a problem for you as a farmer? Why?</b></p> <p><b>FB2:</b> Yes, there was a decline in the rainfall last year with several impacts on the production of maize. In fact, we did not harvest anything that year. Conversely, this year rained too much, and as a result, a lot of vegetables that we produce were damaged, mainly tomatoes. For instance, there exists a kind of potato which is resilient to excessive rainfall, but this year, even this potato couldn't resist, it ended up spoiling, including onion and garlic.</p> <p><b>Q: Only risks from climate change or other additional risks?</b></p> <p><b>FB2:</b> Yes, we also face another additional risk like the case of pests or insects.</p> <p><b>Q: How do you do to recover from this loss?</b></p> <p><b>FB2:</b> Unfortunately, when you lose production in that condition you do not have mechanisms to recover from that loss.</p> <p><b>Q: So then how do you manage the impact of these risks?</b></p> <p><b>FB2:</b> In the case of drought, we have used the irrigation system through the ditches. This system works better to the farms which are close to the rivers and it is difficult to apply to the land which is far from the rivers.</p> <p><b>Q: So what about in the case of excessive rainfall?</b></p> <p><b>FB2:</b> Well, there is nothing to do regarding the production of maize. In that case, farmers lose most of their cultivation. But if the risk is related to a pest then we use pesticides. The big problem is that the production of tomato requires a lot of investment when rainfall too much.</p>	<p>A little rainfall</p> <p>Too much rainfall</p> <p>Pest and insects</p> <p>Lack of social protection schemes</p> <p>Traditional irrigation system</p> <p>Applying pesticides</p> <p>Higher investment</p> <p>Crop diversification</p> <p>High value market High income</p> <p>Growing crops based on custom and season High Profitable High investment</p>



<p><b>Q: What is your main farming activity?</b>  <b>FB2:</b> I used to grow crops such as beans, maize and tomato.</p> <p><b>Q: So why those particular crops?</b>  <b>FB2:</b> Actually, the main crop that I have used to grow are vegetables. They help me a lot because of their high value in the market and they are so profitable.</p> <p><b>Q: What would help you to make decisions about the products that the market need?</b>  <b>FB2:</b> I grow crops based on our custom and season. For instance, growing tomato in the wet season is more profitable, then I produce more tomato on that season. But it also requires a lot of investment because of the use of pesticides.</p> <p><b>Q: Can you tell me how did you fund the business?</b>  <b>FB2:</b> Some can get money by making Capuca (Moonshine - homemade alcohol from sugar cane). I personally have done a non-farm job or I borrow money to the people close to me. The issue with borrowing is that you have to pay interest and sometimes the interest rate is 10 to 10 and if you fail to repay can be a problem.</p> <p><b>Q: Can you tell me if there is a need for a specific financial services (finance, insurance, saving and credit) for farmers in Angola? (Probe what can be done to meet this need?)</b>  <b>FB2:</b> Very important this services.</p>	<p>Making capuca (Moonshine - homemade alcohol from sugar cane)          Borrow money to close people          High interest rate loans</p>
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Table 2: Generating a quantitative survey instrument from qualitative findings

N°	Outcome of interview questions	Survey Questions
1	Environmental uncertainty	Do you observe the adverse effects of climate change on farming?
		What is your overall perception of the impacts of climate change on farming?
		Have the effects of climate change had an impact on farmers' living standards?
		In your view, what is the highest risk small-scale farmers face from climate change?
2	Socio-cultural uncertainty	What do you think that the Angolan government should do to address poverty and food insecurity issue?
		How do you rate the level of production training of farmers that impact positively the quality of production as well as their livelihood? (see Appendix A)
		Farmer decisions on what kind of crop to grow in a particular year depend on (see appendix A)
		The majority of small-scale farmers do not have a bank account because (see Appendix A)
		In your view what is the main social factor that has been affected by climate change in Angola?
		The younger male generation is likely to seek employment outside the agricultural sector compared to adults and the younger female generation because?
		Overall, social learning groups, collective action, and the general empowerment of the farmers can help build a more resilient social system.
3	Governance uncertainty	Please indicate whether you agree or disagree with the following statements based on the following rating scale (see Appendix A)
		What is the overall satisfaction level regarding the institutions and public policy instruments focused on the family farming system in Angola?
		How required are the policy interventions which can help small-scale farmers to rise out from poverty?
		How important are alternative markets and better market linkages that can assist small-scale farmers to improve productivity and increase income from crop sales?
		How challenging is it to find capital to fund the business of farming in Angola

4	Economic uncertainty	Please indicate whether you agree or disagree with the following statements (see Appendix A)
		Access to appropriate financial services such as microcredit, savings and micro-insurance are essential to help small farmers build resilience from the risks they face.
		What are the most difficulties that small scale farmers encounter in obtaining credit from traditional financial institutions?
5	Climate risk management	Please indicate whether you agree or disagree with the following statement (see Appendix A)
		What are the barriers do you think to prevent small-scale farmers from coping with catastrophic shocks such as climate change?