



PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported
TITLE			
Title	1	Farmers' Demand for Climate Information Services in West Africa: A Systematic review	Page 0
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	See the Prisma checklist for abstract
INTRODUCTION			
Rationale	3	<p>By 2050, Africa's population will reach the 2.5 billion (van Ittersum et al., 2016). The associated food demand for this population will double thus, it will be the leading cause of food insecurity and famine across the continent (Hall et al., 2021). The appropriate response to this future food demand is to produce more food. Given that more than 80% of African agriculture remains rainfed, there is no hope that Africa can feed itself by 2050 without an immediate response strategy to cope with climate variability (Dunkelman et al., 2018). The question is how can Africa deal with the climate variability?</p> <p>According to Brasseur and Gallardo (2016) and Dinku et al (2017), this requires accurate, adequate and timely, farm level information on climate variability. Weather forecast has been an approach through which farmers get to know and understand how farm decision can respond to natural occurrences (Antwi-Agyei et al., 2021). It has therefore been established that climate information services (CIS) can be an integral input in farm decision making because of its potential of reducing risk in agriculture that can threaten agricultural livelihoods (Alliagbor et al., 2021; Carr & Owusu-Daaku, 2016; Ouédraogo et al., 2018; Roudier et al., 2014).</p> <p>Therefore, the use of CIS has become an adaptive strategy for farmers (Auer et al., 2021; Feleke, 2015) because the indigenous knowledge through the use of some indicators from trees, birds, stars, and ants' movement is not effective everywhere (Ebhuoma & Simatele, 2017; Jaurès Amegnaglo et al., 2022; Nyantakyi-Frimpong, 2019). Even if this combination of CIS and Indigenous knowledge is possible, it requires a lot of work and many years of research to come out with usable forecasts (Mahoo et al., 2015; Radeny et al., 2019). The urgency of the situation recommends the use of CIS to support farmers in their decision-making because it can be directly on mobile and geolocalized; it is more reliable and reproducible than the indigenous forecasts (Jones & Harvey, 2016; Naab et al., 2019; Vincent et al., 2018; Vogel et al., 2019)</p> <p>The problem is that the supply of CIS remains very low in Sub-Saharan Africa (Tarchiani et al., 2018; Vaughan et al., 2018; Carr & Owusu-Daaku, 2016). According to Jones and Harvey (2016) and Singh et al., (2018), the lack of reliable historical observations both to understand the current climate and to evaluate climate models are the bottleneck of CIS uptake in SSA. The coarse scale of future climate projections, some social and economic barriers including socio-cognitive constraints and a disconnect between users and producers of CIS are the second group of constraints for CIS uptake (Antwi-Agyei et al., 2021; Jones & Harvey, 2016; Singh et al., 2017; Pons et al., 2017; Msemo et al., 2021; Singh et al., 2018). Also, inadequate institutional capacity to effective delivery of CIS (Zougmore et al., 2016; Diouf et al., 2019; Mabe et al., 2014; Ouédraogo et al., 2018; Singh et al., 2018) is another hinder CIS adoption in SSA.</p> <p>All these reasons explain the current use of indigenous weather forecasts despite a revolution in CIS (Ebhuoma et al., 2020; Ebhuoma & Simatele, 2017; Jaurès Amegnaglo et al., 2022). Given all these challenges, one of the solutions is the use of commercial CIS suppliers beside the national agrometeorological offices. However, only commercial CIS suppliers (Esoko in Ghana, and Ignitia in Mali and Burkina Faso) are serving in all ECOWAS (Etwire et al., 2017; Nyadzi et al., 2022). The questions that come to mind is why is there a low supply of CIS in ECOWAS? Is it a lack of demand? A critical analysis of these issues raises the following questions:</p> <ol style="list-style-type: none"> 1. What is the current level of climate information services demand in West Africa? 2. What are the characteristics of climate information services demanded by farmers? 3. What are the key drivers of demand for climate information services? 	Page 1
Objectives	4	<p>The main objective of the study is to assess farmers weather forecast demand in West Africa.</p> <p>Specifically, the study aims at:</p> <ol style="list-style-type: none"> 1. determining the proportion of farmers demanding climate information services; 	Page 2



PRISMA 2020 Checklist

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		2. identifying the characteristics of climate information services demanded by farmers																			
		3. identifying the key drivers of the farmers' climate information services demand																			
METHODS																					
Eligibility criteria	5	<table><thead><tr><th>Criteria</th><th>Inclusion</th><th>Exclusion</th></tr></thead><tbody><tr><td>Research articles and reviews</td><td>Articles and reviews</td><td>Conference papers; Articles processing; government reports, project reports</td></tr><tr><td>Language</td><td>English and French articles and reviews</td><td>Non- English and non-French articles</td></tr><tr><td>Year of publication</td><td>2013-2022</td><td>Before 2013.</td></tr><tr><td>Countries</td><td>articles and reviews from ECOWAS</td><td>Non-ECOWAS articles and reviews</td></tr><tr><td>Fields</td><td>The selected fields are: Social science, agricultural science, business economics and econometrics</td><td>Any field different from the selected one</td></tr></tbody></table>	Criteria	Inclusion	Exclusion	Research articles and reviews	Articles and reviews	Conference papers; Articles processing; government reports, project reports	Language	English and French articles and reviews	Non- English and non-French articles	Year of publication	2013-2022	Before 2013.	Countries	articles and reviews from ECOWAS	Non-ECOWAS articles and reviews	Fields	The selected fields are: Social science, agricultural science, business economics and econometrics	Any field different from the selected one	Page 4
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Information sources	6	SCOPUS GOOGLE SCHOLAR	Page 4																		
Search strategy	7	The search process used the following keywords in the title: ("Climate services" AND demand AND agriculture) OR ("Weather forecast" AND demand AND agriculture) OR ("Climate information" AND demand AND agriculture). However, with these keywords, the results were not fruitful. The last formula used to extract the records is finally: TITLE ("Climate information" OR "Climate service" OR "weather forecast") AND (agriculture) AND SUBJAREA (busi OR deci OR econ OR soci)	Page 4																		
Selection process	8	When a paper met the inclusion criteria describe above in "Eligibility", we proceed by reading the abstract to detect whether it can answer at one of our research questions. If yes, the paper was deeply reviewed and the key findings summarized.	Page 4																		
Data collection process	9	<div>1. Definition of keywords</div> <div>2. Definition of inclusion and exclusion criteria</div> <div>3. Selection of database (SCOPUS & Google Scholar)</div> <div>4. Definition of search strategy</div> <div>5. Search on databases</div> <div>6. Extraction of records</div> <div>7. Screening (retried studies, quality assessment) with respect to specific objective</div>	Not reported in the paper																		
Data items	10a	Outcomes related to objective 1: Proportion of farmers demanding CIS (68%) and Farmers Willigness To pay CIS (USD 2.01 for daily forecasts). Outcomes related to objective 2: The usability of CIS, Daily forecasts & geolocalized CIS and customized CIS are the key features farmers are looking for in the ECOWAS region. Outcome related to objective 3: The main drivers of CIS demand are price and income, vulnerability to climate variability, beliefs and religion, complementary services, gender, type of crops and farm size.	Page 10																		
	10b	According to consumer theory, information such as elasticity of price and income, ranked substitutes of CIS, which are still lacking, are key for the understanding the CIS demand. However, the review showed that few research work has been conducted in this area. The review also showed that, whether CIS is considered as a necessity good (such as seed and fertilizers), to farmers, is vital for suppliers' decision-making.	Page 17																		
Study risk of bias	11	The sampling strategy were used to detect some bias. The word "farmers" still general and does not clear segmentation to the type of	Not reported in the																		



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assessment		crops. Indeed, the type of crop can make a difference in the Climate Information Services (CIS).	paper
Effect measures	12	<ul style="list-style-type: none"> - Proportion of farmers demanding CIS in West Africa (%) - Willingness To Pay for CIS (USD/daily forecasts) - Proportion of papers related to each CIS characteristics (%); - Proportion of papers related to each Drivers (%) - Proportion of papers related to CIS' Substitute (%) 	Not reported in the paper
Synthesis methods	13a	<p>The processes used to decide which studies were eligible include the following:</p> <ul style="list-style-type: none"> - The study meets all the inclusion and exclusion criteria - The study contains relevant information for at least one of our study objectives; - The methods used in the paper is well described and replicable 	Page 4
	13b	Once the records are extracted from SCOPUS and Google Scholar in Excel format, the duplicates were removed before the inclusion criteria application. For each records included, the full paper was read after reading the abstract in the Excel sheet. In the same file, additional column was added to capture the objectives outcomes in each paper in terms of keywords. From this synthesis, the tabulations and graphs were designed for late use in this report.	Not reported in the paper
	13c	All the results in this study used Cross-Tabulations in Excel to extract tables. Some tables were used to design graphs.	Not reported in the paper
	13d	<p>In order to synthesize results, we downloaded first all included papers in folder. Then, a template including:</p> <ul style="list-style-type: none"> - References; - Topic; - Theory and analysis methods; - Key results; - Attribution of the results to at least one specific objective of our study; - Critiques on methods and key finding were applied. 	Not reported in the paper
	13e	The theory and methods of sampling used are the major heterogeneity causes among study results. For example, the majority of studies consider the general word "farmers" while a segmentation may lead to different needs and demand.	Page 7-9
	13f	All the included studies were aligned with the theoretical variables when it comes to demand assessment.	
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Not reported in the paper
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Not reported in the paper
RESULTS			
Study selection	16a	Figure 3: PRISMA flow diagram for systematic reviews adapted (Page et al., 2021)	Page 6
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Not reported in the paper
Study characteristics	17	Cite each included study and present its characteristics.	Not reported in the paper



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Risk of bias in studies	18	The sampling strategy were used to detect some bias. The word “farmers” still general and does not clear segmentation to the type of crops. Indeed, the type of crop can make a difference in the Climate Information Services (CIS). For example, the demand of staple crops farmers may be different than cash crops farmers’ demand. Also, the demand of tree crops farmers may be different than the livestock farmers. Among the papers reviewed, the target remains too broad.	Not reported in the paper
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimates and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Not reported in the paper
Results of syntheses	20a	Sampling strategy may be a source of risk because the majority of studies do not segment deeply the sample of farmers targeted.	Not reported in the paper
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Not reported in the paper
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Not reported in the paper
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	Not reported in the paper
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Not reported in the paper
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Not reported in the paper
DISCUSSION			
Discussion	23a	The demand for CIS is high (68%) which means that the farmers start living the climate variability effect. Suppliers and government should work jointly to deliver the CIS to farmers following the characteristics gathered from the literature review. The	Page 10-17
	23b	Discuss any limitations of the evidence included in the review.	Not reported in the paper
	23c	The topic is quite new in West Africa. Some general report may be relevant when reviewing the literature.	Not reported in the paper
	23d	The results suggest that policy can make CIS available for farmers because 68% of them are demanding the service. In addition, farmers willing to pays for CIS if delivered daily, then suppliers may assessment the profitability at this amount and see whether they can supply to farmers in West Africa. The knowing the key characteristics, suppliers and the entire system should include those features when delivering the CIS to farmers. Future research may focus on: <ul style="list-style-type: none"> - the elasticity of price and income; - ranking the CIS’ Substitutes; - determining whether CIS is a necessity good for farmers 	Page 10 -17
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Not reported in the paper
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Not reported in the



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	24c	Describe and explain any amendments to information provided at registration or in the protocol.	Not reported in the paper
Support	25	Funding acknowledgement: We acknowledge the funding from the International Development Association (IDA) of the World Bank to the Accelerating Impact of CGIAR Climate Research for Africa (AICCRA) project. Contacts: Dr Mathieu OUEDRAOGO, The Alliance of Bioversity International and CIAT. S/C IFPRI Almadies, Dakar BP 24063 Country : Senegal; e-mail : m.ouedraogo@cgiar.org ;	Not reported in the paper
Competing interests	26	The authors declare no conflict of interest	Page 19
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71
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