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# A review of soil fertility management communication in sub-Saharan Africa

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**Abstract**

In sub-Saharan Africa (SSA), declining soil fertility is among the factors affecting optimal food production. Although a number of interventions have been implemented to improve soil fertility management (SFM) in SSA, their adoption especially among small scale farmers has been low. Although the literature provides considerable evidence of socio-economic factors which influence adoption, the subject of how communication influences adoption of SFM remains under-explored. This paper therefore reviewed studies on SFM communication in SSA. The objectives were to identify the current focus of studies on SFM communication, the current definitions of communication which informed such studies, and the type of SFM practices being communicated in the SSA region. Using specific search terms, articles were collected from various databases and content analysed. The review revealed five main themes as the focus of current studies on SFM. The study also revealed two main interpretations of communication which in turn influence the use of either diffusion or participatory communication strategies for SFM communication. The review also showed a focus on integrated soil fertility management (ISFM) messages in the SSA area. The study concludes that while each of the two communication strategies has their individual strengths, farmers prefer participatory strategies. This is because participatory strategies foster interaction and greater understanding; thereby, increasing the likelihood of farmer adoption of SFM practices in SSA. The review concludes by calling for further research on the use of participatory communication to engage farmers about various SFM practices in SSA.

*Keywords:* adoption, farmers, interaction, ISFM, local knowledge, participation

## 1 Introduction

Despite the significant contribution of agriculture to the development of most economies in sub-Saharan Africa (SSA) (Dzanku & Aidam, 2013), it is still plagued with various challenges which threaten continuous food production and overall agricultural sustainability (Conceição *et al*., 2016). Within SSA countries like Ghana, there is a call to pay particular attention to soil management and maintenance as part of the drive towards sustainable agriculture (Singh *et al*., 2001). This is because even though soils are considered an important resource for sustaining living organisms (White *et al*., 2012), most soils in SSA are nutrient deficient due to high rates of nutrient depletion (Montgomery, 2007). The decline in soil nutrients is a result of soil erosion (Veihe, 2000), loss of soil organic matter content and loss of soil fertility (Manlay *et al*., 2007). Soil fertility decline, in particular, is a major concern which needs to be addressed urgently (Morris *et al*., 2007). Until declining soil fertility levels are addressed and reversed, it will be impossible for countries within the SSA region to solve their current problems of insufficient food production (Donovan & Casey, 1998) and ensure sustainable agriculture for future generations (Borlang as quoted in Sishekanu *et al*., 2005).

Soil fertility refers to "the ability of the soil to supply all the essential plant nutrients in proper amounts in available forms and in suitable balance" (Sishekanu *et al*., 2015, 12). In addition to nutrients, fertile soils should also have the capacity to supply water and air in quantities required for plant growth. One main attribute of a fertile soil is the presence of soil organic matter. Soil organic matter is the portion of the soil made up of plant and animal materials containing essential plant nutrients. Soil organic matter aids to strengthen

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soil structure, enables the growth of soil microorganisms, improves the infiltration of water in the soil and builds the water retention capacity of the soil; thereby reducing soil erosion (Sishekanu *et al*., 2015). Thus, soil fertility should lead to soil productivity. In other words, fertile soils should provide all essential nutrients needed for plant growth and also enable a satisfactory environment for plant growth by holding adequate moisture and providing good temperature, air and light.

One way of safeguarding soil fertility is by soil fertility management (SFM) which is defined as "all the attributes, aspects and activities that maintain, enhance and sustain the ability and capacity of the soil to supply adequate quantities of nutrient elements for optimal plant growth" (Soil-Water Management Group, 2005, 9). In other words, SFM involves working to improve the health of the farming ecosystem components such as soil and water in order to increase nutrient supply for plant growth. Managing the fertility of the soil is about implementing activities at the farm level to ensure increased soil nutrients and improved soil conditions for plant growth. Since the 1960s, several SFM practices have existed at different points in time (Vanlauwe & Giller, 2006). These have ranged from the use of inorganic fertilisers alone, the use of organic inputs together with minimal inorganic fertiliser, the use of organic inputs only and currently the use of integrated SFM practices which promote a combined use of organic and inorganic fertilisers and also address the social and economic dimensions of SFM. Even though each of the above listed SFM practices have their own individual successes depending on the agro-ecological zones in which they have been implemented over the years, their rates of adoption among farmers have been low (Ajayi *et al*., 2007), short-term, and unsustainable (Bationo *et al*., 2003).

Generally among farmers, adoption of new technologies or innovations is not straightforward. For one, farmers need to be aware of the existence of a problem and be motivated to act to address that problem based on an understanding of the benefits associated with acting. In most instances, factors which have been found to influence adoption are dependent on the characteristics of the individual farmer and the characteristics of the practice to be adopted (Schlecht *et al*., 2006). Farmer-specific characteristics often include farmer's farm size, land tenure security, profit orientation, management capacity (availability of equipment and labour), access to credit and markets, awareness of the existence of a problem, awareness of the new practice, existing knowledge levels, access to extension support and involvement in a group (Mwangi & Kariuki, 2015) . The characteristics of the practice which influence adoption include the extent of its profitability, the extent to which it solves a technical challenge, the extent to which it conforms to social values and how easy it is to use. Specifically to the issue of SFM, Vanlauwe *et al*. (2017) suggest that it is difficult to convince farmers of the benefits of improved crop and soil management. To this end, low adoption of SFM practices is ascribed to reasons including the fact that (SFM) technologies are often developed at scientific research stations without incorporating farmers' indigenous farming knowledge and practices, and without accounting for the local socio-economic conditions of smallholder farmers (Nyathi *et al*., 2003). Other reasons for the low adoption of SFM practices include the nature of the technology (Tadesse & Belay, 2004), individual farmer characteristics such as lack of awareness of new technologies, insufficient adaptation of technologies to farmers' conditions, poor research-extension linkages (Vanlauwe & Giller, 2006), existing land tenure policies and farming conditions in different agro-ecological zones (Ajayi *et al*., 2007) and low or poor communication of SFM technologies (Kombiok *et al*., 2012).

This paper focuses on the challenge of communication and its role in addressing SFM in SSA (Ballantyne, 2004). The paper acknowledges that definitions of communication vary and have evolved over the years. Early definitions emphasized communication as the transmission of information, ideas, emotions and skills through the use of symbols-words, pictures, figures, or graphs (Berelson & Steiner, 1964). Such definitions limited communication to the dissemination of news and knowledge. Communication as information dissemination also highlighted the importance of persuasion in communication activities. Currently, communication is largely understood as the sharing of information between individuals or between groups of individuals. The emphasis on information exchange suggests that communication occurs when all parties engage in a two-way exchange which results in their contribution to knowledge generation and the utilisation of the generated knowledge based on a common understanding (Khadka, 2000). The interactive nature of communication is described by Khadka (2000) as transactional communication. According to Khadka (2000, 3), "communication is a dynamic process of meaning exchange between senders and receivers whose roles constantly shift in an effort to create understanding". The suggestion is that communication occurs where there is room for messages to be exchanged and all parties in the communication effort contribute to a given conversation, accommodate other's views and strive towards action based on mutual understanding.

The above definitions of communication have significantly informed agricultural communication models over the years. Where communication is viewed as a linear transmission of messages, agricultural communication is guided

by diffusion models which focus on disseminating information and persuading farmers to adopt newly developed farming practices (Coldevin, 2001). Diffusion approaches also reiterate the provision of training for extension workers to provide top-down, linear information to farmers who are considered as passive consumers of information (Agyekum, 2016). Even though top-down communication models are often critiqued as being too prescriptive to farmers thereby making farmers despise the information provided to them (Chukwu *et al*., 2012), such models remain relevant for most SSA countries. For instance, top-down communication models are effective for awareness creation among farmers but are limited in terms of ensuring prolonged farmer adoption of new agricultural innovations in the long term (Coldevin, 2001).

The transactional view of communication informs the use of participatory communication approaches in agricultural communication. Participatory communication is defined by Singhal & Devi (2003, 2) as:

> "a dynamic, interactional and transformative process of dialogue between people, groups and institutions that enables people, both individually and collectively to realise their full potential and be engaged in their own welfare".

Dialogue is therefore central to participatory communication efforts. Such dialogue should enable the exchange of ideas and allow those communicating to brainstorm and find relevant solutions to the problems that confront them. When applied in agriculture, participatory communication is lauded for encouraging social learning and increasing farmer participation (Onasanya et al., 2006; Pamuk *et al*., 2014). Participatory approaches are also considered as more practical because they break down communication barriers (Yahaya, 2003) and facilitate a quicker understanding of the subject being conveyed among agricultural stakeholders (Farouque & Takeya 2009; Muchai *et al*., 2014). Participatory communication approaches are deemed as instrumental in the drive towards sustainable agriculture (Mefalopulos, 2005, McDonough *et al*., 2015) because they allow for greater understanding of agricultural related issues; therefore, making it easier for farmers to adopt sustainable farming practices.

The paper argues that the problem with low/poor communication of SFM activities is related to the definition of communication which informs the type of communication strategy employed. The study therefore set out to investigate current soil fertility communication in SSA using findings of studies on soil fertility communication. The aim was to identify existing communication strategies which inform SFM activities within SSA, identify knowledge gaps and make contributions to how soil fertility communication can be improved in sub-Saharan Africa. Specifically, the study sought to answer the following questions:

1. What is the focus of the studies on SFM communication in SSA?
2. How is communication conceptualised or defined in studies on SFM in SSA?
3. Which SFM practice(s) is/ are communicated in the identified studies?

## 2 Method

Using the search engines "google" and "google scholar", the authors did an online search using the terms "communicating" and "soil fertility", "channels of soil fertility information", "sources of information on soil fertility" "channels of soil fertility information", "communication strategies for soil fertility dissemination", "perceptions of soil fertility communication", "using communication to address soil fertility" and "dissemination strategies for soil fertility information". The search was done in October 2018 and was limited to the period between the year 2000 and the year 2018. The search generated several thousands of journal articles, published theses, conference proceedings and technical reports from across the globe. Several of these were excluded from the review due to criteria set by the authors for the review which are captured in table 1.

The reviewers excluded studies which were situated in countries outside the SSA region and those which contained econometric models which centred on cost-benefit analysis of various aspects of SFM. Also, where it was noticed that a paper appeared both as a conference proceeding and a publication in a journal, the conference option was excluded and the journal article included in the review. At the time of the search, the University of Ghana had not subscribed to all online journal data bases. This affected the number of full articles in the subject area the authors could access given that the search was done using the University's internet facilities. In the end, 32 documents met the set criteria and were subsequently selected for analysis (see appendix A1). A thirteen (13) item coding scheme was developed to aid with the content analysis to glean answers to the questions being addressed in this review. Seven (7) of the items on the coding scheme were descriptors and captured details such as the article title, the document type, the year of publication, the names of authors, the journal name (where applicable) and the context of the study. The other items on the coding scheme captured details such as the focus of the study,

**Table 1:** *criteria for inclusion and exclusion of articles in the review.*

| *Exclusion criteria* | *Inclusion criteria* |
|---|---|
| Studies done outside the SSA region | Studies done in the SSA region |
| Studies on SFM techniques | Studies with a focus on soil fertility communication and knowledge sharing |
| Communication Studies on other areas unrelated to SFM | Studies with a focus on communication preferences of farmers on soil fertility issues |
| Studies with a focus on soil property/composition | Studies with a focus on the effectiveness of communication channels for sharing soil fertility information |
| Conference proceedings which had been duplicated in journal articles | Studies with a focus on sharing indigenous knowledge on soil fertility |
| Studies which included econometric modelling on other aspects of soil fertility | Studies with a focus on factors which influence adoption of SFM options |
| Studies with restricted full access | Studies with a focus on understanding perceptions of soil fertility |

how communication is conceptualised in the study and the SFM practice(s) being promoted or communicated about in the study.

## 3 Analysis

Stroud *et al*. (2017) highlighted three approaches to assessing journal content: a) through a quantitative review which involves an analysis of submission patterns with a focus on nominal variables such as number of authors, year of publication, etc. b) through a qualitative review which entails systematically classifying the content of the identified articles for the purpose of identifying recurring themes and patterns and c) through a summative content analysis which involves doing an initial quantifying of data in order to serve as a basis for comparison and researcher interpretation. This study initially engaged in a quantitative review in order to quantify all the variables on the coding sheet. The quantitative review enabled a quantitative description of the issues emerging from the review. Afterwards, a qualitative assessment was made on two of the variables: the focus of the study and the manner in which communication was conceptualised in the various studies. This is because these two variables provided in-depth information on the crux of the subject matter of this paper: communication of SFM practices in Sub-Saharan Africa. For the qualitative assessment, the researcher read the entire text to assess the SFM communication issue of focus. Themes and patterns were then identified from reading the content.

## 4 Results

Of the thirty-two (32) documents which met the inclusion criteria for this review, twenty-two (22) of them were peer reviewed journal articles, four were Masters Theses, and three were project reports or technical papers. The review also included one book, one conference proceeding and one discussion paper. Aside three documents which provided the context of the studies broadly as West Africa, Southern African Region and Sub-Saharan Africa respectively, the rest of the papers reviewed emanated from English speaking countries in SSA. Most of the studies (11) however originated from Kenya. Ghana and Malawi recorded four studies each, three studies were from Nigeria, Zimbabwe, Ethiopia and Uganda each recorded two studies while Zambia, Mozambique and Rwanda recorded a single study each. The review revealed a glaring absence of studies originating from Francophone SSA countries. However, it is unclear whether the absence is due to a non-existence of studies from such areas or due to the fact that the search for documents was done in English; hence, leaving out studies providing evidence from in French speaking countries in SSA.

### *4.1 Focus of study*

Concerning the issue of the focus of studies on soil fertility communication in SSA, the study found about sixteen different issues as being the preoccupation of the articles which were reviewed. The sixteen issues were condensed into the following five themes:

1. Studies with a focus on the approaches used in soil fertility communication.
2. Studies with a focus on soil fertility communication channels and sources of soil fertility information.
3. Studies with a focus on how soil fertility communication should be done or what should be addressed in soil fertility messaging.
4. Studies on farmer participatory research and its relevance for communication related activities.
5. Studies on communication factors which influence adoption of SFM practices.

### *4.2 Approaches used in soil fertility management communication*

SFM is knowledge intensive. For widespread adoption, it is essential that farmers have access to the requisite information in order to understand the importance of maintaining or improving soil fertility using context appropriate SFM practices (Okoba & De Graaff, 2005). The approach used in SFM communication is often based on one's interpretation and understanding of communication and what it should achieve. Twelve documents did not clearly indicate what they meant by communication. Of the remaining documents, eight of them revealed a conceptualisation of communication as one way dissemination. In seven of the documents reviewed, communication was interpreted as two way and interactional. One document treated communication and dissemination as the same while three documents distinguished between communication and dissemination and addressed both separately.

From the review, where communication is interpreted as dissemination, the approach used is one way, unidirectional and top-down with a focus on how actors such as extension agents and agricultural researchers provide information or knowledge on SFM to farmers (Muchai *et al*., 2014; Adero 2015). At best, such communication approaches only succeed in providing farmers with information which seeks to persuade them to use a recommended SFM practice (Gwandu *et al*., 2014). Where communication is interpreted as transactional, it suggests a two-way exchange of information or knowledge between source and recipient, with an appreciation for feedback and the cultural context within which communication takes place (Adolwa *et al*., 2018). Studies with such an interpretation of communication emphasized a need for SFM communication efforts to utilise communication approaches which are interactive, ensure farmer participation and improve message credibility in order to ultimately increase the likelihood of farmers adopting such SFM technologies.

### *4.3 Channels and sources for communicating about soil fertility management*

The evidence from this review suggests that a wide range of channels are currently being used to communicate about SFM. These channels are broadly categorised as interpersonal, mass media, community based, print, and ICT based audio-visual channels (Adolwa *et al*., 2012). Interpersonal channels include exchanges with neighbours, relatives or friends, songs and poems (Sanginga & Woomer 2009), farmer field schools, farmer to farmer training sessions, and demonstration workshops by extension officers (Mubiru *et al*., 2004; Kimaru, 2011; Adolwa *et al*., 2012).

Mass media channels for SFM communication include radio and television (Muchai *et al*., 2014). Radio in particular is a popular means of spreading information about SFM because of its ability to reach farmers in rural areas (Adolwa *et al*., 2012; Munthali, 2017). Radio becomes a relevant channel for accessing SFM related information especially when it operates as a community radio and broadcasts messages in farmers' local language (Adolwa *et al*., 2018). Print based channels for SFM communication in SSA include extension brochures and booklets, while videos, documentaries, mobile phones and CDs constitute some of the ICT based audio-visual systems utilised in SFM communication (Adolwa *et al*., 2012).

Despite the existence of a plethora of channels available for SFM communication efforts, this review revealed that farmers attribute different levels of effectiveness to individual channels. In other words, according to farmers in the various reviewed studies, not all channels guarantee their understanding of SFM and generate their interest in adoption (Munthali, 2017). The suggestion is that some channels like extension agents, fellow farmers, and mass media are particularly useful for informational and knowledge sharing purposes but do not guarantee understanding leading to actual adoption of SFM practices. However, channels which are more interactive such as learning centres, farmer field days, demonstrations, and agricultural shows are perceived by farmers as more accessible, credible, demonstrable, and engaging (Sanginga & Woomer 2009; Agyekum 2016; Adolwa *et al*., 2018). Such channels are therefore better placed to foster quality farmer interaction or participation which in turn increases farmers' knowledge levels and makes it easier for them to adopt new SFM practices (Gwandu *et al*., 2014).

### *4.4 Soil fertility management practices being promoted in SSA*

From this study, it appears that farmers in SSA are exposed to various integrated soil fertility management (ISFM)

practices. Even though fifteen (15) of the documents reviewed did not state the kind of SFM practice farmers were exposed to, another fifteen (15) of these clearly suggested a range of ISFM practices while two (2) studies emphasised the use of organic SFM practices. The most popular SFM practices mentioned in the review were a combination of organic and mineral fertilisers, crop rotation, compost, the sole use of inorganic fertilisers, intercropping and the use of green manure. In terms of specific breakdowns, it was observed that most of the studies reviewed failed to provide details of the exact combinations of organic and mineral fertilisers. However, concerning intercropping and crop rotations, a few studies (Sanginga & Woomer, 2009; Munthali, 2017) made specific mention of intercropping of maize with legumes as a common SFM practice. In addition, a few studies provided specific details of crop rotation options such as maize and pigeon/ cow peas, maize and soy beans (Sanginga & Woomer, 2009), or soy beans and *Mucuna pruriens* or velvet beans (Kanyama-Phiri *et al*., 2000). Specific soil fertility management practices mentioned in the reviewed manuscripts are listed in appendix A2.

The review also suggested that regardless of the SFM practice being recommended, communication should be interactive and make room for feedback, provide accurate and consistent messages, use channels that foster greater participation and interaction, use simple, non-technical and local language (CTA Report, 2003). In addition, it is suggested that soil fertility messages should address wider concerns such as markets, seeds, production, unresponsive soils, fertilisers, the need to maximize land use for sustainable farming and encourage farmers to adapt technologies to their local farming conditions (Vanlauwe *et al*., 2010). An additional finding was that soil fertility communication efforts should target not only farmers but also policy makers in order create awareness about the need to institutionalize SFM practices into national agricultural research agenda (Ajayi *et al*., 2007).

### *4.5 Communication and adoption of soil fertility management practices in SSA*

The review revealed considerable evidence of social and economic factors which affect or determine farmers' decision(s) to adopt SFM practices. These include farmers' wealth and level of education, labour availability (Mugwe *et al*., 2009), awareness of existenting SFM technologies, poor adaptation of technologies to farmers' conditions, land tenure issues, absence of supportive national and regional policies, and poor research-extension-farmer linkages (Asiedu & Huising, 2017). While these factors are relevant and require attention, this review revealed that communication factors that affect adoption include a poor understanding of information by farmers, poor farmer education, inaccurate message content (Chukwu *et al*., 2012), the provision of inadequate information by agricultural experts, farmer dissatisfaction with the quality of information provided, the provision of contradictory SFM information by agricultural experts such as researchers and extension agents , poor support for extension services (CTA Report, 2003), and the use of channels (Examples of such channels are leaflets and mobile phones) which are not considered by farmers as adequate for obtaining information (Adero, 2015).

### *4.6 Farmer participatory research*

To address some of the communication problems raised in the previous paragraphs, there has been a shift towards farmer participatory research and participatory communication of SFM (Rusike *et al*., 2006; Sanginga & Woomer, 2009). Farmer participatory research (FPR) is based on the argument that within the context of declining food production and rising food insecurity, farmers in less developed parts of the world such as Africa can no longer solely depend on their local knowledge. As such, FPR seeks to bring together local knowledge and outside expertise to find context friendly solutions to e.g. soil fertility problems (Ramisch *et al*., 2006; Kolawole, 2013).

FPR activities have, for example, used field-based learning centres to promote SFM practices in SSA (Giller *et al*., 2011). Such centres are located on farms within farming communities with the aim of showcasing technologies or innovations that integrate local, conventional and emerging knowledge on agricultural practices to facilitate widespread participation and adoption among all stakeholders. Field-based learning centres have been found to stimulate interactive learning to enhance farmers' access to and use of SFM information (Kanyama-Phiri *et al*., 2000; De Jager *et al*., 2004; Gwandu *et al*., 2014;).

A major component of FPR is participatory communication. Participatory communication is inclusive and ensures greater interaction between farmers and other stakeholder groups through dialogue, observation, diagnosis, experimentation and exposure to different types of knowledge (De Jager *et al*,. 2004). Participatory communication brings various stakeholders within the agriculture value chain together and enables such stakeholders to learn from each other without being manipulative or imposing (Huesca, 2002; Barrios & Trejo, 2003; Romanow & Bruce, 2006; Ballantyne, 2009; Odendo *et al*., 2010). However, there is little evidence of successful participatory communication of SFM issues in SSA (Kolawole, 2013). This view is shared by De Jager *et al*. (2004) who suggested that there is a relatively limited

successful gathering of experiences in terms of communication tools and participatory processes which enable effective interaction between farmers, researchers and policy makers.

## 5 Discussion

Farmers' ability to successfully implement SFM practices is dependent on their awareness of the threat of soil fertility decline and the SFM practices they can adopt to manage the decline (Spurk, *et al*., 2020). Communication is a major aspect of awareness creation. While this study agrees that access to information may not necessarily lead to adoption of SFM practices, the study shares the view that information acquisition is a major determinant of farmers' decision to adopt specific SFM practices (Mwangi & Kariuki, 2015). This study further argues that while it is important to provide farmers with SFM information, priority should be placed on how that information is communicated to farmers. This study showed that in SSA, two main interpretations of communication inform how SFM is communicated to farmers. The interpretation of communication as dissemination informs the use of uni-directional and top-down communication strategies. Strategies which emphasize message dissemination focus on spreading information, dispelling existing myths and misconceptions among farmers, and creating awareness of SFM practices.

Furthermore, top-down communication strategies assume the information needs of the farmers, churn out information through pre-determined channels (Obidike, 2011), and overlook or discredit local knowledge (Nederlof & Dangbégnon, 2007). The use of such top-down communication strategies potentially results in a situation where the local knowledge resource for SFM is often left untapped (Adjei-Nsiah *et al*., 2004). Again, when agricultural "authorities" like extension agents and researchers use top-down communication channels to provide farmers with SFM information, they mainly succeed in informing farmers about the existence of particular SFM practices instead of providing farmers with in-depth understanding of the SFM practices, how these work and how these can be implemented. The effect is often farmer apathy and disinterest in the adoption of the promoted SFM practice(s) in the long term (Adero, 2015).

The study showed that a variety of information/communication channels are currently being used to communicate about different SFM practices. It is evident that each channel has specific strengths and weaknesses in their ability to effectively convey information to farmers. For instance, channels which foster one way communication provide farmers with pertinent SFM information. Thus, such channels are effective for addressing the existing information gap on SFM among farmers. However, farmers in the reviewed studies repeatedly indicated a preference for two-way channels which allow for greater interaction and participation. The suggestion is that interactive and participatory communication channels facilitate better understanding of SFM issues and ultimately lead to a higher likelihood of farmer adoption of recommended practices (Chisenga *et al*., 2006; Simachew *et al*., 2010). It therefore behoves on SFM communicators to use channels that are preferred by farmers to provide SFM information to farmers in order to facilitate greater understanding and adoption (Kimaru-Muchai *et al*., 2012).

This review provided evidence of how FPR has led to the joint development and implementation of SFM practices and also showed the importance of participatory communication in FPR activities (Rusike *et al*., 2006, Mubiru *et al*., 2004). However, this review revealed a dearth of evidence on the successful implementation of participatory communication about SFM in SSA and how it influences different stakeholders under different circumstances to adopt specific SFM practices (Sanginga & Woomer, 2009). In other words, though participatory approaches to research and communication regarding SFM are touted, there is not enough tangible evidence of its implementation and results (Kolawole, 2013). This study therefore calls for further research to explore this gap in knowledge about exactly how dialogue, which is central in participatory communication activities, unfolds to enable the exchange of SFM messages among scientists, extension workers and farmers and fosters farmers understanding and adoption of SFM practices in SSA.

## 6 Conclusion

This paper attempted a meta-analysis of articles about SFM communication in SSA. The objectives were to review findings on soil fertility communication in SSA with the aim of identifying current communication strategies used, identify knowledge gaps and make contributions for the way forward. The study found that current SFM communication efforts are based on two interpretations of communication: either as the transfer of information or as the exchange of information. These two interpretations widely impact the strategies or approaches used to communicate about SFM. Even though the review shows that each SFM communication strategy has its own strength and relevance, the suggestion is that most farmers prefer more interactive ways of communicating. Thus, the study concludes that the transactional interpretation of communication should guide SFM communication efforts in SSA. Such an interpretation accommodates participatory and dialogue-based communica-

tion for mutual understanding. Additionally, this review calls for more research into the nature, processes and challenges of participatory communication and how it enables information exchange for mutual understanding of SFM among researchers, extension workers and farmers in SSA.

*Limitations*

This review used documents obtained from an online search based on the search terms already specified. It is therefore possible that other studies on soil fertility communication exist which may not have been included because they did not emerge during the search or were simply unavailable to the authors. Articles selected for this review focused on SFM communication within the SSA region. Yet, the findings present evidence from only nine SSA countries. It is unclear whether this is because there are no studies from the other SSA countries or studies from those countries did not emerge from the search. Additionally, the authors were unable to get full access to some of the articles. Admittedly, these drawbacks limits the findings, their implications, and the conclusions drawn. Nevertheless, the review provides an initial insight into SFM communication in SSA.

*Supplement*

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*Conflict of interest*

The authors declare that they have no conflict of interest.

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