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Assessment of Use of Selected Social Media Tools by Extension Workers to Disseminate Climate Smart Agriculture (CSA) Information to Farmers in Lesotho

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Abstract:
Agriculture remains a key sector in the economy of Lesotho and majority of smallholder farmers are struggling to improve their agricultural production due to dire effects of Climate Change (CC). The study assessed selected social media tools exploited by extension workers (EWs) to transmit CSA agricultural information that mitigate against devastating effects of CC on agriculture. A simple random sampling technique was used to select 35 extension workers (51%) of the total public extension workers (68) in Maseru, Lesotho. Data were collected using structured questionnaires and analysed descriptively using frequency counts, percentages, mean and standard deviation. Findings revealed that extension service in Lesotho is female-dominated and youthful with a mean age of 40.4 years. Majority were married and educated above certificate level with many years of experience. Most EWs preferred WhatsApp and Facebook which they used to a large extent to transmit CSA technologies to farmers. The EWs generally have positive attitudes towards social media usage, although many constraints still exist. It is recommended that the Ministry of Agriculture and Food Security (MAFS) on behalf of the government make effort to address constraints identified in this study to encourage these youthful, educated and experienced extension workers use more social media to do their work.

Keywords: Assessment, social media, climate smart agriculture, climate change, extension workers, Lesotho.

1. Introduction

Climate Change (CC) has become a worldwide concern, which is one of the major subjects of discussions by many scientists and policy makers. It impacts negatively on the yield of crops with a decrease in agricultural productivity in general in most countries in Sub-Saharan Africa (SSA) and globally [1]. The CC and agriculture have a complex relationship [2,3]. Increasing temperatures, erratic rainfalls and frequent and severe droughts threaten food security in agriculture-based economies. Also, different farming practices contribute to climate change through emission of greenhouse gases (GHGs). The impacts have been harmful to agriculture, especially in tropical Africa [4]. GHGs account for 7% of the total world's emissions, thereby contributing to a higher CC impacts.

Adaptation practices to CC will improve the efficiency of natural resources, build resilience of livelihoods and ecosystems and reduce GHGs emissions. According to [5], practices such as mixing of crops, livestock and agroforestry systems, use of drought tolerant varieties, irrigation, water harvesting, crop insurance, crop rotation, intercropping, conservation agriculture (CA), weather agro-advisories, use of cover crops, and use of climate information systems improve resiliency of vulnerable communities.

In Africa, agriculture remains an integral part of the economy and responsible for about 60% of jobs across the continent. Most SSA households benefit from smallholder agriculture for their livelihoods, and most agriculture is practised by smallholder households. Similarly, agriculture contributed an average of 6 percent to the national Gross Domestic Product (GDP) of Lesotho over the period 2012 - 2016 [6]. There

has been a decline in Agriculture's contribution to the GDP since 1960s, when the sector contributed over 80 percent, to below 20 percent in recent years. Notwithstanding, agriculture still remains a major livelihood for the majority of the rural population, while revenue from products such as wool and mohair are important for the economy. Maize, wheat, pulses and sorghum are the primary crops grown while livestock comprise sheep and goats, which are key for the production of wool and mohair. Cattle on the other hand is mainly subsistence for household use such as draught power, milk, fuel (dung) and meat. Between 2009 and 2013, wool contributed about 55 percent to total agricultural exports on average; wheat flour 25 percent; and maize flour 11 percent. The value of total agricultural exports for crops and livestock on average over the period 2009-2013 was US$ 6.6million [6].

Agricultural sector in Lesotho is being challenged by severe land degradation, use of traditional agronomic practices, overgrazing and high climate variability [7]. Vulnerability to climate risks has reduced the productivity of the sector because farmers have low capacity to mitigate against climate variability due to CC [8]. A series of data have also shown that major crop failure in Lesotho was due to drought and floods. Realisation of this fact made the Government of Lesotho to set in place among other frameworks, a Resilience Strategic Framework (RSF) to guide and coordinate efforts to address weather risks [9].

To emphasise the dangers of CC further, the 2007 Intergovernmental Panel on Climate Change (IPCC) report confirmed that communities living in marginal lands and whose livelihoods are highly dependent on natural resources are the most vulnerable to CC and they must strategise to cope with this phenomenon. Furthermore, Lesotho has also developed the National Adaptation Program of Action (NAPA) on CC in 2007 [10], and identified technology needs in agriculture because it contributes the most important to the national economy and livelihoods of majority of the population [11]. The NAPA process identified several adaptation options, most of which address land and water management and agricultural production, following the finding that chronic food insecurity is likely to be further deepened through CC.

To further address CC effects on agricultural productivity, scientists came up with Climate Smart Agriculture (CSA) strategies. The CSA is any agricultural practice that enhances productivity by contributing to realisation of at least one of the CSA objectives: adaptation and mitigation [12]. In Lesotho, some of the crop-based adaptation practices include Conservation Agriculture (CA), agroforestry, crop diversification, keyhole and trench gardens. The CA has been supported by several organizations such as the Food and Agriculture Organization of the United Nations (FAO), and has been the major focus of the government in terms of allocating resources through subsidies and formulation of agricultural production policies.

In terms of livestock, improved breeds (including drought, heat and cold resistant) of cattle, merino sheep and angora goats are a priority for the country. There is some adoption of improved breeds as well as cross-breeding supported by international development partners such as the International Fund for Agricultural Development (IFAD) and research organizations such as ILRI, mostly with the aim of improving the quantity and quality of milk, wool and mohair. In addition, farmers practice rotational grazing, fodder production, stock size management and improved housing (particularly for poultry), as a means of adapting to weather variability and climate change but also as a means of reducing land degradation. As with most livestock-related resilience practices, provision of adequate health care and good animal hygiene play a key role in boosting livestock productivity, increasing efficiency of production, and enhancing resilience. Overall grassland management and rangeland rehabilitation remain key priorities for the country and should be considered when designing livestock-related programs [12].

Agricultural extension workers have critical roles to play in order to make CSA technologies adopted by farmers. Agricultural extension systems are meant to assist farmers and rural dwellers to receive vital knowledge, including agricultural technology in both developed and developing countries [13]. Remarkably, [14] recognised more than 140 digital agricultural initiatives globally in their review of pros and cons that exist in the use of ICT in agricultural work. Several of these initiatives are made possible in various areas of agricultural extension service by mobile phones, computers, and web-based technologies [15]. Digital agricultural extension is an accessible, cost-effective solution that allows farmers access to actionable knowledge through extension workers [16].

Social media is an offshoot of ICT that can transform agricultural extension services. Social media are web based tools of electronic communication that allow users to personally interact with others individually or in groups for the purposes of exchanging information, sharing thoughts and opinions, influencing and facilitating decision-making by creating, storing, retrieving and exchanging information in any form (text, pictures, video) by anyone in the virtual world [17]. The most popular ones are WhatsApp, Facebook, YouTube, Google+, LinkedIn, Instagram, Blog and Skype. Others like Microsoft teams, Zoom, and Google meet became prominent with the advent of COVID-19 pandemic, when people were forced to work virtually in order to avoid being infected with the deadly disease. Common feature of these platforms is that they can reach millions of people at once and transmit loads of information. This present a huge potential for extension practitioners to reach out to millions of their clientele [18].

Agricultural Extension system in Lesotho is mainly public [19], with a few private stakeholders such as Non-governmental organisations (NGOs), farmer groups, Community-Based Organisations (CBOs), International organisations and higher education institutes [20]. The public extension system has always been top-down in nature and operation. In order to move away from top-down extension to participatory approach and improve performance, the Unified Extension System (UES) was proposed in 2001. It recognised the need to support communities and farmers to reach self-defined goals based on understanding of their challenges and the self-determination of solutions [21]. Despite this proposal, [22] argued that the extension system in Lesotho has not been successful to build the necessary capacity of farmers to manage agricultural resources effectively.

There have been several studies on the use of Information Communication Technologies (ICTs) in agricultural extension services by many scholars, but specific studies on transmission of CSA information by extension workers using ICT via social media is rare. Scholars like [23], [24], [25], [26], [27] and [28] have researched into the use of ICTs in extension in different countries, including Lesotho. To fill this gap, it is necessary to study the use of social media among extension officers in Lesotho regarding transmission of CSA information to farmers. This is necessary considering the popularity and usage of social media in other businesses and professions, and devastating effects of CC on agricultural productivity in Lesotho.

The main purpose of the study was to assess the use of selected social media by extension workers to disseminate climate smart agriculture (CSA) information to farmers in Lesotho. To achieve this main purpose, the following specific objectives were achieved: Identification of personal characteristics of the extension workers, ascertaining preferred social media platforms, determination of extent of social media usage for CSA information dissemination, analysis of types of CSA information disseminated through social media, determination of extension worker's attitude towards use of social media, and identification of constraints to social media usage.

2. Materials and Methods

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This is a descriptive quantitative study carried out in Maseru, Lesotho (Figure 1). Lesotho is land locked country within the Republic of South Africa. It is located between 280 S and 310 S latitudes and 270 E and 300 E longitudes, covering an area of about 30, 355 km2 of which about 12% is arable. It consists of four Agro-ecological Zones (AEZ): The Lowland, Senqu River valley, Foot-Hills and mountains. Lesotho has a continental temperate climate with well-marked seasons of spring, summer, autumn and winter. The average temperature ranges from -2 °C in winter to 28 °C in summer. Droughts occur periodically in three out of every ten years. Maseru district was purposely selected out of ten districts in the country because it has the largest number of extension workers (68). Forty-four extension workers (64.7%) were randomly selected from a list at the Ministry of Agriculture and Food Security (MAFS). Thirty-five (51%) questionnaires were good enough to be analysed after collection.

A semi-structured questionnaire was designed based on related literature and objectives of the study, and used to collect data from respondents. The instrument has six sections as follows: personal characteristic of the respondents; it drew information on their gender: male (1) and female (2); age: (in years); marital status: Married (1); Widow (2); Divorce (3); Separated (4); Single (5); level of education: Primary education (1); Secondary education (2); Certificate (3); Diploma (4); Bachelor's degree (5); Masters (6); PhD (7), and job experience: (in years). The second section dealt with preferred social medial tools by the respondents and this was measured on a 5-point Likert type scale of Not preferred (1), Least preferred (2), Somewhat preferred (3), Preferred (4) and Greatly preferred (5). The third section dealt with the extent of social media usage and was measured with a 4-point Likert type scale of Never (1), Rarely (2), Sometimes (3), and Always (4). The fourth section was about CSA practices transmitted by extension workers and was measured on 2-point Likert type scale of Yes (1) and No (2). The fifth section dwelled on attitude of extension workers towards use of social media and was measured on a 5-point Likert type scale of Strongly Agree, SA (5); Agree, A (4); Undecided, U (3); Strongly Disagree, SD (2) and Disagreed, DA (1). The last section was about constraints to social media usage and was measured on a 2-point Likert type scale of Yes (1) and No (2). Data were analysed with Statistical Package for the Social Sciences (SPSS 20), using descriptive statistical tools such as percentages, frequency counts, means and standard deviation.

Figure 1: Administrative map of Lesotho showing Maseru and other districts.
Source: Lesotho Bureau of Statistics, 2015.

3. Results

The results cover identification of personal characteristics of the extension workers, ascertaining preferred social media platforms, determination of extent of social media usage for CSA information dissemination, analysis of types of CSA information disseminated through social media, determination of extension worker's attitude towards use of social media, and identification of constraints to social media usage.

3.1 Personal characteristics of respondents

Results from Table 1 show that majority of the respondents were female (68.8%) while male accounts for remaining 31.4%. The table also show that majority (65.7%) of the respondents were 40 years of age or below with a mean age of 40.4 years. Furthermore, the findings in this study show that majority of respondents were married (71.4%), some were widowed (8.6%), while the remaining were separated (8.6%). The findings reveal further that all respondents were educated to a certain level. Educational levels attained were Certificate (31.4%), Diploma (31.4%), Bachelor (28.6%) and Masters (8.6%). Majority (50.3%) have 11 to 20 years of extension job experience, followed by 10 years or less (40%) and above 20 years (5.7%), with a mean of about 12 years' experience.

Table 1: Distribution of Personal characteristics of the respondents

Personal characteristics	Frequency	Percentage	Mean
Gender			
Male	11	31.4	
Female	24	68.6	
Age (years)			
≤ 40	23	65.7	
41-60	12	34.3	40.4
Above 60	0	0	
Marital status			
Married	25	71.4	
Widow	3	8.6	
Divorce	0	0	
Separated	3	8.6	
Single	4	11.4	
Level of education			
Primary education	0	0	
Secondary education	0	0	
Certificate	11	31.4	
Diploma	11	31.4	
Bachelor's degree	10	28.6	
Masters	3	8.6	
PhD	0	0	
Job experience (Years)			
≤ 10	14	40	
11-20	19	54.3	12.1
Above 20	2	5.7	

Source: Field Survey, 2022

3.2 Preferred social media tools for CSA information dissemination

For the purpose of interpretation of the findings, the values of the 5-point Likert type scale of Not preferred (1), Least preferred (2), Somewhat preferred (3), Preferred (4) and Greatly preferred (5), were summed up to give 15 and then divided by 5 giving a mean of 3. Items with mean values ≥ 3 were considered as preferred. Information from Table 2 show that respondents preferred WhatsApp (m = 4.54; SD = 0.657), Facebook (m = 3.80; SD = 1.346) and Google+ (m = 3.09; SD = 1.560). This implies that these are platforms that are likely going to be used by extension workers to execute their job activities. According to the same table, YouTube, Microsoft teams, Zoom, Google meet, LinkedIn, Instagram, Blog and Skype are less preferred by the extension workers because they have means less than 3.

Table 2: Distribution of respondents' preferred social medial tools

Social Media	N	Mean (m)	Std. Deviation
WhatsApp	35	*4.54	0.657
Facebook	35	*3.80	1.346
Google+	35	*3.09	1.560
YouTube	35	2.69	1.530
Microsoft teams	35	2.63	1.516
Zoom	35	2.63	1.497
Google meet	35	2.31	1.278
LinkedIn	35	2.17	1.382
Instagram	35	1.97	1.317
Blog	35	1.89	1.078
Skype	35	1.51	0.853

Source: Field survey 2022

*Preferred social media

Note: SD less than 1 indicate similarity in respondents' responses while value of 1 and above indicate difference in their responses.

3.3 The extent of social media usage for CSA information dissemination

For the purpose of interpretation of the findings, values of the 4-point Likert type scale of Never (1), Rarely (2), Sometimes (3), and Always (4) were summed up to give 10 and divided by 4 to give 2.5. Items with mean values ≥ 2.5 were considered to be of greater extent. Table 3 expresses extent of use of social media by the respondents. Out of ten popular social media platforms listed, major ones used to a large extent were WhatsApp (m = 3.37; SD = 0.808) and Facebook (m = 2.77; SD = 1.087). Meanwhile, Google+, Zoom, YouTube, Google meet, Microsoft teams, Instagram, Skype, LinkedIn have means less than 2.5 therefore they were considered to be used at a lower extent.

Table 3: Distribution of extent of use of social media for CSA information dissemination

Social Media	N	Mean (m)	Std. Deviation
WhatsApp	35	*3.37	0.808
Facebook	35	*2.77	1.087
Google+	35	2.06	1.187

Zoom	35	1.91	1.147
YouTube	35	1.77	1.140
Google Meet	35	1.71	1.126
Microsoft teams	35	1.60	0.976
Instagram	35	1.46	0.741
Skype	35	1.37	0.731
LinkedIn	35	1.34	0.725

Source: survey data 2022

*Social media used to a large extent

Note: SD less than 1 indicate similarity in respondents' responses while value of 1 and above indicate difference in their responses.

3.4 CSA practices transmitted through social media by extension workers

From Table 4, application of organic fertilizer (85.7%), crop rotation (82.9%), planting improved varieties (82.9%), keyhole (77.1%), trench gardens (77.1%), IPDM (74.3%), improved animal nutrition (74.3%) and mulching (60%), were prominent CSA practices transmitted by extension workers using social media. Agroforestry (45.7), Contour ploughing (48.6%), Water harvesting (48.6) and Rotational grazing (48.6) were less prominent.

Table 4: Distribution of CSA practices transmitted by respondents using social media.

CSA practice	**Yes (%)**	**No (%)**
Agroforestry	16 (45.7)	19 (54.3)
Keyhole	27 (77.1)	8 (22.9)
Trench gardens	27 (77.1)	8 (22.9)
Crop rotation	29 (82.9)	6 (17.1)
Application of organic fertilizer	30 (85.7)	5 (14.3)
Integrated Pest and Disease Management (IPDM)	26 (74.3)	9 (25.7)
Planting improved varieties	29 (82.9)	6 (17.1)
Contour ploughing	17 (48.6)	18 (51.4)
Mulching	24 (68.6)	11 (31.4)
Water harvesting	17 (48.6)	18 (51.4)
Rotational grazing	17 (48.6)	18 (51.4)
Improved animal nutrition	26 (74.3)	9 (25.7)

Source: survey data 2022

3.5 Attitude of extension workers towards the use of social media for CSA information dissemination

For the purpose of interpretation of the findings, values of the 5-point Likert type scale of Strongly Agree, SA (5); Agree, a (4); Undecided, U (3); Strongly Disagree, SD (2) and Disagreed, DA (1) were added up to give 15 and then divided by 5 giving 3. Statements with mean values ≥ 3 were considered to be positive attitudes. Information from Table 5 show that respondents have positive attitudes towards 12 out 18 statements in the survey. The top five attitudinal statements were: I don't need to have postgraduate qualification to use social media (m = 4.34; SD = 1.110), use of social media will keep me abreast with happenings in other parts of the world (m = 4.14; SD = 1.264), use of social media will expose me to weather information for agriculture (m = 4.11; SD = 1.105), use of social media will increase my

agricultural knowledge (m = 4.11; SD = 1.105), use of social media will expose me to CSA agricultural information (m = 4.06; SD = 0.998). The EWs displayed negative attitudes towards Erratic power supply will not limit my use of social media (m = 2.94; SD = 1.474), I cannot understand or interpret information from the social media (m = 2.46; SD = 1.221), Use of social media will not improve my work (m = 2.23; SD = 1.285), Use of social media will distract me from my domestics chores (m = 2.00; SD = 1.138), Use of social media is of no benefit for agricultural extension workers (m = 1.94; SD = 1.282), and The use of social media will not expose me to modern agriculture (m = 1.77; SD = 0.942).

Table 5: Attitude of respondents towards the use of social media for CSA information dissemination

Attitude	N	Mean (m)	SD
I don't need to have postgraduate qualification to use social media	35	*4.34	1.110
Use of social media will keep me abreast with happenings in other parts of the world	35	*4.14	1.264
Use of social media will expose me to weather information for agriculture	35	*4.11	1.105
Use of social media will increase my agricultural knowledge	35	*4.11	1.105
Use of social media will expose me to CSA agricultural information	35	*4.06	0.998
I have no problem mixing with people during the use of social media at ICT centers	35	*4.03	0.822
Use of social media will help me to keep abreast with government agriculture policies	35	*4.00	1.138
Use of social media will facilitate timely CSA information dissemination	35	*3.83	1.071
Use of social media at agriculture resource centers is expensive for me	35	*3.63	1.060
I cannot afford the cost of data for using social media for work	35	*3.63	1.308
I have sufficient time to use the social media for accessing CSA agricultural information	35	*3.57	1.119
Timing of agricultural programmers on social media are properly scheduled for my use	35	*3.23	1.114
Erratic power supply will not limit my use of social media	35	2.94	1.474
I cannot understand or interpret information from the social media	35	2.46	1.221
Use of social media will not improve my work	35	2.23	1.285
Use of social media will distract me from my domestics chores	35	2.00	1.138
Use of social media is of no benefit for agricultural extension workers	35	1.94	1.282
The use of social media will not expose me to modern agriculture	35	1.77	0.942

Source: survey data 2022

* Positive attitudes towards use of social media for CSA information dissemination
Note: SD less than 1 indicate similarity in respondents' responses while value of 1 and above indicate difference in their responses.

3.6 Constraints or to social media usage for extension

From Table 6, respondents indicated all ten statements as constraints to social media use in extension. The top five were: High cost (91.4%), Non-availability of technical personnel (82.9%), fluctuation or low network service (80%), inability of government to maintain ICT infrastructure (77.1%), Non- availability of genuine components and parts of ICT devices (77.1%). This finding is worrisome because it implies that extension workers will find it difficult to use social media effectively with so many constraints.

Table 6: Distribution of constraints to the use of social medial for extension

Constraints	Constraints (%)	Not a Constraint (%)
High cost	32 (91.4)	3 (8.6)
Inability of government to maintain the ICT infrastructure.	29 (82.9)	6 (17.1)
Non-availability of genuine components and parts of ICT devices.	27 (77.1)	8 (22.9)
Non-availability of technical personnel.	29 (82.9)	6 (17.1)
Fake and substandard ICTs products in the market	27 (77.1)	8 (22.9)
Lack of power supply.	24 (68.6)	11 (31.4)
Insufficient service provider in the country	21 (60)	14 (40)
Lack of skill	21 (60)	14 (40)
Poor basic infrastructure that encourages use of social media at work.	29 (82.9)	6 (17.1)
Fluctuation or low network service	28 (80)	7 (20)

Source: survey data 2022

4. Discussion

4.1 Personal Characteristics

In terms of gender, public extension service in Lesotho is dominated by female (68.6%), this implies that women dominate the public extension system in Lesotho. This finding differs from that of [29] and [30] who reported male-dominated extension service in Southeast Nigeria and Northwest Province in South Africa respectively.

Most extension workers (57.1%) are 40 years of age or less, and the mean age was 40.4 years, indicating that extension workers are youthful, implying that they may be interested in the use of social media during official duties. This is in agreement with the findings of [31] in a study in Kaduna State of Nigeria where majority of extension agents were aged between 30 – 40 years.

Majority of the extension workers were married indicating that they are likely to use social media to keep in touch with relatives and friends and this may influence them to use same platform at work. This is in line with the findings of [32] that 82.5% of extension workers in Kara State of Nigeria were Married.

In the case of education, all extension workers are educated to tertiary level. This implies that formal public extension job usually requires tertiary level of education, at least certificate level, and this is likely to assist them in social media use at work. This may also help them to be able to search for CSA-relevant information online in order to assist their clientele. Similarly, [33] reported that majority of the extension professionals in Southwest Nigeria had B.Sc. They concluded that this should help them to decide on the type of social media tools that will help them to be effective in their job.

There is also an indication that most extension workers in the study area are well experienced with majority (54.3%) of them having 19 years of experience and mean experience of 12.1 years (Table 1). They must have acquired enough knowledge to realise that social media usage at work will improve their efficiency than the traditional extension system in the past. Lesotho government also developed an ICT policy in 2005 which may encourage civil servants to undergo ICT training to improve their efficiency.

4.2 Preferred social media tools

Regarding preferred social media platforms, respondents mostly preferred WhatsApp, Facebook and Google+. This implies that these are platforms that are likely going to be used by extension workers to execute their job activities. WhatsApp and Facebook are the most common social media platforms used

all over the world. Extension authorities can take advantage of this findings and invest more in this platforms. In India, [34] also discovered that WhatsApp, Facebook and YouTube are likely to be used to share farm-based information.

4.3 Extent of social media usage

To a large extent, WhatsApp and Facebook are used to transmit CSA information than any other platform. This is consistent with the above findings that they are the most preferred platforms. This may be due to the fact that these two were the most popular that people use in their day-to-day activities outside work environment.

4.4 CSA practices transmitted through social media

The findings that application of organic fertilizer, crop rotation, planting improved varieties, key hole, trench gardens, IPDM, improved animal nutrition and mulching are CSA information transmitted by extension workers through social media is a welcome development. These practices are very critical and can mitigate against many CC problems. This suggests that the few social media platforms available to extension workers were useful in transmitting most CSA practices to farmers. However, other CSA technologies should be brought on board to make the information complete and helpful to farmers. This is in line with [35] who reported that extension workers in Enugu State of Nigeria use Facebook to communicate CSA information such as effects of deforestation on agriculture, animal husbandry, climate change, fertilizer and erosion to farmers.

4.5 Attitude of extension workers towards social media usage

Extension workers have positive attitudes to most of the 18 attitudinal statements. This implies that they are ready to continue to use social media in their jobs. It is also an indication that they may take up those other social media platforms that they are not using now.

4.6 Constraints to social media usage

There are still many constraints confronting extension workers while using social media. This is a concern and it may demotivate extension workers in doing their job effectively. Issues such as high cost, Non-availability of technical personnel, fluctuation of network service, inability of government to maintain ICT infrastructure, non- availability of genuine components and parts of ICT devices are serious challenges that need attention. Similarly, [36] discovered most common challenges to include poor network access, power outages, and high cost of charges when using social media for extension service delivery in Kesses district in Kenya.

5. Conclusions

The study assessed the use of selected social media by extension workers to disseminate climate smart agriculture (CSA) information to farmers in Lesotho. From the findings it can be concluded that majority of the extension workers were female, married, youthful, educated and experienced in extension service. They preferred using WhatsApp, Facebook and Google+ to send CSA information to farmers, using WhatsApp and Facebook to a large extent.

Prominent CSA practices transmitted by extension workers using social media were: application of organic fertilizer, crop rotation, planting improved varieties, key hole, trench gardens, IPDM, improved animal nutrition and mulching.

Extension workers also have positive attitudes towards most of the attitudinal statements in the survey although serious constraints to social media usage in extension still exist. Some of these constraints include high cost, non-availability of technical personnel, fluctuation or low network service, inability of

government to maintain ICT infrastructure, non- availability of genuine components and parts of ICT devices.

It is recommended that the Ministry of Agriculture and Food Security (MAFS) on behalf of the government make effort to address constraints identified in this study to encourage these youthful, educated and experienced extension workers use more social media to do their work. Facebook and WhatsApp platforms can be officially adopted and used among extension professionals in agricultural agencies, ministries and departments. This can later be extended to other social media platforms that are been neglected.

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Appendix A

Questionnaire on Assessment of Use of Selected Social Media by Extension Workers to Disseminate Climate Smart Agriculture (CSA) Information to Farmers in Lesotho

Dear Respondent,

This is a questionnaire for a study on use of selected social media by extension workers to disseminate climate smart agriculture information. Your response to these questions will be appreciated as it will contribute to the success of this study and all information given will be made confidential.

Thanks and best regards

Date: ……

Tick (V) as appropriate

A. **Personal Characteristics**
1. **Gender**: Male [ ] Female [ ]
2. **Age**: ……years
3. **Marital status**: Married [ ] Widow [ ] divorced [ ] separated [ ] single [ ]
4. **Level of education**: …….
5. How long have you been an extension worker? ……..years

B. **Preferred social media tools for CSA information dissemination**
Tick (V) as appropriate

Social Media	Not preferred	Least Preferred	Somewhat Preferred	Preferred	Greatly Preferred
Facebook					
WhatsApp					
Skype					
Instagram					

Google+					
LinkedIn					
YouTube					
Blog					
Google meet					
Zoom					
Microsoft teams					

C. The extent of social media usage for CSA information dissemination

Tick (V) as appropriate

Social Media	**Never**	**Rarely**	**Sometimes**	**Always**
Facebook				
WhatsApp				
Skype				
Instagram				
Google+				
LinkedIn				
YouTube				
Blog				
Google meet				
Zoom				
Microsoft teams				

D. CSA practices transmitted through social media by extension workers

Tick (V) as appropriate

CSA practice	**Yes**	**No**
Agroforestry		
Keyhole		
Trench gardens		
Crop rotation		
Application of organic fertilizer		
Integrated Pest and Disease Management (IPDM)		
Planting improved varieties		
Application of improved irrigation		
Contour ploughing		
Mulching		
Water harvesting		
Rotational grazing		
Grassland restoration and conservation		

Improved livestock breeds	
Improved animal nutrition	

E. Attitude of extension workers towards the use of social media for CSA information dissemination Tick (V) as appropriate

Attitude of teachers to the use of social media	**SA**	**A**	**U**	**DA**	**SD**
Erratic power supply will not limit my use of social media					
I have sufficient time to use the social media for accessing CSA agricultural information					
I cannot afford the cost of data for using social media for work					
Use of social media will not improve my work					
Use of social media will expose me to CSA agricultural information					
I have no problem mixing with people during the use of social media at ICT centers					
I don't need to have postgraduate qualification to use social media					
I cannot understand or interpret information from the social media					
Use of social media will increase my agricultural knowledge					
The use of social media will not expose me to modern agriculture					
Use of social media will distract me from my domestics chores					
Use of social media is of no benefit for agricultural extension workers					
Use of social media will keep me abreast with happenings in other parts of the world					
Use of social media will help me to keep abreast with government agriculture policies					
Use of social media will expose me to weather information for agriculture					
Use of social media at agriculture resource centres is expensive for me					
Use of social media will facilitate timely CSA information dissemination					
Timing of agricultural programmes on social media are properly scheduled for my use					

***SA - Strongly Agreed; A – Agreed; U – Undecided; DA – Disagreed; SD - Strongly Disagreed**

F. Constraints or challenges to social media usage for teaching

Tick (V) as appropriate

Constraints to social media use	**Yes**	**No**
High cost		
Inability of government to maintain the ICT.		
No skillful operator		
Non-availability of genuine components and parts of ICT devices.		
Non-availability of technical personnel.		
Fake and substandard ICTs products in the market		
Insufficient service provider in the country		
Lack of skill		
Poor basic infrastructure that encourages use of social media at work.		
Fluctuation or low network service		

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