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Evaluating gender differentials in farmers' access to agricultural advice in Tanzania:

An intra-household survey

Authors
Monica K. Kansiime
Martin Macharia
Edward Baars
Deogratias F. Rutatora
Silvia Silvestri
Rahab Njunge

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Monica K. Kansiime, CABI, Canary Bird, 673 Limuru Road, Muthaiga, PO Box 633-00621, Nairobi, Kenya. Email: m.kansiime@cabi.org; ORCID: 0000-0003-1036-8469

Martin Macharia, CABI, Canary Bird, 673 Limuru Road, Muthaiga, PO Box 633-00621, Nairobi, Kenya. Current address: Equity Bank Limited, PO Box 75104-00200, Nairobi, Kenya. Email: machariamartin4@gmail.com

Edward Baars, IITA Central Africa Hub, c/o ICIPE, PO Box 30772-00100, Nairobi, Kenya. ORCID: 0000-0003-3015-1291

Deogratius F. Rutatora, Sokoine University of Agriculture, 3000, Chuo Kikuu, Morogoro, Tanzania. Email: d_rutatora@yahoo.com

Silvia Silvestri, CABI, Canary Bird, 673 Limuru Road, Muthaiga, PO Box 633-00621, Nairobi, Kenya. Current address: 56 Avenue du General de Gaulle, Maisons-Alfort, 94700, France. Email: silsilvestri@gmail.com; ORCID: 0000-0001-7427-0351

Rahab Njunge, CABI, Canary Bird, 673 Limuru Road, Muthaiga, PO Box 633-00621, Nairobi, Kenya. Email: r.njunge@cabi.org; ORCID: 0000-0002-7569-281X

Cover photo: Members of Mafanakio farmers' group in Mapogoro village inspect a soybean demonstration plot facilitated by the African Fertilizer and Agribusiness Partnership (AFAP) under the ASHC/Scaling-up improved legume technologies in Tanzania (SILT) partnership project. *Photo credit*: M.K. Kansiime (CABI).

Abstract

The Gender and the Legume Alliance (GALA) project aimed to support smallholder farming households, especially women and youth, to achieve sustainable legume intensification and increase their participation in markets, by improving access to information and knowledge on farming techniques using multi-media communication approaches and input brokerage. This study provided baseline information aimed at understanding gender differentials in access to agricultural information, information sharing, and important channels for reaching men, women and youth farmers. Data were collected from 332 households (and 998 respondents) in five regions in Tanzania. An intra-household approach was used where up to four members, aged 15+ years old, per household were interviewed. Results show that farmers relied mainly on their own experience (67%), and on a limited array of sources of information represented mainly by extension agents, neighbours and radio. Men were more likely to receive information from radio while women relied on their own experience, and other household members for their information. There were significantly low proportions of young people and older people accessing information from all sources. Demonstration plots and agro-dealers were important information sources in promoting production inputs and more recently introduced practices (such as soil testing, use of inoculants and Purdue Improved Crop Storage [PICS] bags), while farmers' experience was mainly important for traditional practices, for example early field operations. At least 82% of farmers shared information within their households or community, but primarily for traditional agricultural practices. Sharing information on new technologies such as *Rhizobium* inoculants, soil testing and PICS bags was minimal, representing practices that were least used by farmers due to limited awareness, limited access to inputs and high purchase costs. Overall, there is still margin for improving learning and knowledge of newly introduced practices and facilitating input brokerage to enhance access by farmers. Given the varied sources of information used by household members, enhancing information sharing through integrated gender programming is a key strategy.

Key words: gender, input brokerage, legume technologies, multi-media

Contents

List of Acronyms

AFAP	African Fertilizer and Agribusiness Partnership
AGRA	Alliance for a Green Revolution in Africa
ARI	Agricultural Research Institute
ASHC	Africa Soil Health Consortium
B&MGF	Bill and Melinda Gates Foundation
BRiTEN	Building Rural Incomes Through Entrepreneurship
CRS	Catholic Relief Services
csv	comma-separated values
Faida MaLi	Faida Market Link
FFS	Farmer field school
GALA	Gender and the Legume Alliance
HH	Households
IITA	International Institute of Tropical Agriculture
ISFM	Integrated Soil Fertility Management
KIT	The Royal Tropical Institute
NGO	Non-governmental organization
ODK	Open Data Kit
PICS	Purdue Improved Crop Storage bags
RUDI	Rural –Urban Development Initiatives
SAI	sustainable agricultural intensification
SAIRLA	Sustainable Agricultural Intensification Research and Learning in Africa
SILT	Scaling-up improved legume technologies in Tanzania
SMS	Short message service
SSTP	Scaling Seeds and Technologies Partnership
SUA	Sokoine University of Agriculture
TLU	Tropical livestock units
UDS	University of Development Studies
UPTAKE	Upscaling Technologies in Agriculture through Knowledge Extension
VBA	Village-based advisors

1. Introduction

1.1 Background to the study

Sustainable intensification of agricultural systems is important for ensuring a continuous supply of food to meet the present and future food demand (Pretty et al., 2011). Integrated Soil Fertility Management (ISFM) is considered central to sustainable intensification, particularly in Africa where poor soil fertility is the primary production constraint (Vanlauwe et al., 2019). Legume crops such as common bean (*Phaseolus vulgaris* L.), soybean (*Glycine max* L.) and cowpea (*Vigna unguiculata* L.) are commonly grown worldwide (Nassary et al., 2020), with nutritional and economic value to human and feed to livestock (Maingi et al., 2001). Besides, legume crops play a key role in ISFM through fixation of atmospheric nitrogen (N_2), supply of organic resources, enhanced fertilizer uptake and suppression of weeds, among other benefits (Vanlauwe *et al*., 2019).

Despite the benefits, the area under legume cultivation is relatively small in most farming systems in sub-Saharan Africa (Mtambanengwe & Mapfumo, 2009), and has been on the decline in recent years (Minushi et al., 2015). This is in part attributed to low adoption of improved legume technologies (Bentley *et al*., 2018), occasioned primarily by the lack of access to actionable information and the lack of appropriate linkages to factor markets (markets where services such as labour, capital and resources are purchased and sold) (Shiferaw et al., 2015). Moreover, factor markets can also provide critically needed information on inputs, agronomic practices and output marketing if proper linkages are established between the service providers and farmers. Enhancing information flows along the value chain is therefore critical, as it would help generate recommendations for decision makers to foster these linkages and for smallholder farmers' integration into the value chains.

Although the relative importance of and demand for different types of information varies in different situations, there is a consistent demand for information on new varieties, pest and disease management, use of pesticides and fertilizer, as well as weather, credit and markets (Bernard et al., 2014). Despite sub-Saharan Africa having 456 million unique mobile phone subscriptions by the end of 2018 (GSMA, 2019), traditional information sources prevail. Radio dominates as the main mass media source, as the internet is hardly used by small-scale farmers owing to multiple factors including lack of infrastructure in many rural areas, low literacy levels and high internet costs among others. Extension services, family, friends and neighbours, and agro-dealers are important face-to-face sources of information. Considerable investment by donors has extended and strengthened agro-dealer networks, including more emphasis on their role as sources of information and advice (Sones et al., 2015). They link advice to the supply of inputs for new technology uptake and some have a role in output markets. School-aged children and young adults have been acknowledged as conduits for information to farming families. They are usually more dynamic, open to new ideas and more at home with new communication technologies, which make them well suited to act as a link between new technologies and approaches, and older, less literate or connected farmers.

The CABI-led Gender and the Legume Alliance: Integrating multi-media communication approaches and input brokerage (GALA) project sought to harness the current opportunities to improve access to and capacity to use agricultural information and knowledge by poor smallholders to achieve sustainable intensification in legume production in Tanzania, using integrated multi-media communication approaches, targeting men, women and youth. The project was developed under the umbrella of the Sustainable Agricultural Intensification Research and Learning in Africa (SAIRLA) programme.

This study assessed gender differentials in access to market, agronomic and other information, and knowledge by poorer smallholders, especially women and youth, to achieve sustainable intensification. Specifically, the study assessed: (i) information flows within smallholder farming households and within the community; (ii) the importance of information sources on agricultural knowledge and decision making by men, women and youth; and (iii) information flows (including feedback loops) between chain actors – knowledge providers, intermediaries and smallholder farming households. Results provided a basis for development of communication messages and decision on the most effective dissemination channels, and design of input brokerage models that address the needs of women, men and youth farmers. Results are also relevant for public, private and NGO (non-governmental organization) actors keen to deliver more effective policies and investments leading to better targeted communication of information on sustainable agricultural intensification (SAI) and more effective value chain initiatives in Tanzania. In turn, this can lead to an increase in the participation of smallholder farmers, especially women and youth, in markets and to the implementation of SAI practices by farmers that will increase productivity of legumes, increasing soil fertility through nitrogen fixation.

2. Methods

2.1 Study area

The study was undertaken in five regions in Tanzania covering eight districts. The districts were distributed along a transect from the north to the south of Tanzania (see Figure 1, Table 1). The selected sites represented: (i) districts where campaigns on common bean or soybean had or were taking place by CABI projects, e.g. Africa Soil Health Consortium (ASHC), Scaling-up improved legume technologies in Tanzania (SILT), Upscaling Technologies in Agriculture through Knowledge Extension (UPTAKE); (ii) districts where the target crops common bean and/or soybeans are grown; (iii) districts where other complementary initiatives were taking place and have formal partnership implementation agreements with the N2Africa project, e.g. Building Rural Incomes Through Entrepreneurship (BRiTEN), Faida Market Link (Faida MaLi), Agricultural Research Institute (ARI) Selian, Catholic Relief Services (CRS) Soya ni Pesa Project, ARI Ilonga, ARI Uyole, Clinton Development Initiative, Rural –Urban Development Initiatives (RUDI)- Alliance for a Green Revolution in Africa (AGRA); and (iv) sites where the AGRA Scaling Seeds and Technologies Partnership (SSTP) in Africa was taking place.

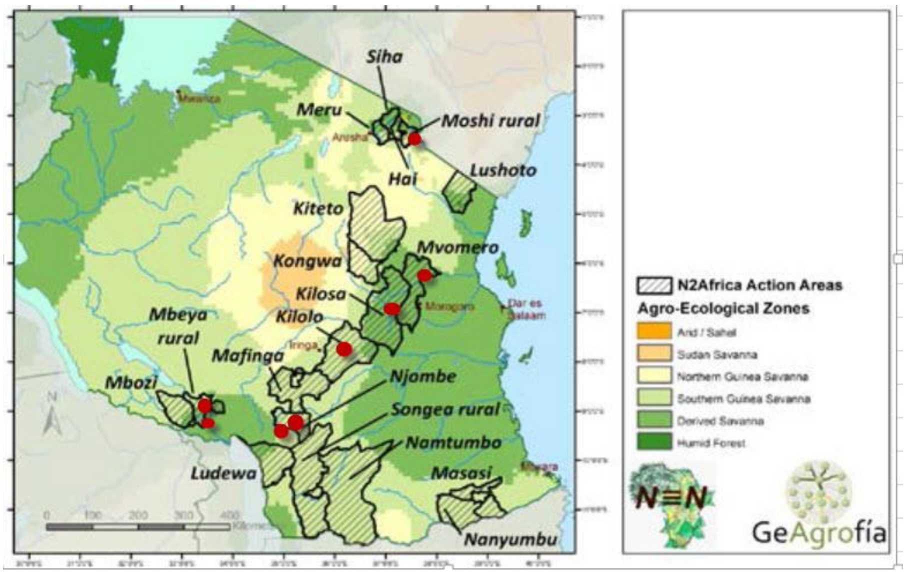

Figure 1: Map of Tanzania showing the study sites (red dots).
Source: Map based on (Farrow, 2014)

The regions also represented distinct agro-ecological zones and farming systems. Mbeya region in the southern highlands is characterized by high rainfall (1000–2000 mm per year) and moderate temperatures. Moving northwards, towards central Tanzania (Northern Iringa, Morogoro, Manyara), the area is characterized by semi-arid conditions; rainfall is unimodal and unreliable delivering 500–800 mm per year, between December and March. Towards the north are the Northern Highland areas (at the foot of Mt Kilimanjaro and Mt Meru) characterized by rich volcanic soils. Rainfall is bimodal and varies widely between 1000 mm and 2000 mm per year.

Table 1: Sample districts, their biophysical characteristics and sampled households.

Region	Biophysical characteristics‡	Sampled district	Parallel initiatives	CABI campaign	No. of households
Kilimanjaro	Volcanic soils from lavas and ash, with deep fertile loams. Altitude is 1000–2500 masl. Rainfall is bimodal ranging from 1000 mm to 2000 mm, cropping season is November to January and March to June.	Moshi rural	BRAC Tanzania, Faida MaLi, ARI Selian	Common beans	77
Morogoro	Flat or undulating plains with rocky hills, moderate fertile loams and clay soils, altitude is 200–600 masl, rainfall is unimodal delivering 600–800 mm per year during December – March.	Mvomelo, Kilosa	CRS, ARI Ilonga, AFAP	Common beans	129
Mbeya	Southern highlands with undulating plains, dissected hills and mountains. Moderately fertile clay soils with volcanic soils. Altitude is 1200–1500 masl, rainfall is bimodal delivering 1000–2000 mm per year during October–December and February–May.	Mbeya rural	BRiTEN, ARI Uyole	Soybean	63
Iringa	Semi-arid lands with undulating plains, rocky hills and low scarps. Well drained soils with low fertility. Altitude ranges from 1000 masl to 1500 masl, rainfall is unimodal delivering 500–800 mm per year during December–March.	Kilolo	Clinton Initiative	Soybean	20
Njombe	Three distinct climate zones in the region: highlands (1600–3000 masl), midlands (700–1700 masl) and lowlands (600–1400 masl). Rainfall ranges from 1000 mm to 1600 mm per year, falling in a single season from November through to May.	Wanging'ombe	BRiTEN, CRS	Soybean	43

AFAP, African Fertilizer and Agribusiness Partnership; ARI, Agricultural Research Institutes –Ilonga, Selian and Uyole; BRAC Tanzania, a microfinance in Tanzania; BRiTEN, Building Rural Incomes Through Entrepreneurship; Faida MaLi, Faida Market Link; CRS, Catholic Relief Services; HHs, households

‡Source: (URT, 2007)

2.2 Study population, samples and data collection

The sampling frame consisted of households in the target villages growing soybean and/or common bean. These households had been exposed or were to be exposed to information delivered through radio, leaflets, comics, radio listening groups, demonstrations and village-based advisors, the key campaign channels. The highest hierarchy of the sampling units was regions, followed by districts, wards and villages. A total of 332 households were sampled across the study area (see Table 1). An intra-household survey approach was used for the study, where up to four members, aged 15 years and above, of the same family were interviewed. For the 332 households enumerated, at least 998 respondents were interviewed. Intra-household analysis was aimed at understanding household dynamics in receipt, sharing and application of information from various sources. It was also assumed that members of a farm family are an important resource for information sharing, learning and application of agricultural practices even if individual household members were not necessarily exposed to formal information sources.

Data collection was done electronically on tablets through face-to-face interviews by trained enumerators. The tablets were pre-loaded with the survey questionnaire designed in Open Data Kit (ODK). The data entry application had in-built range and consistency checks to ensure good quality data. The Team Leader ran checks on data while still in the field thereafter electronically transmitting it to the online ODK database, managed by one of the scientists at CABI who also conducted quality checks on the data. Training of enumerators for the intra-household survey was carried out by a team from CABI in early October 2016. First, enumerators were trained on aspects of data collection and data entry using tablets and mobile applications. Secondly, field testing of the questionnaire was done which was intended to give enumerators a practical feel of mobile data collection and so they could be familiarized with the tool. Consent was sought from each household head or primary respondent before the interview was conducted. In the anticipation of some households declining to participate in the survey, a list of reserve households to interview was prepared.

The survey collected information on: household demographics, social and economic characteristics, household income sources, household assets (principally land and livestock ownership), crop production, sources of agricultural information, information sharing and decision making within a household, changes in knowledge, attitudes and practices after receiving information, access to market information and access to credit.

2.3 Data analysis

Data were downloaded from ODK aggregate as csv (comma-separated values) files. Exploratory data analysis was done is both Excel and R statistical package. Records were inspected for completeness, and to ensure each enumerated household had more than one respondent. In the end, 113 records were dropped and a total of 885 analysed. Descriptive analysis was used to provide general understanding of the study results in terms of agricultural information sharing within a household and source, how information received and shared translates into awareness and adoption and the reach of bean and soybean campaigns within the households in the study areas. Chi square and *t*-tests were used to test significance of proportions and means across sex and age.

3. Results

3.1 Household characteristics

Table 2 shows the descriptive statistics of respondents. Female respondents were 53% of the total respondents. The proportion of young people (15–25 years old) to the total respondents was 23%. Average household size was five, and the young dependency ratio was on average 37%, with a higher ratio in Kilolo and a lower ratio in Moshi rural compared with other districts. The average total land owned by households was 5.2 acres, and on average farmed 4 acres. Farmed land varied between 0.5 acres and 9.7 acres.

The primary agricultural activity was crop farming from which the majority of households derived their livelihood. At least 74% of the households indicated that crop farming contributed more than 60% of their household income (see Table 2). Livestock keeping was minimal and dominated by poultry and small ruminants (goats and sheep). Labour availability at the household level was computed as a ratio of the total land farmed by a household to the number of household members. In determining the number of household members to supply labour, the number of household members between the ages of 14 and 65 years old were considered. It is assumed that one individual within this age bracket was capable of cultivating 1 ha of land in a season. A ratio equal to 1 indicated labour balance: farm labour is enough for the cultivated land. A ratio of less than 1 indicated labour shortage and a ratio greater than 1 indicated labour surplus at the household level.

Table 2: Farm household characteristics across sample districts in Tanzania (*n* = 885)

District	Household size	Young dependency ratio (%)†	Labour constraint ††	TLU	Average farm size (acres)	Cropping (% households) ǂ
Kilolo	4.90 (1.52)	43.79	0.59 (0.45)	2.73 (1.61)	2.33 (1.44)	65.0
Kilosa	5.07 (2.00)	39.48	0.71 (0.68)	1.64 (1.32)	2.84 (1.93)	79.7
Mbeya rural	4.98 (1.76)	38.29	0.90 (0.75)	1.17 (1.48)	3.77 (2.48)	74.6
Moshi rural	4.58 (1.88)	27.14	1.07 (2.72)	1.01 (1.57)	4.64 (10.81)	72.7
Mvomero	5.88 (1.91)	42.16	1.02 (0.73)	0.82 (1.18)	5.27 (2.99)	75.0
Wanging'ombe	4.93 (1.53)	37.43	0.92 (0.74)	0.37 (0.81)	4.17 (2.30)	69.8
Total sample	5.06 (1.86)	36.87	0.90 (1.44)	1.15 (1.46)	4.01 (5.65)	74.1

TLU, Tropical livestock units: the sum of the animals with conversion factors; cattle (0.7), sheep and goats (0.1), pigs (0.20), and poultry (0.01). Source: (Bongers et al., 2015)
†Young dependency ratio, taken as the ratio of dependents aged 14 years and below to the total household size.
††Labour constraint computed as a ratio of the total land farmed by a household and the number of household members.
ǂCrop farming contributes more than 60% of household incomes.
Note: Figures in parentheses are standard deviations.

3.2 Crop production and cropping systems

Crop production in the study districts was diversified. Farmers grew crops mainly in two distinct rain seasons, *vuli* (short rains which normally ranges from October to January) and *masika* (long rains which normally range from mid-February to early June), with some minor variations in different regions. The largest proportion of farmers grew crops during *vuli*. *Masika* was important for production of soybean, rice and vegetables.

Maize, common bean and soybean were the most important crops in the sample districts, both in terms of the proportion of farmers growing them and proportion of land allocation relative to other crops (Figure 2A). Land allocation to common bean, soybean and pigeon peas was represented in almost equal proportions, about 30% of total farmed land (Figure 2B). Farmers allocated more land during *vuli* for almost all crops except maize and vegetables. Rice, though grown by a small proportion of farmers, enjoyed bigger land allocation that was comparable to maize. Average plot size was 1.3 and 1.2 acres during *masika* and *vuli* seasons, respectively (Figure 2C). Though the proportion of farmers growing rice was small compared to maize and common legumes, farmers growing rice generally allocated larger proportions of their land to rice cultivation. Average plot size for rice was also higher than the commonly grown legumes, but comparable to maize, the key staple.

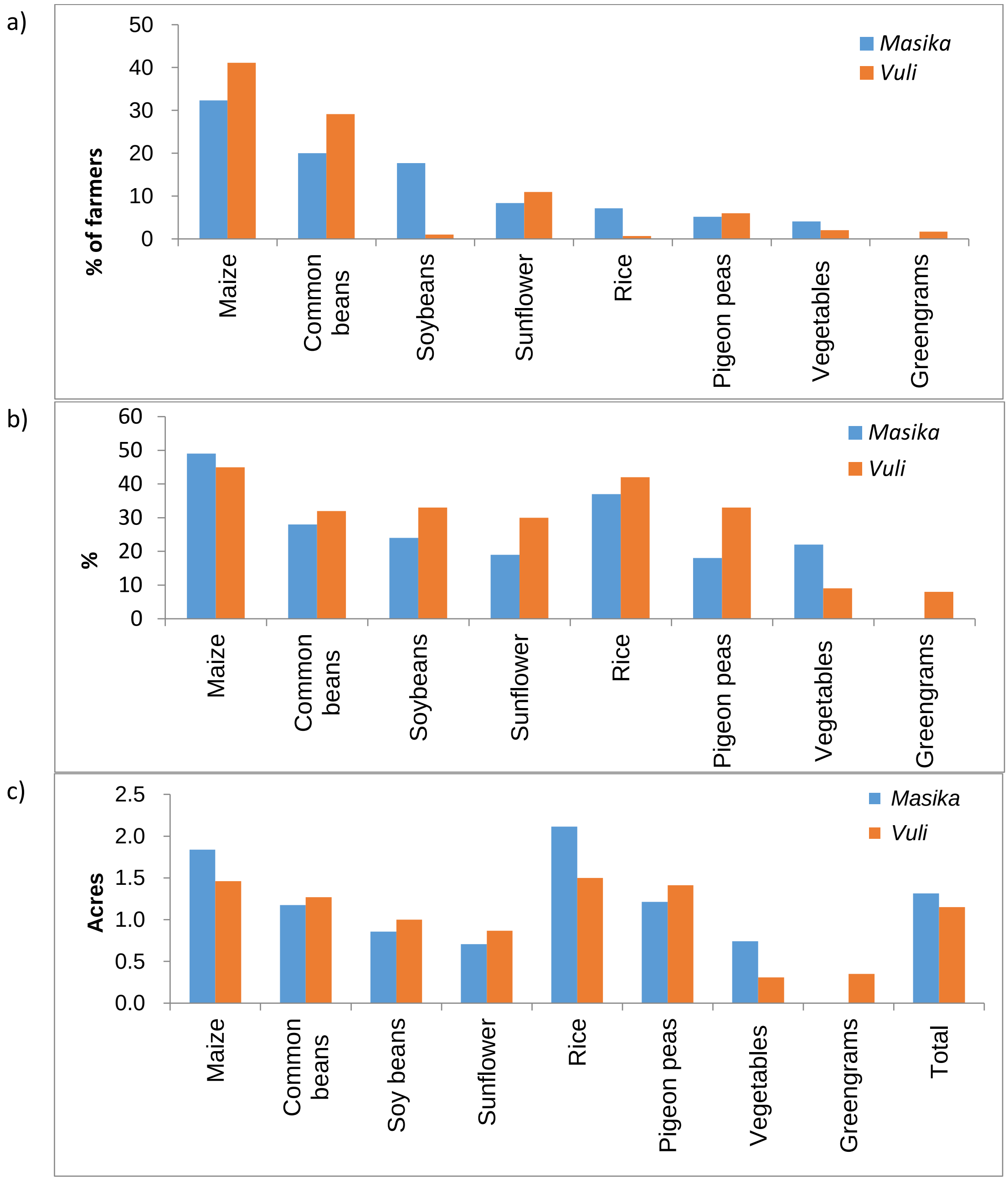

Figure 2: Frequency of crops grown (A), proportion of land allocation to various crops (B) and average plot size per crop (C) in study districts

3.3 Farmer sources of agricultural information disaggregated by gender

Farmers primarily relied on their own experience and knowledge of agricultural practices to manage their farming activities (Table 3). Extension agents, neighbours and radio were other important sources of agricultural information for farmers. Newspapers, mobile short message service (SMS) and leaflets were represented in very small proportions as farmers' sources of information. Data showed significant differences in men and women's utilization of information from their own experience, radio, and other household members. Women were more likely to use their own experience, and information shared by other family members compared to men. Men, on the other hand, were more likely to use radio as source of information compared to women. In terms of age category, there were significantly low proportions of young people (15-25 years) and older people (65+ years) accessing information from all sources, compared to middle aged people (26-64 years)

(Table 4). Farmers in the middle-age bracket, 26–64 years old, were more likely to have access to information from external sources besides their own experience. There were significant differences in access to different information sources by age. There were proportionately more farmers in this category receiving information compared to young people and elderly people. It might be because they are the most active in farming and therefore targeted by information dissemination.

Table 3: Information sources by gender.

Source of information	% of farmers receiving information			Chi square	*P* value
	Overall sample	Male	Female		
Own experience	67	62	71	8.344	0.004
Extension agent	39	41	37	2.038	0.153
Neighbour	31	32	30	0.591	0.442
Radio	21	25	16	10.602	0.001
Household member	18	14	22	10.689	0.001
Farmer field school	11	12	10	1.198	0.274
Agro-dealer	7	8	7	0.289	0.591
Village-based advisor	5	4	6	1.430	0.232
Demonstrations	4	5	3	2.112	0.146
Leaflet	3	4	2	1.779	0.182
SMS	2	2	1	0.624	0.430
Newspaper	1	2	1	0.347	0.556

Table 4: Information sources by age category.

Information source	% of farmers receiving information				Chi square	*P* value
	15–25 years	26–44 years	45–64 years	65+ years		
Own experience	27	80	89	76	271. 396	0.000
Extension agent	8	50	58	47	157.178	0.000
Neighbour	14	40	35	38	51.147	0.000
Radio	7	27	27	24	43.651	0.000
Household member	15	22	18	18	4.546	0.337
Farmer field school	3	14	17	12	29.307	0.000
Agro-dealer	2	9	10	10	20.355	0.000
Village-based advisor	0	6	9	8	20.355	0.000
Demonstrations	2	4	5	3	6.313	0.177
Leaflet	1	3	7	1	17.696	0.001
SMS	0	2	3	1	6.839	0.145
Newspaper	1	1	0	5	10.005	0.040

An investigation of farmers' sources of information by crop showed that a majority of farmers relied on their own experience for production of common beans and maize (Table 5). For these two crops farmers also obtained information from extension officers, agro-dealers and radio, among other external information sources. The combination of the two crops is not surprising since they are often grown as intercrops, so there are possibilities that information is delivered as a package. For soybean information, farmers mentioned mainly demonstration plots and SMS as their main sources of information. Data showed gaps in farmers access to information for some common food crops such as cassava and other root crops, plantain and non-food cash crops (cotton, tobacco). Of those receiving information from mass media – radio and SMS – maize, beans and soybean top the list.

Agro-dealers were important in providing information for maize crop and to a small extent beans and soybean. For soybean, farmers seemed to rely principally on demonstrations.

Table 5: Farmer information sources for the key crops.

Crops	Sources of information (%)						
	Own experience	Extension	HH member	Neighbour	Radio	Demo / FFS	Agro-dealer
Maize	94	88	73	78	80	25	87
Common beans	66	60	52	57	45	31	40
Soybeans	12	36	22	16	21	78	22
Rice, other cereals	15	14	14	11	11	9	2
Other beans/peas	11	9	14	10	6	6	2
Vegetables	9	13	11	12	12	12	9
Cassava, tuber crops	4	1	2	2	5	–	–
Plantain	7	7	3	5	3	–	2
Tree crops	7	10	2	8	10	–	3
Other food cash crops	13	12	3	9	13	3	14
Non-food cash crop	1	3	2	2	2	–	2

Demo, demonstration; FFS, farmer field school; HH, household.

Farmers were asked to rank information sources according to the perceived importance on a scale of 1 to 7, where 7 was most important and 1 least important. Importance was subjective based on whether farmers perceive information received to be useful and relevant. All age categories ranked own experience as the most important with regard to knowledge of agricultural practices. Both men and women had similar ranking of other household members, neighbours, radio and extension as important sources of information (data not presented). Village-based advisors, farmer field school and agro-dealers received an average score, though with wide variability between scores. Young people and elderly people ranked other household members as an important source of information for them, while middle-aged farmers mainly appreciated their neighbours, radio and extension agents as sources of information.

3.3 Awareness and utilization of agricultural practices and importance of information source

The study also explored farmers' awareness and utilization of good agricultural practices, and the importance of various information sources with regard to the known practices. Farmers mentioned several practices utilized on their farms (Table 6). Timing of field operations (land preparation and planting), field scouting and proper spacing were the most commonly mentioned agricultural practices by the majority of farmers, though they were largely based on their own experience. Extension, household members and neighbours also played an important role in sharing information on these practices. Radio and agro-dealers were important for sharing information on use of quality seed, new varieties and the suitability of different varieties to diverse agro-ecological zones. These two sources were also key for information on soil fertility management using organic materials, proper spacing, use of registered products for pest control and use of herbicides for weeding, in comparison to other information sources.

Table 6: Awareness of agricultural practices by information source.

Practices	Information sources (%)						
	Own experience	Extension	HH member	Neighbour	Radio	Demo / FFS	Agro-dealer
Timing of field operations	100	49	41	65	69	90	29
Agronomic practices (e.g. crop rotation)	37	25	18	20	23	14	8
Seed quality, variety, seed source	23	34	25	44	61	66	68
Field sanitation for pest control	38	17	17	19	21	40	12
Chemical fertilizers (rates, blends)	19	15	11	15	21	19	15
Organic soil fertility management	45	44	30	49	65	78	67
Importance of fertility management	16	19	11	44	16	43	8
Proper spacing	57	52	32	54	69	93	40
PICS bags	5	21	7	16	16	19	19
Field scouting for pest and disease	93	41	33	40	47	99	25
Use of registered pest control products	22	25	19	24	35	56	36
Use of *Rhizobium* inoculants	5	14	6	9	13	53	12
Conservation farming	0	3	1	1	17	-	9
Use of herbicides for weeding	11	23	16	19	33	40	25

Demo, demonstration; FFS, farmer field school; HH, household; PICS, Purdue Improved Crop Storage.

Despite reported high level of awareness of practices such as use of chemical fertilizer, new varieties, and use of registered pest control products, less than half of the respondents utilized them. Utilization of some practices such as soil testing, zero tillage, use of PICS bags, use of local pest control measures, and fertilizer blends was represented in small proportions (< 20% of farmers). This may not be surprising since the level of awareness of these practices was equally low across the sample. Improved practices commonly used by farmers were based on their own experience and informal information sharing through family members and neighbours. This may partly imply farmers' reliance on their own knowledge/experience, and/or the role of local farmer/family networks for information dissemination.

Farmers' reasons for failure to use some of the known improved practices included: (i) lack of adequate knowledge about the practice; (ii) lack of access to associated inputs; and (iii) high cost associated with the inputs. Some farmers indicated that they lacked knowledge on how to do things differently, particularly on fertility management and fertilizer blends. The high cost of inputs was more prominent for chemical fertilizer, pesticides and herbicides.

3.5 Information sharing within the household

Respondents were asked if they shared information they received from various sources, and if so with whom they shared the information. Overall, at least 82% of respondents indicated that they shared information with their household members. Household members over the age of 45 years had a higher likelihood of sharing information with their household members compared to younger persons.

Respondents shared information mainly on maize, common beans and soybean. This corresponds with earlier information where other household members played a key role as information sources for these crops beside neighbours and other sources. Other crops such as vegetables, other food cash crops, plantain and tree crops were also discussed albeit by a small proportion of farmers. Older family members over the age of 65 years had a high proportion of respondents sharing information on tree crops and plantain. It was noted that farmers hardly shared information within the household regarding cassava and other roots and tuber crops, and non-food cash crops (cotton and tobacco).

Beside crops, farmers also shared information regarding agricultural practices. Overall, farmers shared information on timely planting, early land preparation, spacing, pest monitoring and manual weeding. The proportion of farmers sharing this information is comparable across age category and gender. There was minimal sharing of information on practices such as soil testing, use of lime and use of PICS bags. The most commonly shared practices are those whose information is primarily based on own experience or information from within the farmer networks. The least shared practices are largely learned through external information sources, for example demonstrations, radio, leaflets and agro-dealers.

4. Insights from the study

This study explores gender differences in access to agricultural advice in Tanzania, information sharing, and importance of different channels in reaching smallholder farmers. Farmers indicated reliance on their own experience for most of the crops and agricultural practices, plus a limited array of external sources represented primarily by extension agents, radio and neighbours. Data showed that men have access to more diversified sources of information compared to women. In particular, some information sources seem to be the prerogative of the men, such as radio and demonstrations. Men were also more likely to depend on external sources such as radio and demonstrations, while women, besides their own experience, relied significantly more on other household members compared to men. In terms of age, both younger and older people referred to other members of the household as their sources of information. Youth might want to learn from members with more experience, while older people might want to learn new technologies from the younger household members.

Farmers were aware of and utilized various agricultural practices. In particular, timing of field operations, field scouting and spacing were the most commonly mentioned. Farmers relied on their own experience for these practices. External sources of information were important for relatively new practices or adaptation of existing practices. For example, information on seed quality or seed varieties suitable for different agro-ecologies, use of organic matter for soil fertility management, proper spacing, and use of registered products for pest control was mainly obtained from external sources of information. Face-to-face and hands-on approaches such as demonstrations provided a more tangible way of learning about new technologies. This explains also why relatively new practices such as the use of inoculants for soybean may be better promoted through demonstrations. However, the scalability of demonstrations is always the greatest challenge along with the associated high cost of managing them.

Information sharing was frequent, and a majority of interviewed farmers indicated that they shared information within the household and their farming communities. Sharing of information was frequent for more traditional practices, well known by farmers through experience, for example timely planting. On the other hand, information on new practices (such as the use of *Rhizobium* inoculants, soil testing before application of fertilizer, and PICS bags) was less shared, probably because these were not yet mastered enough by farmers to make them feel confident enough to share information. These were also the practices least used by farmers and less promoted by extension agents. In fact, farmers also indicated that the low use of these practices was due to lack of awareness, limited access to inputs, and high cost especially for agrochemicals. Although a high proportion of farmers reported sharing information with the other household members, household members were not listed as the main source of information, implying that farmers would value external information sources, building on their own experiences.

Overall, the study showed that there is still margin for improving learning and knowledge of more recently introduced practices, and trust in these practices is something that has to be built. It would also be important to link promotion of specific practices with targeted and suitable information sources that are accessible to men, women and youth. Information sharing within the household and community can be enhanced to support increased participation by women in extension activities, through provision of extension support materials, training of lead farmers or village-based advisors, who were the main sources of information for women farmers.

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contact CABI

Africa

Kenya
CABI, Canary Bird
673 Limuru Road, Muthaiga
PO Box 633-00621
Nairobi, Kenya
T: +254 (0)20 2271000/ 20
E: africa@cabi.org

Ghana
CABI, CSIR Campus
No. 6 Agostino Neto Road
Airport Residential Area
P. O. Box CT 8630, Cantonments
Accra, Ghana
T: +233 (0)302 797 202
E: westafrica@cabi.org

Zambia
CABI, Southern Africa Centre
5834 Mwange Close
Kalundu
P.O. Box 37589
Lusaka, Zambia
T: +260 967 619 665
E: westafrica@cabi.org

Americas

Brazil
CABI, UNESP-Fazenda Experimental
Lageado, FEPAF (Escritorio da CABI)
Rua Dr. Jose Barbosa de Barros 1780
Fazenda Experimental Lageado
CEP:18.610-307
Botucatu, São Paulo, Brazil
T: +5514-38826300
E: y.colmenarez@cabi.org

Trinidad & Tobago
CABI, Gordon Street, Curepe
Trinidad and Tobago
T: +1 868 6457628
E: caribbeanLA@cabi.org

USA
CABI, 745 Atlantic Avenue
8th Floor, Boston,
MA 02111, USA
T: +1 (617) 682-9015
E: cabi-nao@cabi.org

Asia

China
CABI, Beijing Representative Office
Internal Post Box 85
Chinese Academy of Agricultural Sciences
12 Zhongguancun Nandajie
Beijing 100081, China
T: +86 (0)10 82105692
E: china@cabi.org

India
CABI, 2nd Floor, CG Block,
NASC Complex, DP Shastri Marg
Opp. Todapur Village, PUSA
New Delhi – 110012, India
T: +91 (0)11 25841906
E: cabi-india@cabi.org

Malaysia
CABI, PO Box 210,
43400 UPM Serdang
Selangor, Malaysia
T: +60 (0)3 89432921
E: cabisea@cabi.org

Pakistan
CABI, Opposite 1-A,
Data Gunj Baksh Road
Satellite Town, PO Box 8
Rawalpindi, Pakistan
T: +92 (0)51 9290132
E: sasia@cabi.org

Europe

Switzerland
CABI, Rue des Grillons 1
CH-2800 Delémont, Switzerland
T: +41 (0)32 4214870
E: europe-CH@cabi.org

UK
CABI, Nosworthy Way
Wallingford, Oxfordshire, OX10 8DE, UK
T: +44 (0)1491 832111
E: corporate@cabi.org

CABI, Bakeham Lane
Egham, Surrey, TW20 9TY, UK
T: +44 (0)1491 829080
E: microbiologicalservices@cabi.org
E: cabieurope-uk@cabi.org

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