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Dynamics in Agricultural Extension Services Provision in Malawi

Insights from Two Rounds of Household and Community Panel Surveys

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INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

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Abstract

The Government of Malawi is in the process of developing its National Agricultural Extension Strategy. Two rounds of national household and community surveys (2016, 2018), coupled with in-depth interviews and focus group discussions, were implemented to provide research evidence supporting the Strategy's development. This paper summarizes emerging trends from these surveys and monitors progress in extension services provision, players and actors in extension services provision, and evidence on the coverage and effectiveness of extension approaches. Positive trends include (1) improvements in the percentage of men and women farmers accessing extension services; (2) consistently high ratings in the perceived quality of extension services; (3) more diversity in extension messages, including more information regarding market access and nutrition; (4) greater use of cost-effective tools, such as radio programming and community or group meetings, as sources of agricultural information; and (5) greater crop diversification, although diversification outside of agriculture remains low.

Four areas remain weak and need further improvements. First, information sharing among farmers, friends, and neighbors is frequent, and the coverage of those officially trained "lead farmers" (those trained specifically to promote technologies to other farmers) remains low, with only 7 percent of households reporting getting relevant advice from them. Second, while there are more "model villages" and "village agricultural committees" present, we see decreasing participation and ratings for these. Third, we observe greater awareness of promoted technologies, including conservation agriculture, pit planting, and sustainable land practices, but adoption remains very low. Fourth, we observe greater crop diversification, but farm productivity and commercialization remain low.

Although we have investigated many dimensions and factors in this paper, there remain challenges and puzzles that could be further addressed in future research. These include constraints on the adoption of minimal expensive inputs and low-cost management practices, constraints on the role of intensive training and labor, and understanding the drivers and factors affecting commercialization and diversification.

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Most importantly, we are grateful to all the people who have shared their previous time with us during the surveys and interviews: the women and men farmers, community and group leaders, extension agents, extension organizations' officers and heads, development agencies' representatives and government officials.

This book is especially dedicated to the late Dr. Ephraim Chirwa, for his dedication and legacy for quality teaching, research, and data collection for research-based policy solutions to development.

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1. Introduction

The Government of Malawi is in the process of developing its National Agricultural Extension Strategy. The International Food Policy Research Institute (IFPRI) and Wadonda Consult implemented two rounds of national household (HH) and community surveys (2016, 2018), coupled with in-depth interviews and focus group discussions. These surveys, which received funding from the Government of Flanders, the United States Agency for International Development, and the German Agency for International Cooperation [GIZ]), were implemented to provide research evidence supporting the Strategy's development. The sampling methodology and descriptive results from the 2016 survey are summarized in Ragasa and Niu (2017), while the methodology and analysis of the interviews and focus group discussions (FGD) are summarized in Ragasa et al. (2017) and Ragasa, Aberman, and Alvarez-Mingote (2019).

This paper aims to present key dynamic and spatial trends in (1) the provision of extension services; (2) evidence on the coverage and effectiveness of the different extension approaches used; and (3) the performance of agriculture and food systems, primarily looking at HH-level trends in the adoption of improved technologies, production, productivity, commercialization, diversification, and food security. After section 2 on data and methods, the subsequent sections (3-5) are structured based on these themes. Last, we discuss some implications of our results in section 6.

2. Data and Methods

This report is primarily based on panel HH and community-level surveys conducted by IFPRI between August—October 2016 (wave 1) and July—September 2018 (wave 2), with the assistance of Wadonda Consult. Wave 1 covers 3,001 HHs and 299 sections in all 29 districts in Malawi (excluding Likoma).[1] The distribution of the sample HHs and respondents, by district, gender, age group and lead farmer member are presented in Table 1. Wave 2 covers a second round of interviews with 2,888 HHs—achieving a low attrition rate of 4 percent.

For details of the sampling method, see Ragasa and Niu (2017). A similar questionnaire was used in 2016 and 2018: some questions were dropped based on responses in 2016, and some questions were added. The added questions include measures of women's empowerment and gender parity gaps, inspired by the Women's Empowerment in Agriculture Index, and measures of the extent of food loss and production losses due to fall army worm and other pests and diseases. A total of 5,069 female and male primary adults were interviewed in 2016, of whom 90 percent were re-interviewed in 2018.

To compare results, we used the Malawi-Integrated Household Panel Survey (IHPS) (2010, 2013, 2016), which has a section on access to different sources of extension services. In 2016, 1,989 HHs, which are roughly half of the IHPS 2013 respondents, were re-interviewed.

These datasets were mainly analyzed using descriptive analysis, complemented by some insights from the key informants' interviews and focus group discussions. Logistic regression models, commonly used for binary response data, are estimated to identify demographic, socioeconomic, and community-level factors that help explain variations in access to extension services by source. At an individual level, we use age, gender, education level, literacy level, being a lead farmer, and number of organizations joined. At the HH level, we use age, gender, education level, and number of organizations joined by HH head;

[1] Mzimba district is divided into North and South, and Lilongwe district is divided into East and West. These four are used in this study as separate districts.

whether HH has a lead farmer; asset or wealth level; crop acreage; and crops grown. The asset index was calculated using principal components analysis based on dwelling roof material, dwelling wall material, and the number of air conditioners, radios, cellphones, tape or CD players, televisions, refrigerators, washing machines, bicycles, motorcycles/scooters, cars, ox-carts, power tillers, and tractors. This information was largely drawn from the Malawi integrated household survey (IHS) questionnaire. Community-level factors include the number of agricultural projects in the community; the distance (in km) from the center of the community to the nearest market and extension agent; how well-off the general population is in the community; whether the community has village agricultural committees or group villages agricultural committees (VACs/GACs) or village development committees (VDCs); whether the community has started with the Model Village (MV) concept, which is an integrated approach for community development and extension services that is being promoted in Malawi. The logit models control for the year (2016, 2018) and the dummies for districts.

Table 1: Survey sample size by region and district, both at individual respondent and HH levels

District	Number of sample HHs	% of female-headed HHs	% of youth-headed (age <35 yrs) HHs	Number of respondents	% of female respondents	Number of lead farmers
Northern region	240	23	43	417	54	47
Chitipa	30	23	60	54	57	6
Karonga	30	27	47	53	58	6
Mzimba North	50	22	42	83	51	10
Mzimba South	80	23	40	141	55	16
Nkhata Bay	30	20	37	50	50	5
Rumphi	20	25	35	36	56	4
Central region	1,361	25	45	2,304	55	231
Dedza	241	25	46	414	56	45
Dowa	110	25	50	190	54	22
Kasungu	110	25	50	189	54	19
Lilongwe East	180	27	39	273	55	33
Lilongwe West	270	27	44	461	56	36
Mchinji	170	25	42	299	54	33
Nkhotakota	40	20	45	65	52	6
Ntcheu	160	24	49	277	53	24
Ntchisi	30	20	53	52	54	5
Salima	50	24	44	84	50	8
Southern region	1,400	25	46	2,347	54	253
Balaka	130	27	47	220	55	25
Blantyre	191	26	45	317	52	36
Chikwawa	121	25	40	216	55	22
Chiradzulu	38	22	49	63	52	6
Machinga	270	26	48	463	54	42
Mangochi	210	26	46	341	55	41
Mulanje	90	23	47	151	53	17
Mwanza	20	25	45	34	56	4
Neno	20	25	55	32	53	4
Nsanje	70	23	43	107	51	12
Phalombe	50	22	54	88	55	10
Thyolo	80	24	40	124	55	13
Zomba	110	25	53	191	57	21
National	**3,001**	**25**	**46**	**5,068**	**54**	**531**

Source: IFPRI HH surveys (2016 and 2018).

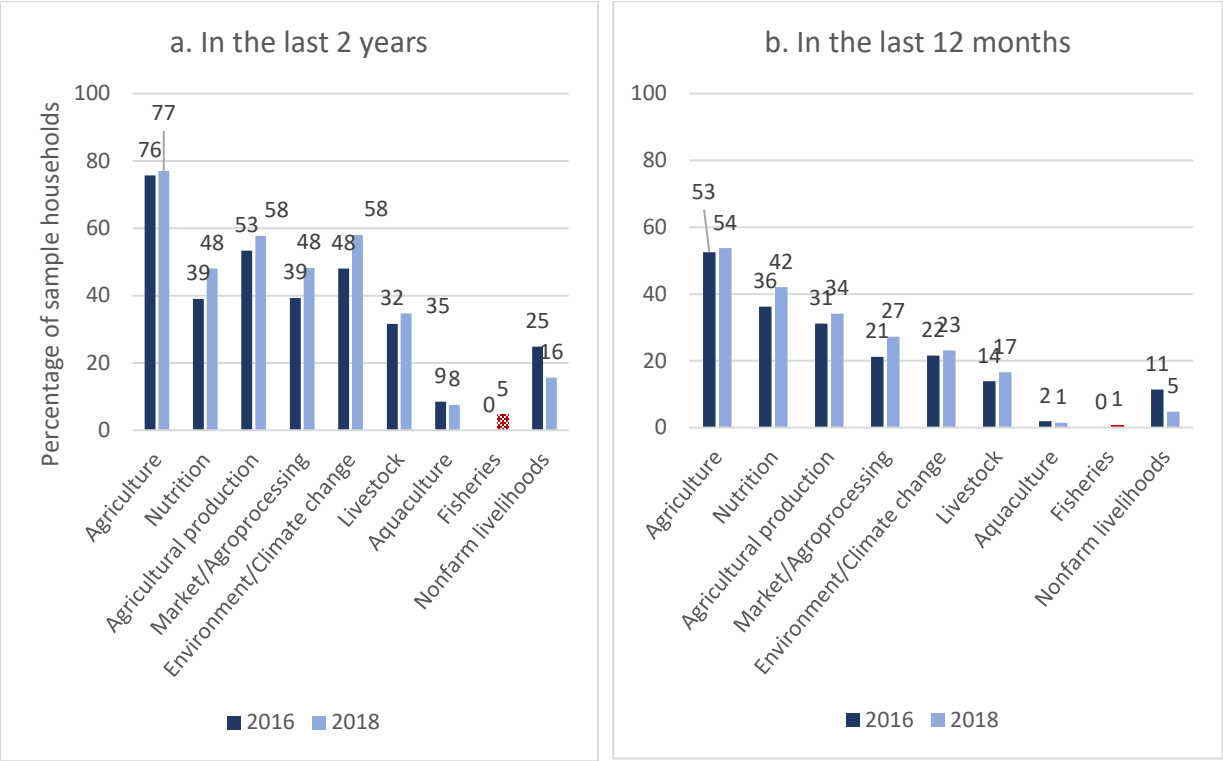
Note: HH = household.

3. Status of Extension Service Provision

3.1. Access to extension services

In the last 2 years (panel a), 77 percent of the HHs reported access to agricultural advice—a fairly high level; and 48 percent of the HHs reported access to nutrition advice—not quite as high a level (Figure 1). Both agriculture and nutrition advice do not come yearly as we see large difference between access to advice within a 2-year duration (panel a) versus 1-year duration (panel b). In panel b, 54 percent of the HHs reported access to agriculture advice in 2018; only a 1 percent increase from 2016. Access to marketing/agroprocessing and environment/climate change improved, however. There was a decline in advice on non-farm livelihoods. In nutrition advice, we see a significant increase in the proportion of HHs reporting accessing nutrition advice, with 27 percent of the HHs reporting access to nutrition advice in 2018 – up from 21 percent of HHs in 2016.

Figure 1: Percentage of HHs receiving agriculture or nutrition advice from any source, 2016 and 2018



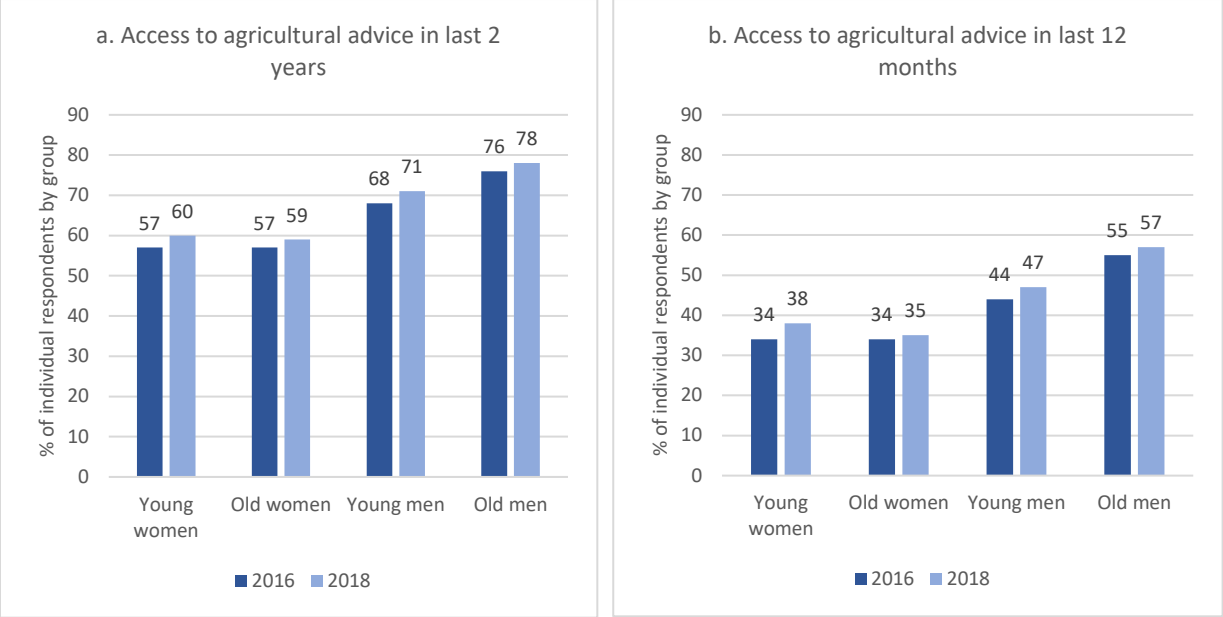
Source: IFPRI household and community surveys (2016 and 2018). **Note:** HH = household. Survey question: "In the last 2 years [In the last 12 months], did you receive any information or advice on any of these topics?" Agriculture (the first item) combines all non-nutrition-related advice, including on crop production, market/agroprocessing, environment/climate change, livestock, aquaculture, fisheries, and nonfarm livelihoods. The dotted red bar (fisheries) means only 2018 data were collected on this subject.

Comparing our results with IHPS, we see slightly more HHs reporting access to advice in the IHPS data (Annex 1). In the IHPS, among agricultural advice, the most common topics on which advice was received were new seed varieties, fertilizer use, and composting. Other common topics were irrigation

and pit planting. There seems to be more diversified advice in 2013, where a greater proportion of HHs reported more advice and topics covered than in 2016.

In terms of gender and age group, women are less likely to access agricultural advice than men; and youth are less likely to access agricultural advice than nonyouth at the individual level (Figure 2). Older women are the least likely to receive agricultural advice. There is a slight increase in the proportion of individuals accessing extension advice by all age and gender group. Interestingly, there is slightly greater increase among young women and young men accessing advice from 2016 to 2018. In some of these women getting advice, there may be cases where women are sent by uninterested husbands to attend meetings or trainings, but that these women may not have the authority nor power to decide and implement those lessons and new knowledge (see Ragasa, Aberman, and Alvarez-Mingote 2019).

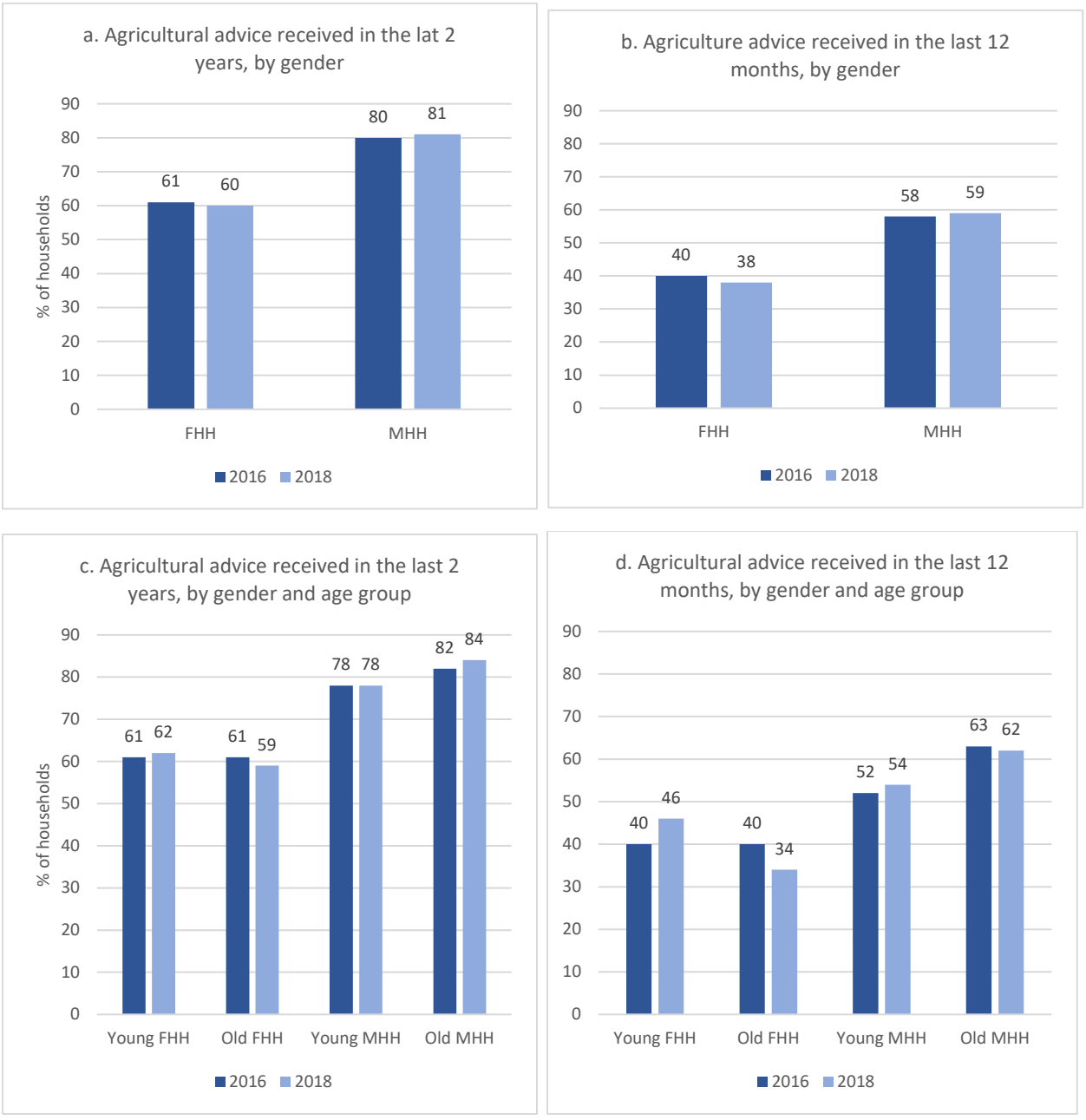
Figure 2. Percentage of individuals by access to agricultural advice, by gender and age group



Source: IFPRI household surveys (2016 and 2018).

At the household level (Figure 3), female-headed HHs (FHH) are less likely to receive agricultural advice than male-headed HHs (MHH). While there is slightly more MHH accessing agricultural advice in 2018, there is a slight drop in FHHs. There is difference between the IFPRI survey and the IHPS (Annex 2), in which we see much higher access to extension services for both types of households and much wider gap between FHH and MHH. Similar to the individual-level data in Figure 2, old FHH are the least likely to received agricultural advice; and the proportion of old FHH receiving advice is decreasing (Figure 3).

Figure 3. Percentage of HHs receiving agricultural advice, by gender and age of designated household head



Source: IFPRI household surveys (2016 and 2018). HH = household. FHH=female-headed households; MHH=male-headed households.

To help explain the differentials in access to nutrition or agriculture advice, we run several regression and statistical analyses to identify the significant factors contributing to access to information and advice related to agriculture and nutrition—that is, whether a HH received any advice (both agriculture and nutrition) over the last 12 months and 2 years. Table 2 shows the results.

Table 2: Logit regression results on determinants of access to extension—Pooled, both years

	All extension access - 2 years		All extension access - 12 months	
HH characteristics	**Marginal effect**	**Std. errors**	**Marginal effect**	**Std. errors**
HH head education	0.060***	(0.015)	0.058***	(0.013)
HH head education squared	-0.001	(0.001)	-0.001*	(0.001)
HH head male (=1)	0.357***	(0.052)	0.247***	(0.047)
HH head age	0.026***	(0.008)	0.020***	(0.007)
HH head age squared	-0.000***	(0.000)	-0.000***	(0.000)
Asset (control=poorest group)				
2nd asset quintile	0.034	(0.070)	-0.040	(0.062)
3rd asset quintile	0.086	(0.074)	0.060	(0.064)
4th asset quintile	0.099	(0.081)	0.042	(0.068)
5th asset quintile	0.057	(0.083)	0.162**	(0.070)
HH has lead farmer	0.346***	(0.094)	0.220***	(0.066)
Number of organizations joined	0.328***	(0.036)	0.170***	(0.015)
Year of data (2018)	0.047	(0.053)	0.032	(0.046)
Cropping characteristics				
Crop acreage	0.034	(0.031)	0.075***	(0.029)
Crop acreage squared	-0.004	(0.003)	-0.008***	(0.003)
HH grew maize (=1)	0.069	(0.132)	-0.128	(0.116)
HH grew rice	0.129	(0.132)	-0.051	(0.111)
HH grew cereals	0.107	(0.081)	0.124*	(0.070)
HH grew tubers	0.113	(0.084)	-0.027	(0.065)
HH grew beans	0.103**	(0.052)	0.184***	(0.044)
HH grew groundnuts	0.041	(0.054)	0.071	(0.046)
HH grew vegetables	-0.202***	(0.063)	-0.127**	(0.056)
HH grew oilseeds	0.369*	(0.191)	0.313**	(0.147)
HH grew fibers	0.089	(0.119)	-0.037	(0.103)
HH grew tobacco	0.281***	(0.103)	0.259***	(0.085)
Community characteristics				
Number of projects in community	-0.022	(0.017)	-0.023	(0.015)
Distance (control=nearest)				
2nd road distance quintile	-0.075	(0.077)	-0.077	(0.065)
3rd road distance quintile	-0.175**	(0.085)	-0.003	(0.071)
4th road distance quintile	-0.303***	(0.079)	-0.102	(0.068)
5th road distance quintile	-0.221***	(0.082)	-0.208***	(0.070)
Community distance to nearest market (km)	-0.000	(0.005)	0.001	(0.004)
Distance to extension agent (km)	-0.000	(0.000)	-0.000	(0.000)
Village has VAC/GACs	-0.023	(0.053)	0.003	(0.045)
Village has VDC	-0.252	(0.222)	-0.071	(0.184)
Village has model village program	-0.094	(0.058)	-0.095*	(0.050)
Community well-being (control=1st quintile or poorest community)				
2nd community wellbeing quintile	-0.073	(0.072)	-0.113*	(0.063)
3rd community wellbeing quintile	-0.022	(0.078)	-0.026	(0.066)
4th community wellbeing quintile	0.125	(0.080)	0.074	(0.068)
5th community wellbeing quintile	0.006	(0.083)	0.102	(0.072)
District dummies: YES				
Constant	0.187	(0.364)	-0.552*	(0.311)
Observations	4,760		4,787	
Pseudo R-squared	0.208		0.163	

Source: IFPRI household and community surveys (2016 and 2018).

Note: Standard errors in parentheses: * p<0.10, ** p<0.05, *** p<0.01. VAC = village agricultural committee; GACs = group villages agricultural committees; VDC = village development committee

Regarding HH characteristics, we see positive associations between HH head age and education and access to extension (Table 2). We also see that male HH heads are associated with better access, as are HHs which have a lead farmer who also joined more organizations. Of the crop characteristics, HHs growing tobacco and beans were associated with better access to extension, while those growing vegetables were, interestingly, associated with reduced access. Intuitively, HHs which were further away from paved roads, shown under the community characteristics, were less likely to have extension access.

There was no discernable effect from the year dummy variable included. This is interesting, as it indicates that HH access to extension services was not affected by the year. As well, there is little difference between the determinants of the two measures: 12-month access and 2-year access. Both have largely the same significance, with slight differences in the coefficients. The only differences which stand out are that the 12-month extension access model shows more crop acreage and different crop patterns being associated with better extension access and reduced significance of the road distance quintiles.

We have also undertaken regression and statistical analyses to determine access to extension at the individual level (female and male adults in the HHs). Table 3 below shows these results. The covariates were largely the same as those used in the HH regressions in Table 2, but with additional individual characteristics.

Table 3: Individual logit regression results on determinants of access to extension—Pooled, both years

	All extension access - 2 years		All extension access - 12 months	
Individual characteristics	**Marginal effect**	**Std. errors**	**Marginal effect**	**Std. errors**
Individual's age	0.023***	(0.006)	0.019***	(0.006)
Individual's age squared	-0.000***	(0.000)	-0.000***	(0.000)
Male (=1)	0.155***	(0.034)	0.098***	(0.032)
Individual's highest education level	0.030*	(0.016)	0.043***	(0.014)
Individual's education squared	0.001	(0.001)	-0.001	(0.001)
Individual can speak/write Chichewa	0.139***	(0.053)	0.134***	(0.050)
Individual can speak/write English	-0.021	(0.053)	0.080*	(0.046)
Whether individual was lead farmer	0.378***	(0.086)	0.169***	(0.060)
HH characteristics				
HH head education	0.023***	(0.006)	0.019***	(0.006)
HH head age	-0.000***	(0.000)	-0.000***	(0.000)
HH head male (=1)	0.155***	(0.034)	0.098***	(0.032)
Asset (control=poorest group)				
2nd asset quintile	0.039	(0.051)	-0.005	(0.048)
3rd asset quintile	0.053	(0.053)	0.039	(0.049)
4th asset quintile	0.087	(0.055)	0.048	(0.051)
5th asset quintile	0.075	(0.058)	0.129**	(0.053)
Number of organizations joined	0.389***	(0.029)	0.220***	(0.015)
Year dummy: 0 = 2016	0.096**	(0.037)	0.122***	(0.035)
Cropping characteristics				
Crop acreage	0.046**	(0.022)	0.054***	(0.020)
Crop acreage squared	-0.003*	(0.002)	-0.005***	(0.002)
HH grew maize (=1)	0.027	(0.095)	-0.062	(0.090)
HH grew rice	-0.059	(0.089)	-0.154*	(0.084)
HH grew cereals	0.054	(0.058)	0.087	(0.055)
HH grew tubers	0.024	(0.053)	-0.028	(0.047)
HH grew beans	0.110***	(0.036)	0.131***	(0.034)
HH grew groundnuts	0.074**	(0.038)	0.065*	(0.034)

HH grew vegetables	-0.209***	(0.045)	-0.157***	(0.043)
HH grew oilseeds	0.289**	(0.119)	0.232**	(0.105)
HH grew fibers	0.008	(0.082)	-0.004	(0.076)
HH grew tobacco	0.182***	(0.063)	0.210***	(0.058)
Community characteristics				
Number of projects in community	-0.002	(0.012)	-0.004	(0.011)
Distance (control=nearest)				
2nd road distance quintile	-0.056	(0.054)	-0.095*	(0.050)
3rd road distance quintile	-0.096*	(0.058)	-0.050	(0.053)
4th road distance quintile	-0.147***	(0.056)	-0.073	(0.052)
5th road distance quintile	-0.173***	(0.058)	-0.188***	(0.053)
Community distance to nearest market (km)	0.006*	(0.003)	0.006*	(0.003)
Distance to extension agent (km)	-0.000	(0.000)	-0.000	(0.000)
Village has VAC/GACs	-0.052	(0.037)	0.002	(0.035)
Village has VDC	-0.057	(0.150)	-0.030	(0.142)
Village has model village program	-0.040	(0.041)	-0.085**	(0.038)
Community well-being (1=poorest)				
2nd community well-being quintile	-0.075	(0.051)	-0.112**	(0.048)
3rd community well-being quintile	0.021	(0.054)	-0.038	(0.050)
4th community well-being quintile	0.099*	(0.056)	0.016	(0.052)
5th community well-being quintile	0.025	(0.058)	-0.001	(0.055)
District dummies: YES				
Constant	-0.314		-0.823***	
Observations	7,843		7,843	
Pseudo R-squared	0.158		0.140	

Source: IFPRI household and community surveys (2016 and 2018).
Note: Standard errors in parentheses: * p<0.10, ** p<0.05, *** p<0.01. HH = household; km = kilometers; VAC = village agricultural committee; GACs = group villages agricultural committees; VDC = village development committee.

Under the individual-level characteristics, we can see that education level and whether the person can speak/write Chichewa are associated with more access to extension, and also that older individuals and men are more likely to have access to extension. As for the HH characteristics, these remain the same as for the HH-level regressions even after controlling for the individual-level characteristics—and interesting details. We also see more significant relationships between different crops and whether an individual has access to extension, with new significance associated with beans, groundnuts, and oilseeds, as well as total crop acreage being significant across both measures now.

Regarding the community-level characteristics, we again see that road distance is negatively related to access to extension—more strongly so with the 2-year indicator than the 12-month indicator. We also now see that community well-being and whether the village has an MV program have negative relationships with extension access under the 12-month indicator.

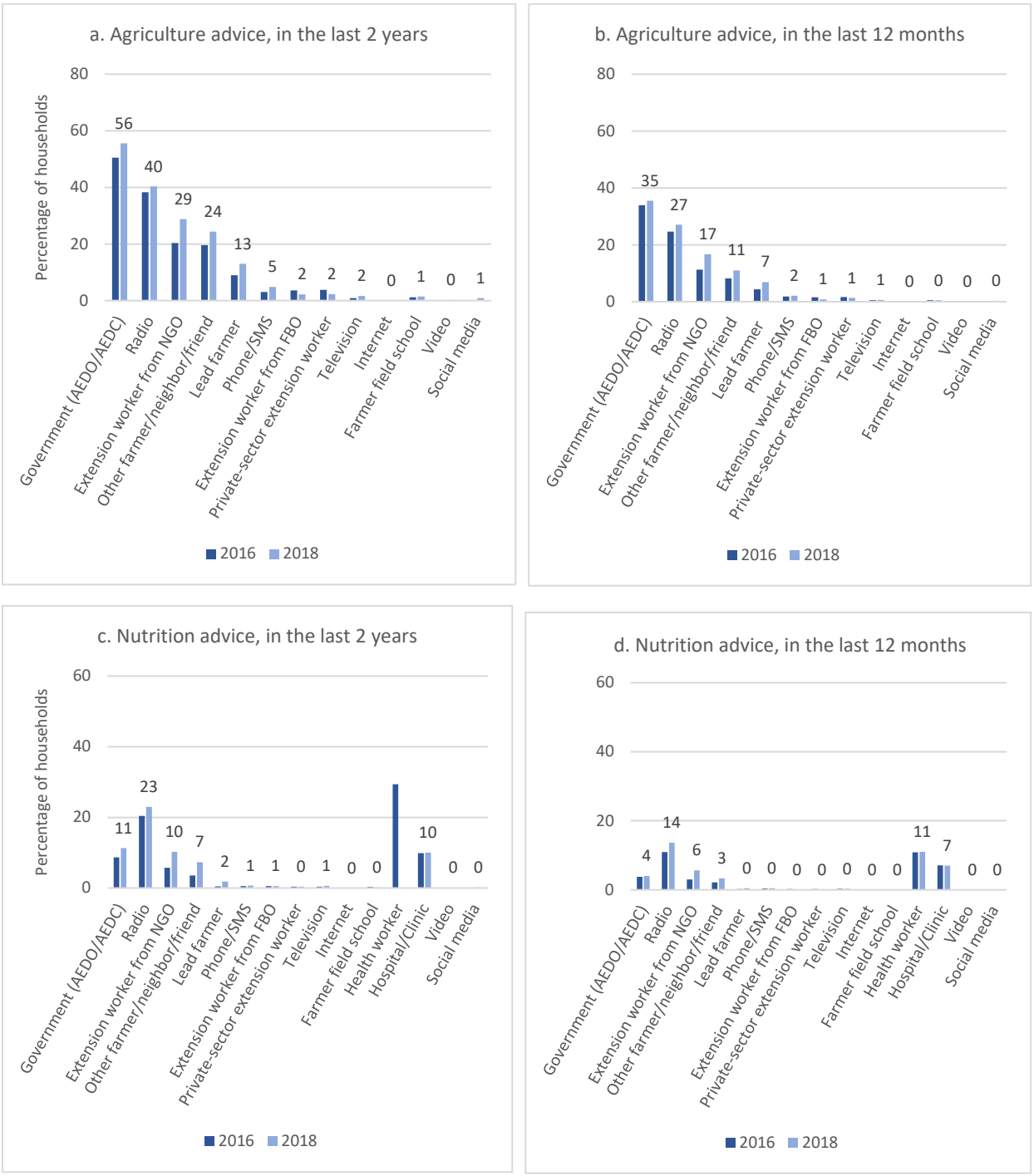
Most interestingly however, is that the coefficient for the year dummy variable is now strongly significant and positive. This would imply that the year being 2018 was strongly associated with individuals having more access to both agriculture and nutritional extension. This is especially interesting considering the lack of significance found in the HH-level models. Further analysis on this subject is needed.

3.2. Source of extension services

For agriculture advice, the main source was that of government extension agents [agricultural extension development officer (AEDO) or agricultural extension development coordinator (AEDC)], followed by radio, nongovernmental organization (NGO) extension workers, other farmers, lead farmers, and

phone/SMS (Figure 4). There was a slight increase in the percentage of HHs receiving advice from all these sources, excepting extension workers from farmer-based organizations (FBOs) and the private sector. The most noticeable improvements are seen in more HHs having reported receiving agriculture advice from NGO extension workers, other farmers, lead farmers, and SMS/phone.

Figure 4: Percentage of HHs receiving agriculture or nutrition advice from a specific source, 2016 and 2018



Source: IFPRI household survey (2016 and 2018)

Note: Values shown are for 2018; 2016 values are shown so not to crowd the graph. AEDO/AEDC = agricultural extension development officer/agricultural extension development coordinator; FBO =farmer-based organizations; HH = household; NGO = nongovernmental organization. Agriculture (the first item) combines all non-nutrition-related advice, including crop production, market/agroprocessing, environment/climate change, livestock, aquaculture, fisheries, and non-farm livelihoods. The red bar means data was only collected in 2018. Survey question: "From which sources did you receive information or advice about agriculture or nutrition in the last 2 years (in the past 12 months)?" While the source of nutrition advice from health workers appears to drop significantly—from 29 percent of HHs in the last 2 years and 11 percent of HHs in the last 12 months—we believe this is due to an error in the data which causes there to be no observations of reported advice from health workers in 2018.

For nutrition advice, the main sources were still mainly health workers and hospitals, as in 2016. The percentage of HHs reporting accessing nutrition advice from radio, NGOs, other farmers, and AEDO/AEDC all increased in 2018.

Comparing our results with the IHPS, we see slightly more HHs reporting having access to advice in the IHPS (Annex 1). We do see similar patterns in terms of most common sources of advice (radio and community/group meetings) (Annex 3). There was a noticeable jump in the percentage of HHs receiving advice from "other farmers" in 2016, up from 2013/2010. The percentage of HHs reporting getting advice from other farmers in the IHPS was much larger than in the IFPRI surveys.

To further investigate potential correlates with the source of extension, we carried out logit regressions —similar to those in Tables 2 and 3—but this time we broke our sample down by the source of extension access. For these regressions, the dependent variable is whether the HH, or individual, received extension knowledge from either a government or a private-sector source.

Tables 4-7 show HH and individual-level access to extension, respectively, broken down along the lines of access in the last 2 years or 12 months and whether this access was provided by the government, radio, NGOs, or other farmers. Many of the results are similar to those in Tables 2 and 3. For example, HH head education, age, and gender all still play significant roles—except for "other farmer," where only gender is significant. But it is more interesting for us to look at the places where the determinants of access to extension from these differing sources begin to diverge.

The results from Table 4 show us that access to extension service in the last two years from the government, radio, and NGOs is more significantly associated with male HH heads than female heads—a relationship not seen as strongly in access to "other farmer" extension. Also, access to government and NGO extension seems to be strongly related to higher wealth quintiles. There are strongly significant results for the third, fourth, and fifth wealth quintiles in the government results, while only significant results in the fourth quintile in the NGO results. The number of organizations a HH joined was significant across all sources of extension, while whether the HH had a lead farmer was positive and significant for government and NGO access but negative and significant for radio and "other farmer" access.

Interestingly, looking at the year dummy results, we see that all but the radio extension access have a significant, positive relationship. This would imply that 2018 was associated with better government, NGO, and "other farmer" extension access, but there is no such relationship with radio.

Regarding crop acreage, we again see a positive relationship for government, radio, and NGO access and no relationship with "other farmer" access. Also, many of the dummy variables for different crops had significant (though not always positive) coefficients, leading us to believe that there are a variety of relationships between what crops are grown and what type of extension a HH can access.

Looking at the community-level variables, the higher quintiles of road distance were generally associated with less extension access from government, radio, and other farmers—and this was especially true for radio. For access to NGO extension services, the number of organizations in the community and the distance from the road were both positively associated with more access. Somewhat counterintuitively, whether the community had a VDC, VAC, or MV program was each negatively associated with more access to "other farmer" extension.

Table 5 presents regression results similar to those in Table 4, but in which the dependent variable is now access to extension in the last 12 months rather than 2 years. The results are mostly in agreement with those in Table 4, but there are some notable exceptions. First, any significance in the relationship with the asset quintiles almost completely disappears. Also, the positive relationship between access to government extension and the year being 2018 no longer appears. Crop acreage, which was a significant determinant for NGO access in Table 4, no longer displays such a relationship. And perhaps most intriguing, the community well-being asset quintiles now display a strong, negative relationship with access to "other farmer" extension.

Table 4: HHs logit regression results on determinants of access to extension—Pooled, both years, by source—2 years

	All extension access - 2 years							
	Government		Radio		NGO		Other farmers	
HH characteristics	**Marginal effect**	**Std. errors**	**Marginal effect**	**Std. errors**	**Marginal effect**	**Std. errors**	**Marginal effect**	**Std. errors**
HH head education	0.039***	(0.013)	0.054***	(0.013)	0.041***	(0.014)	0.004	(0.014)
HH head age	0.040***	(0.007)	0.015**	(0.007)	0.018**	(0.009)	-0.005	(0.008)
HH head male	0.222***	(0.048)	0.399***	(0.048)	0.187***	(0.054)	0.179***	(0.052)
HH head education squared	-0.001	(0.001)	-0.001	(0.001)	-0.001	(0.001)	0.001	(0.001)
HH head age squared	-0.000***	(0.000)	-0.000***	(0.000)	-0.000**	(0.000)	-0.000	(0.000)
Asset (control=poorest)								
2nd asset quintile	0.078	(0.063)	0.024	(0.062)	0.054	(0.069)	-0.082	(0.066)
3rd asset quintile	0.234***	(0.064)	0.102	(0.063)	0.064	(0.070)	-0.008	(0.067)
4th asset quintile	0.186***	(0.068)	0.068	(0.065)	0.149**	(0.071)	-0.099	(0.069)
5th asset quintile	0.200***	(0.070)	0.084	(0.067)	0.236***	(0.073)	-0.080	(0.072)
HH has lead farmer	0.381***	(0.066)	-0.162***	(0.061)	0.599***	(0.060)	-0.207***	(0.066)
Number of organizations joined	0.234***	(0.018)	0.080***	(0.011)	0.087***	(0.011)	0.063***	(0.011)
Year dummy: 0 = 2016	0.144***	(0.045)	0.045	(0.044)	0.344***	(0.048)	0.201***	(0.047)
Cropping characteristics								
Crop acreage	0.069***	(0.026)	0.048*	(0.026)	0.060**	(0.030)	-0.003	(0.027)
Crop acreage squared	-0.006**	(0.002)	-0.005**	(0.002)	-0.005*	(0.003)	-0.000	(0.002)
HH grew maize	-0.077	(0.114)	0.008	(0.116)	-0.010	(0.128)	0.087	(0.135)
HH grew rice	-0.053	(0.107)	0.391***	(0.105)	-0.025	(0.115)	-0.121	(0.120)
HH grew cereals	-0.100	(0.071)	-0.043	(0.069)	0.129*	(0.073)	-0.018	(0.076)
HH grew tubers	0.143**	(0.066)	0.051	(0.060)	0.058	(0.063)	-0.048	(0.064)
HH grew beans	0.062	(0.045)	0.009	(0.043)	0.158***	(0.048)	0.000	(0.047)
HH grew groundnuts	0.134***	(0.046)	0.041	(0.044)	0.012	(0.048)	0.040	(0.047)
HH grew vegetables	-0.214***	(0.056)	-0.022	(0.054)	0.172***	(0.058)	-0.019	(0.058)
HH grew oilseeds	0.407***	(0.152)	0.104	(0.129)	0.422***	(0.133)	-0.299**	(0.151)
HH grew fibers	-0.110	(0.103)	0.041	(0.099)	0.159	(0.103)	0.103	(0.112)
HH grew tobacco	0.135	(0.083)	0.145*	(0.075)	0.254***	(0.079)	0.036	(0.081)
Community characteristics								
Number of projects in community	-0.003	(0.015)	-0.002	(0.014)	0.044***	(0.016)	0.011	(0.015)
Distance (control=nearest)								
2nd road distance quintile	0.084	(0.064)	-0.173***	(0.063)	0.075	(0.070)	-0.198***	(0.068)
3rd road distance quintile	0.050	(0.070)	-0.164**	(0.068)	0.091	(0.075)	-0.089	(0.072)
4th road distance quintile	-0.140**	(0.067)	-0.234***	(0.066)	0.188***	(0.073)	-0.157**	(0.069)
5th road distance quintile	-0.074	(0.070)	-0.268***	(0.069)	0.104	(0.076)	-0.250***	(0.073)
Community distance to nearest market	0.005	(0.004)	-0.003	(0.004)	-0.005	(0.004)	0.002	(0.004)
Distance of extension agent from community	-0.000*	(0.000)	-0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Village has VAC/GACs	0.065	(0.045)	-0.052	(0.044)	0.023	(0.048)	-0.101**	(0.047)

Village has VDC	-0.342*	(0.187)	-0.135	(0.186)	0.102	(0.215)	-0.339*	(0.191)
Village has model village program	0.042	(0.050)	-0.065	(0.049)	-0.089*	(0.054)	-0.166***	(0.053)
Community well-being (control=poorest)								
2nd community well-being quintile	0.069	(0.063)	0.037	(0.062)	0.083	(0.067)	-0.103	(0.068)
3rd community well-being quintile	0.056	(0.067)	0.061	(0.064)	-0.077	(0.071)	-0.120*	(0.069)
4th community well-being quintile	0.118*	(0.069)	0.157**	(0.067)	0.035	(0.074)	-0.005	(0.072)
5th community well-being quintile	0.137*	(0.072)	0.030	(0.070)	-0.034	(0.076)	-0.033	(0.075)
District dummies: YES								
District (dummy variable with base Balaka)								
Constant	-1.360***	(0.308)	-1.126***	(0.308)	-1.968***	(0.357)	-0.601*	(0.332)
Observations	4,787		4,787		4,787		4,787	
Pseudo R-squared	0.198		0.113		0.165		0.065	

Source: IFPRI household and community surveys (2016 and 2018)

Note: Standard errors in parentheses: * p<0.10, ** p<0.05, *** p<0.01. HH = household; NGO = nongovernmental organization; VAC = village agricultural committee; GACs = group villages agricultural committees; VDC = village development committee.

Table 5: HHs logit regression results on determinants of access to extension—Pooled, both years, by source—12 months

	All extension access 12 months							
	Government		Radio		NGO		Other farmers	
HH characteristics	**Marginal effect**	**Std. errors**	**Marginal effect**	**Std. errors**	**Marginal effect**	**Std. errors**	**Marginal effect**	**Std. errors**
HH head education	0.032**	(0.013)	0.046***	(0.014)	0.055***	(0.016)	0.006	(0.017)
HH head age	0.036***	(0.008)	0.011	(0.008)	0.028***	(0.010)	-0.003	(0.010)
HH head male	0.222***	(0.050)	0.424***	(0.054)	0.136**	(0.064)	0.020	(0.065)
HH head education squared	-0.001	(0.001)	0.000	(0.001)	-0.002*	(0.001)	0.000	(0.001)
HH head age squared	-0.000***	(0.000)	-0.000*	(0.000)	-0.000***	(0.000)	-0.000	(0.000)
Asset (control=poorest)								
2nd asset quintile	-0.078	(0.065)	0.007	(0.067)	0.015	(0.079)	-0.165**	(0.080)
3rd asset quintile	0.047	(0.066)	0.053	(0.067)	0.035	(0.080)	-0.019	(0.081)
4th asset quintile	0.062	(0.069)	-0.001	(0.070)	0.091	(0.080)	-0.046	(0.084)
5th asset quintile	0.193***	(0.070)	0.079	(0.071)	0.159**	(0.081)	-0.108	(0.087)
HH has lead farmer	0.341***	(0.062)	-0.173***	(0.065)	0.537***	(0.065)	-0.223***	(0.083)
Number of organizations joined	0.203***	(0.013)	0.079***	(0.011)	0.099***	(0.011)	0.072***	(0.012)
Year dummy: 0 = 2016	0.051	(0.046)	0.036	(0.046)	0.297***	(0.055)	0.293***	(0.057)
Cropping characteristics								
Crop acreage	0.079***	(0.028)	0.066**	(0.029)	0.009	(0.015)	0.040	(0.032)

Crop acreage squared	-0.007**	(0.003)	-0.008***	(0.003)	-0.000	(0.000)	-0.001	(0.003)
HH grew maize	0.073	(0.128)	0.007	(0.128)	-0.067	(0.149)	0.141	(0.197)
HH grew rice	-0.057	(0.112)	0.272**	(0.112)	0.122	(0.125)	-0.051	(0.143)
HH grew cereals	0.056	(0.071)	-0.049	(0.075)	0.094	(0.085)	0.083	(0.095)
HH grew tubers	0.096	(0.063)	0.052	(0.062)	0.012	(0.071)	-0.049	(0.079)
HH grew beans	0.127***	(0.046)	0.085*	(0.046)	0.062	(0.055)	0.041	(0.059)
HH grew groundnuts	0.044	(0.046)	0.041	(0.046)	0.064	(0.053)	-0.030	(0.056)
HH grew vegetables	-0.146**	(0.058)	-0.071	(0.058)	0.142**	(0.064)	-0.121*	(0.073)
HH grew oilseeds	0.162	(0.141)	-0.085	(0.149)	0.334**	(0.149)	-0.144	(0.195)
HH grew fibers	-0.004	(0.104)	0.077	(0.107)	0.056	(0.115)	-0.018	(0.147)
HH grew tobacco	0.137*	(0.083)	0.192**	(0.079)	0.180**	(0.086)	0.043	(0.097)
Community characteristics								
Number of projects in community	-0.007	(0.015)	-0.025	(0.015)	0.044**	(0.017)	0.046**	(0.019)
Distance (control=nearest)								
2nd road distance quintile	0.065	(0.066)	-0.173***	(0.067)	-0.044	(0.081)	-0.206**	(0.080)
3rd road distance quintile	0.060	(0.072)	-0.127*	(0.071)	0.122	(0.084)	-0.162*	(0.086)
4th road distance quintile	-0.069	(0.069)	-0.184***	(0.069)	0.042	(0.082)	-0.197**	(0.085)
5th road distance quintile	-0.119*	(0.072)	-0.316***	(0.073)	-0.021	(0.086)	-0.323***	(0.091)
Community distance to nearest market	0.006	(0.004)	-0.004	(0.004)	-0.003	(0.005)	0.008	(0.005)
Distance of extension agent from community	-0.000*	(0.000)	-0.000	(0.000)	0.000**	(0.000)	0.000	(0.000)
Village has VAC/GACs	0.054	(0.046)	-0.054	(0.047)	0.011	(0.055)	-0.062	(0.058)
Village has VDC	-0.009	(0.203)	-0.100	(0.190)	0.199	(0.250)	-0.061	(0.218)
Village has model village program	-0.019	(0.051)	-0.076	(0.052)	-0.104*	(0.061)	-0.259***	(0.067)
Community well-being (control=poorest)								
2nd community well-being quintile	0.012	(0.065)	-0.031	(0.068)	-0.086	(0.076)	-0.121	(0.083)
3rd community well-being quintile	0.032	(0.068)	0.008	(0.069)	-0.111	(0.079)	-0.176**	(0.084)
4th community well-being quintile	0.083	(0.070)	0.108	(0.071)	0.015	(0.083)	-0.183**	(0.089)
5th community well-being quintile	0.154**	(0.073)	0.047	(0.075)	-0.142*	(0.086)	-0.165*	(0.095)
District dummies: YES								
District (dummy variable with base Balaka)								
Constant	-2.131***	(0.331)	-1.295***	(0.326)	-2.218***	(0.405)	-1.639***	(0.426)
Observations	4,787		4,787		4,787		4,719	
Pseudo R-squared	0.191		0.131		0.181		0.110	

Source: IFPRI household and community surveys (2016 and 2018)

Note: Standard errors in parentheses: * p<0.10, ** p<0.05, *** p<0.01. HH = household; NGO = nongovernmental organization; VAC = village agricultural committee; GACs = group villages agricultural committees; VDC = village development committee.

Table 6: Individual logit regression results on determinants of access to extension—Pooled, both years, by source—2 years

	All extension access - 2 years							
	Government		Radio		NGO		Other farmers	
Individual characteristics	**Marginal effect**	**Std. errors**	**Marginal effect**	**Std. errors**	**Marginal effect**	**Std. errors**	**Marginal effect**	**Std. errors**
Individual's age	0.017	(0.012)	0.019	(0.012)	0.003	(0.013)	-0.019	(0.013)
Individual's age squared	-0.000	(0.000)	-0.000	(0.000)	-0.000	(0.000)	0.000	(0.000)
Male (=1)	0.116***	(0.040)	0.305***	(0.040)	0.069	(0.047)	0.036	(0.045)
Individual's highest education level	0.008	(0.017)	0.012	(0.018)	0.027	(0.020)	-0.026	(0.020)
Individual's education squared	0.001	(0.001)	-0.000	(0.001)	-0.000	(0.001)	0.002*	(0.001)
Individual can speak/write Chichewa	0.082	(0.052)	0.139***	(0.053)	0.017	(0.061)	0.125**	(0.059)
Individual can speak/write English	-0.001	(0.047)	0.131***	(0.045)	0.102**	(0.050)	0.028	(0.052)
Whether individual was lead farmer	0.321***	(0.061)	-0.218***	(0.058)	0.531***	(0.057)	-0.187***	(0.066)
HH characteristics								
HH head education	0.022	(0.014)	0.018	(0.014)	0.018	(0.016)	0.010	(0.015)
HH head education squared	-0.001	(0.001)	0.001	(0.001)	-0.001	(0.001)	-0.001	(0.001)
HH head age	0.030**	(0.012)	-0.005	(0.012)	0.025*	(0.014)	0.012	(0.014)
HH head age squared	-0.000***	(0.000)	0.000	(0.000)	-0.000*	(0.000)	-0.000	(0.000)
HH head male (=1)	0.001	(0.050)	0.015	(0.051)	0.020	(0.059)	-0.083	(0.056)
Asset (control=poorest)								
2nd asset quintile	0.066	(0.050)	0.000	(0.051)	0.004	(0.058)	-0.076	(0.056)
3rd asset quintile	0.171***	(0.051)	0.086*	(0.051)	-0.005	(0.059)	0.003	(0.056)
4th asset quintile	0.160***	(0.052)	0.043	(0.052)	0.101*	(0.059)	-0.100*	(0.058)
5th asset quintile	0.163***	(0.055)	0.070	(0.054)	0.158***	(0.061)	-0.063	(0.061)
Number of organizations joined	0.316***	(0.017)	0.103***	(0.012)	0.138***	(0.012)	0.071***	(0.013)
Year dummy: 0 = 2016	0.128***	(0.035)	0.050	(0.035)	0.321***	(0.040)	0.234***	(0.040)
Cropping characteristics								
Crop acreage	0.031	(0.019)	0.034*	(0.020)	0.038*	(0.022)	-0.006	(0.022)
Crop acreage squared	-0.002	(0.002)	-0.004**	(0.002)	-0.002	(0.002)	-0.000	(0.002)
HH grew maize (=1)	-0.067	(0.091)	0.080	(0.095)	-0.068	(0.105)	0.098	(0.116)
HH grew rice	-0.120	(0.084)	0.252***	(0.083)	0.009	(0.094)	-0.110	(0.101)
HH grew cereals	-0.136**	(0.056)	0.027	(0.057)	0.129**	(0.063)	0.026	(0.065)
HH grew tubers	0.125**	(0.049)	0.058	(0.047)	0.010	(0.052)	-0.110**	(0.054)
HH grew beans	0.074**	(0.035)	0.006	(0.035)	0.107***	(0.040)	-0.014	(0.040)
HH grew groundnuts	0.116***	(0.035)	0.042	(0.035)	0.016	(0.040)	0.027	(0.039)
HH grew vegetables	-0.199***	(0.045)	-0.037	(0.044)	0.187***	(0.048)	-0.063	(0.050)
HH grew oilseeds	0.310***	(0.106)	0.053	(0.102)	0.362***	(0.107)	-0.232*	(0.126)
HH grew fibers	-0.018	(0.079)	0.046	(0.079)	0.113	(0.084)	0.065	(0.095)
HH grew tobacco	0.121**	(0.060)	0.080	(0.058)	0.212***	(0.063)	0.025	(0.065)
Community characteristics								
Number of projects in community	0.017	(0.011)	0.001	(0.011)	0.041***	(0.013)	0.025*	(0.013)
Distance (control=nearest)								
2nd road distance quintile	0.050	(0.051)	-0.173***	(0.051)	0.051	(0.059)	-0.189***	(0.057)
3rd road distance quintile	-0.033	(0.055)	-0.100*	(0.054)	0.071	(0.062)	-0.108*	(0.060)

4th road distance quintile	-0.078	(0.053)	-0.210***	(0.053)	0.182***	(0.060)	-0.122**	(0.059)
5th road distance quintile	-0.054	(0.055)	-0.251***	(0.055)	0.092	(0.063)	-0.216***	(0.062)
Community distance to nearest market	0.008***	(0.003)	-0.002	(0.003)	-0.001	(0.003)	0.005	(0.003)
Distance to extension agent (km)	-0.000**	(0.000)	-0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
Village has VAC/GACs	0.025	(0.035)	-0.047	(0.036)	0.000	(0.040)	-0.096**	(0.040)
Village has VDC	-0.189	(0.146)	-0.141	(0.152)	0.147	(0.168)	-0.258	(0.158)
Village has model village program	0.054	(0.039)	-0.065*	(0.039)	-0.073*	(0.044)	-0.157***	(0.045)
Community well-being (control=poorest)								
2nd community well-being quintile	0.036	(0.050)	-0.022	(0.051)	0.028	(0.056)	-0.075	(0.057)
3rd community well-being quintile	0.039	(0.052)	0.054	(0.052)	-0.065	(0.059)	-0.060	(0.058)
4th community well-being quintile	0.087	(0.054)	0.156***	(0.054)	-0.005	(0.062)	0.021	(0.060)
5th community well-being quintile	0.062	(0.056)	0.014	(0.057)	-0.082	(0.064)	-0.051	(0.065)
District dummies: YES								
Constant	-1.802***	(0.246)	-1.311***	(0.252)	-2.215***	(0.294)	-0.811***	(0.281)
Observations	7,842		7,842		7,842		7,842	
Pseudo R-squared	0.176		0.105		0.149		0.057	

Source: IFPRI household and community surveys (2016 and 2018)

Note: Standard errors in parentheses: * p<0.10, ** p<0.05, *** p<0.01. HH = household; km = kilometers; NGO = nongovernmental organization; VAC = village agricultural committee; GACs = group villages agricultural committees; VDC = village development committee.

Table 7: Individual logit regression results on determinants of access to extension—Pooled, both years, by source—12 months

	All extension access - 12 months							
	Government		Radio		NGO		Other farmers	
Individual characteristics	**Marginal effect**	**Std. errors**	**Marginal effect**	**Std. errors**	**Marginal effect**	**Std. errors**	**Marginal effect**	**Std. errors**
Individual's age	0.033**	(0.013)	0.010	(0.013)	0.017	(0.016)	0.003	(0.016)
Individual's age squared	-0.000**	(0.000)	-0.000	(0.000)	-0.000	(0.000)	-0.000	(0.000)
Male (=1)	0.127***	(0.043)	0.328***	(0.044)	-0.032	(0.054)	0.006	(0.056)
Individual's highest education level	0.004	(0.018)	0.020	(0.020)	0.029	(0.023)	0.008	(0.026)
Individual's education squared	0.001	(0.001)	0.000	(0.001)	0.000	(0.001)	-0.001	(0.001)
Individual can speak/write Chichewa	0.155***	(0.056)	0.156***	(0.060)	0.028	(0.074)	0.108	(0.075)
Individual can speak/write English	0.135***	(0.048)	0.171***	(0.049)	0.101*	(0.058)	0.095	(0.067)
Whether individual was lead farmer	0.272***	(0.059)	-0.210***	(0.062)	0.458***	(0.063)	-0.242***	(0.087)
HH characteristics								
HH head education	-0.000	(0.015)	-0.006	(0.016)	0.022	(0.018)	-0.019	(0.019)
HH head education squared	-0.001	(0.001)	0.001	(0.001)	-0.001	(0.001)	0.001	(0.001)
HH head age	0.009	(0.013)	0.001	(0.014)	0.015	(0.017)	-0.011	(0.016)
HH head age squared	-0.000	(0.000)	-0.000	(0.000)	-0.000	(0.000)	0.000	(0.000)
HH head male (=1)	-0.002	(0.053)	0.066	(0.057)	0.041	(0.069)	-0.169**	(0.070)
Asset (control=poorest)								
2nd asset quintile	-0.016	(0.054)	-0.052	(0.056)	0.019	(0.069)	-0.110	(0.070)
3rd asset quintile	0.046	(0.055)	0.019	(0.056)	0.058	(0.069)	0.011	(0.071)
4th asset quintile	0.064	(0.056)	-0.015	(0.057)	0.126*	(0.067)	-0.013	(0.072)
5th asset quintile	0.147***	(0.057)	0.056	(0.059)	0.140**	(0.070)	-0.070	(0.077)

Number of organizations joined	0.262***	(0.014)	0.102***	(0.012)	0.151***	(0.013)	0.091***	(0.016)
Year dummy: 0 = 2016	0.044	(0.038)	0.067*	(0.039)	0.299***	(0.047)	0.293***	(0.049)
Cropping characteristics								
Crop acreage	0.051**	(0.022)	0.024	(0.022)	0.011	(0.025)	0.012	(0.013)
Crop acreage squared	-0.004**	(0.002)	-0.004**	(0.002)	-0.000	(0.002)	-0.000	(0.000)
HH grew maize (=1)	0.112	(0.107)	0.038	(0.109)	-0.115	(0.126)	0.196	(0.179)
HH grew rice	-0.143	(0.093)	0.162*	(0.093)	0.107	(0.103)	-0.038	(0.126)
HH grew cereals	0.031	(0.060)	0.028	(0.064)	0.147**	(0.074)	0.097	(0.084)
HH grew tubers	0.091*	(0.050)	0.033	(0.051)	-0.014	(0.060)	-0.103	(0.069)
HH grew beans	0.110***	(0.038)	0.059	(0.039)	0.031	(0.046)	0.021	(0.051)
HH grew groundnuts	0.055	(0.037)	0.048	(0.038)	0.059	(0.045)	0.005	(0.048)
HH grew vegetables	-0.122**	(0.048)	-0.057	(0.049)	0.169***	(0.055)	-0.137**	(0.065)
HH grew oilseeds	0.153	(0.109)	-0.059	(0.122)	0.266**	(0.126)	-0.103	(0.168)
HH grew fibers	0.049	(0.083)	0.096	(0.089)	0.042	(0.098)	0.121	(0.124)
HH grew tobacco	0.168***	(0.063)	0.143**	(0.063)	0.144**	(0.071)	0.006	(0.082)
Community characteristics								
Number of projects in community	0.001	(0.012)	-0.011	(0.013)	0.047***	(0.015)	0.052***	(0.017)
Distance (control=nearest)								
2nd road distance quintile	0.016	(0.054)	-0.187***	(0.055)	-0.077	(0.070)	-0.222***	(0.070)
3rd road distance quintile	-0.070	(0.058)	-0.121**	(0.058)	0.087	(0.070)	-0.166**	(0.074)
4th road distance quintile	-0.070	(0.057)	-0.190***	(0.058)	0.050	(0.070)	-0.203***	(0.075)
5th road distance quintile	-0.114*	(0.059)	-0.298***	(0.061)	-0.016	(0.073)	-0.304***	(0.080)
Community distance to nearest market	0.007**	(0.003)	-0.003	(0.004)	0.001	(0.004)	0.010**	(0.004)
Distance of extension agent from community	-0.000**	(0.000)	-0.000	(0.000)	0.000**	(0.000)	0.000	(0.000)
Village has VAC/GACs	0.056	(0.038)	-0.032	(0.040)	0.004	(0.047)	-0.091*	(0.051)
Village has VDC	-0.025	(0.159)	-0.185	(0.158)	0.220	(0.203)	-0.117	(0.193)
Village has model village program	0.005	(0.042)	-0.083*	(0.044)	-0.104**	(0.052)	-0.269***	(0.059)
Community well-being (control=poorest)								
2nd community well-being quintile	0.028	(0.053)	-0.094*	(0.057)	-0.099	(0.064)	-0.103	(0.072)
3rd community well-being quintile	0.001	(0.055)	0.000	(0.057)	-0.076	(0.067)	-0.134*	(0.072)
4th community well-being quintile	0.024	(0.057)	0.086	(0.059)	-0.025	(0.071)	-0.161**	(0.077)
5th community well-being quintile	0.045	(0.060)	-0.036	(0.063)	-0.182**	(0.074)	-0.186**	(0.085)
District dummies: YES								
Constant	-2.246***	(0.269)	-1.335***	(0.273)	-2.453***	(0.340)	-1.712***	(0.389)
Observations	7,842		7,842		7,842		7,724	
Pseudo R-squared	0.173		0.131		0.166		0.115	

Source: IFPRI household and community surveys (2016 and 2018)

Note: Standard errors in parentheses: * p<0.10, ** p<0.05, *** p<0.01. HH = household; NGO = nongovernmental organization; VAC = village agricultural committee; GACs = group villages agricultural committees; VDC = village development committee.

Moving to the individual-level results for the extension sourcing regressions, Tables 6 and 7 follow the same pattern of Tables 4 and 5 but the sample is now at the individual level and we introduce the individual-level covariates. We can see from Table 6 that introducing the individual-level covariates removes much of the significance of the HH head covariates we see from Tables 4 and 5. And what relationships remain with the HH head are more muted in impact. Instead, we now see that an individual being male is significantly associated with access to only government and radio extension services. As for individual education, the two new covariates of whether an individual can read/write Chichewa or English are both strongly and positively associated with access to radio extension and are alternatively associated with access to NGO and "other farmer" services. However, there is no discernable relationship between these education variables and access to government extension.

Comparing Table 4 to Table 6 (which both cover access to extension over the last 2 years), there are similar patterns for the asset quintiles, number of organizations joined, and the year dummy variable. There is a slight change in the covariates for crop acreage, as only government and radio extension access display a positive, significant relationship. Intuitively, the community covariates also remain largely unchanged. This makes sense as the community variables should have a common effect on the HH and the individual. However, one interesting change in the community variables is that distance to the nearest market is now positively and significantly associated with government extension access.

Finally, Table 7 displays the individual-level results for access to extension in the last 12 months. Compared with Table 6, we now see the ability to read/write Chichewa or English as having a significant relationship with access to both government and radio extension. As was the case with the changes in the coefficients from Tables 4 to 5, the coefficients on the asset quintiles are no longer significant in Table 7, as they were in Table 6. The community-level variables, again, remain mostly unchanged. However, we yet again see the interesting large, negative coefficients associated with community well-being and access to "other farmer" extension.

3.3. Delivery method or extension approach

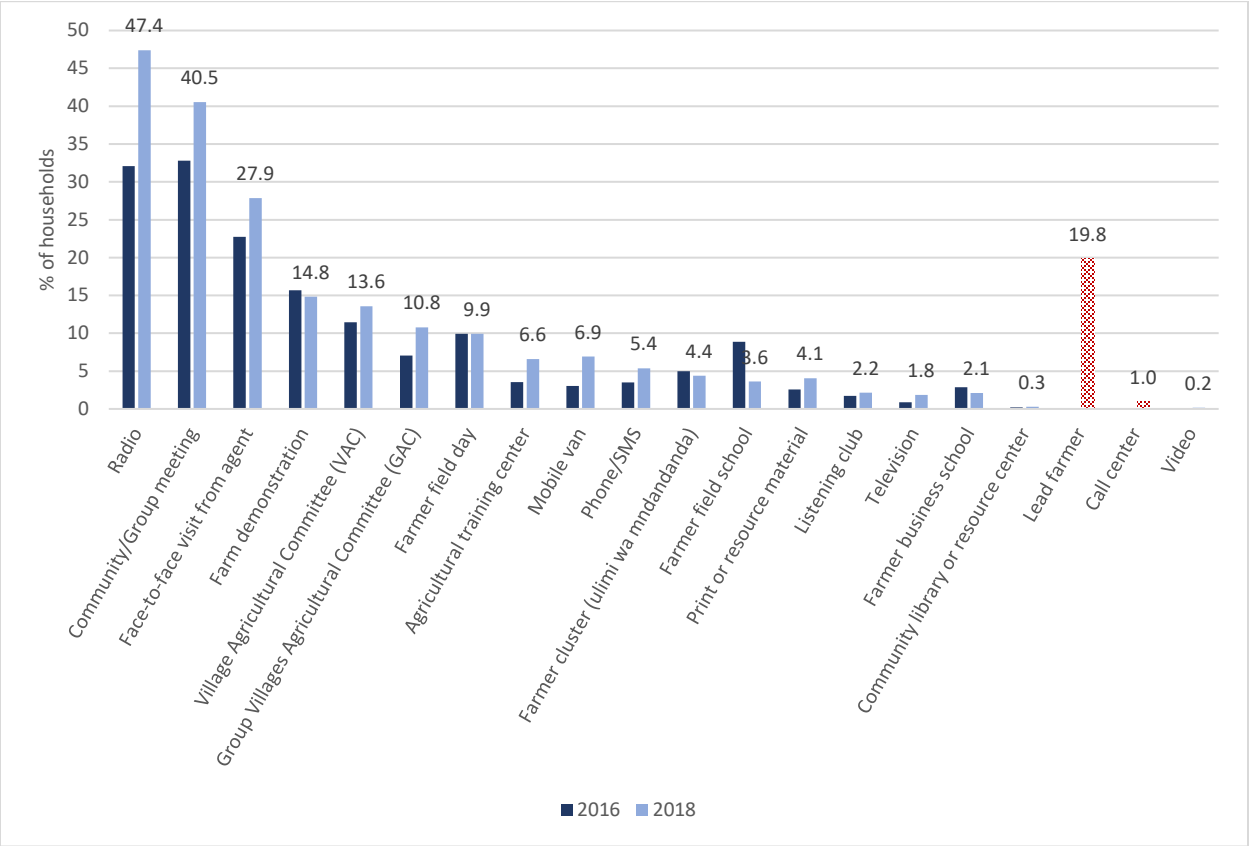
Among the surveyed HHs, radio is the main method of receiving agriculture or nutrition advice (48 percent of HHs) (Figure 5). This is followed by community or group meetings and face-to-face visits from extension agents. These have consistently been the primary methods of receiving advice in both 2016 and 2018. The greater access to agriculture or nutrition-related advice observed in 2018 seems to be driven by increases in access through radio, community/group meetings, and face-to-face visits from extension agents.

Other communications methods that show slight improvements in terms of HHs reporting having used them are VACs/GACs, training centers, mobile vans, mobile phones/SMS, print materials, and television shows. However, there is a slight decrease in the percentage of HHs reporting farm demonstrations, farmer clusters, farmer field schools, and farmer business schools.

In 2018, we asked new questions regarding access to a "lead farmer," and 20 percent of HHs said they have participated in an activity with lead farmers. This is slightly higher compared to those reporting access to advice or information from lead farmers (Figure 4).

There is still very low coverage of call centers (1 percent of HHs), despite providing free calls or text messages, which is also consistent with the results below regarding the low motivation to demand agricultural extension services.

Figure 5: Percentage of HHs participating in various methods or approaches



Source: IFPRI household and community surveys (2016 and 2018)

Note: HH = household. The dotted red bars (lead farmer, call center, video) means that data was collected only in 2018. Survey question: "In the last 12 months, have you participated in any of these activities or used any of these methods to get information on agriculture or nutrition?"

As radio was cited as the most prevalent method of extension access in 2018 (and second-most-prevalent in 2016), we have also conducted an HH-level regression to investigate the determinants of participation in radio extension. This again follows the same pattern and covariates as our previous logit regressions but differs slightly in that the dependent variable is participation in radio extension rather than access to it (Table 8).

Table 8: HHs logit regression results on determinants of participation in extension—Radio only

HH characteristics	Marginal effect	Std. errors
HH head education	0.052***	(0.013)
HH head education squared	-0.000	(0.001)
HH head age	0.013*	(0.008)
HH head age squared	-0.000**	(0.000)
HH head male (=1)	0.388***	(0.049)
Asset (control=poorest)		
2nd asset quintile	0.056	(0.063)
3rd asset quintile	0.109*	(0.064)
4th asset quintile	0.117*	(0.066)
5th asset quintile	0.174***	(0.067)
HH has lead farmer	0.054	(0.060)
Number of organizations joined	0.032***	(0.010)
Year dummy: 0 = 2016	0.331***	(0.043)
Cropping characteristics		
Crop acreage	0.070***	(0.025)
Crop acreage squared	-0.005**	(0.002)
HH grew maize (=1)	-0.146	(0.120)
HH grew rice	0.163	(0.109)
HH grew cereals	0.092	(0.068)
HH grew tubers	-0.068	(0.061)
HH grew beans	0.121***	(0.044)
HH grew groundnuts	0.083*	(0.044)
HH grew vegetables	0.120**	(0.053)
HH grew oilseeds	0.068	(0.131)
HH grew fibers	0.152	(0.098)
HH grew tobacco	0.128*	(0.074)
Community characteristics		
Number of projects in community	-0.035**	(0.014)
Distance (control=nearest)		
2nd road distance quintile	-0.085	(0.062)
3rd road distance quintile	-0.136**	(0.067)
4th road distance quintile	-0.175***	(0.065)
5th road distance quintile	-0.178***	(0.068)
Community distance to nearest market	0.001	(0.004)
Distance of extension agent from community	-0.000	(0.000)
Village has VAC/GACs	0.023	(0.044)
Village has VDC	-0.196	(0.189)
Village has model village program	-0.024	(0.049)
Community well-being (control=poorest)		
2nd community well-being quintile	0.085	(0.063)
3rd community well-being quintile	0.131**	(0.065)
4th community well-being quintile	0.223***	(0.067)
5th community well-being quintile	0.255***	(0.069)
District dummies: YES		
District (dummy variable with base Balaka)		
Constant	-1.524***	(0.314)
Observations	4,787	
Pseudo R-squared	0.105	

Source: IFPRI household and community surveys (2016 and 2018)

Note: Standard errors in parentheses: * p<0.10, ** p<0.05, *** p<0.01. HH = household; VAC = village agricultural committee; GACs = group villages agricultural committees; VDC = village development committee.

The results in Table 8 show that HHs with more educated and older heads are associated with more use of extension via radio, while male HH heads are quite significantly associated with more radio use. HHs

in the higher asset quintiles also are associated with higher use of radio extension, along with HHs which joined more organizations. Interestingly, the coefficient on the year dummy variable indicates that the year being 2018 was associated significantly with more radio extension use. The previous regressions of access to extension showed no significant relationship between year and radio access, so this result is particularly intriguing.

HHs with more crop acreage also had more radio extension use—though the negative sign on the squared crop acreage tells us that this relationship is perhaps curved in an inverse u-shape. Whether a HH grew tobacco also showed high levels of radio use.

There was a consistent, strongly negative, relationship between radio extension use and the distance quintiles. Being further away from a road was associated with less radio extension use, and the coefficients on the various quintiles increased along with the quintile. This seems somewhat counterintuitive. We would expect those HHs further out to more often rely on technology such as radio. As such, this result merits further investigation. And finally, there was a consistently positive relationship between community well-being and radio extension use. This is perhaps more intuitive, as more well-off communities may have more access to radio technology.

3.4. Indicators of perceived quality of extension services

In addition to asking questions about access to different extension services, the surveys in question also aimed to assess the perceived quality of the services once they were accessed. To investigate this, we asked five questions (pertaining to the latest advice received):

- *Were you satisfied with the advice? (Likert scale: very satisfied, satisfied, somewhat satisfied, not satisfied)*
- *Was the advice useful? (Likert scale: very useful, useful, somewhat useful, not useful)*
- *Did you act upon it or did you follow the advice? (0/1)*
- *Was it something that you needed or wanted? (0/1*
- *Was it something that you expressed demand for or have requested? (0/1)*

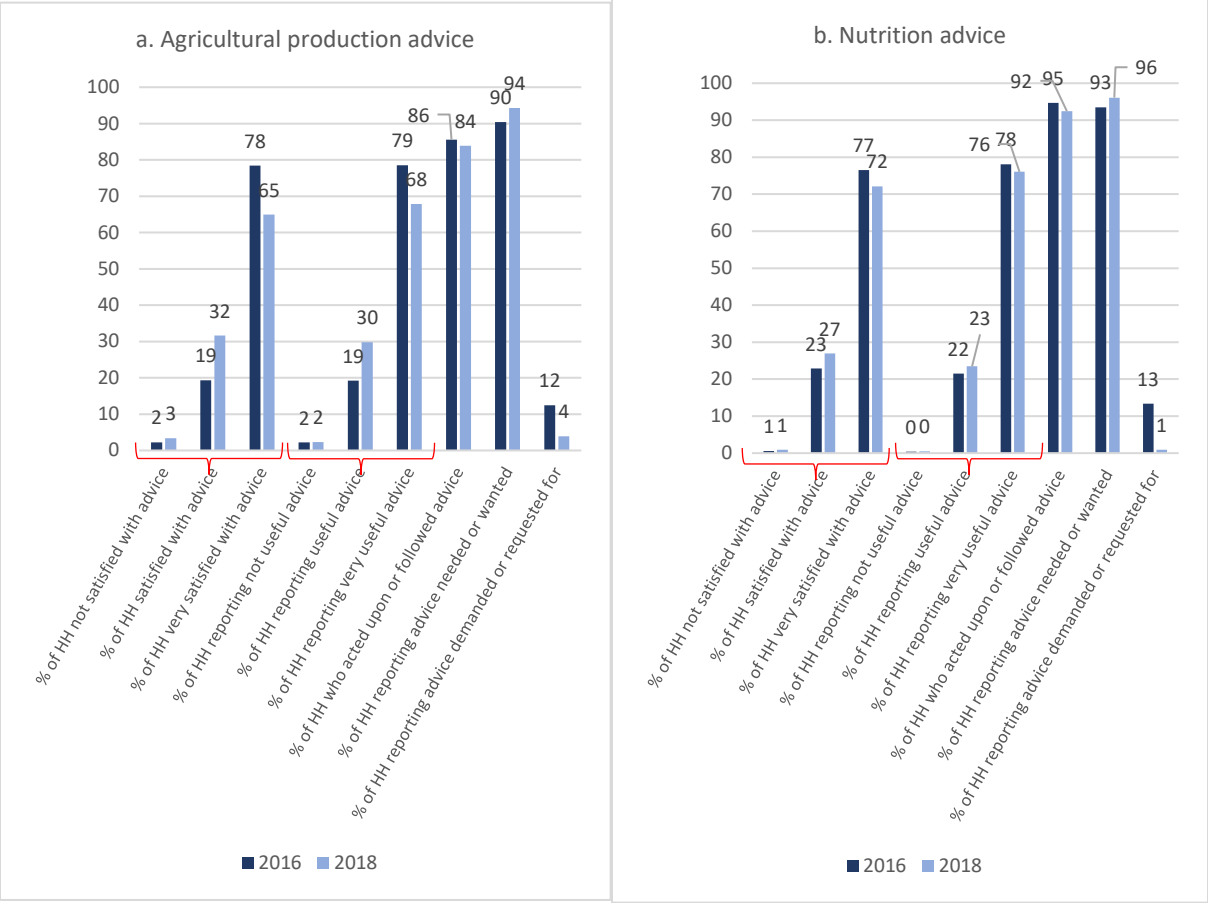
Overall, the ratings were generally high both for 2016 and 2018 across four different ways of asking the perceived “quality” questions, and similar patterns of high ratings emerged across most topics (Figure 6). The only exception was that of aquaculture, where there were poor ratings given in 2016, but these ratings improved considerably in 2018. For example, 28 percent of HHs did not find the aquaculture advice useful in 2016, which fell to only 11 percent in 2018. In 2016, 29 percent of HHs did not follow aquaculture advice, which increased to 43 percent of HHs in 2018.

However, for agriculture advice, fewer HHs rated advice as “very useful” or reported being “very satisfied,” instead downgrading the advice received to just “useful” or being “satisfied.” For nutrition advice, the 2018 ratings were similar to those of 2016.

Compared with the IHPS (Annex 4), both surveys find generally high ratings of the perceived quality of advice received. The IHPS has lower ratings than the IFPRI surveys, but both datasets show slight worsening of ratings across years. Save for the government (AEDO/AEDC), lower ratings were reported for all sources of advice in 2016, compared to 2013 (Annex 5).

What is noticeable are fewer HHs reporting that they demanded or requested the advice they received, dropping from 12-13 percent of HHs in 2016, to only 1-4 percent of HHs in 2018. This is consistent with the above findings on the low usage of call centers or text messaging to express needs or demands for services, despite being provided for free.

Figure 6: Percentage of HHs and their ratings on advice received, 2016 and 2018



Source: **IFPRI household surveys (2016 and 2018)**

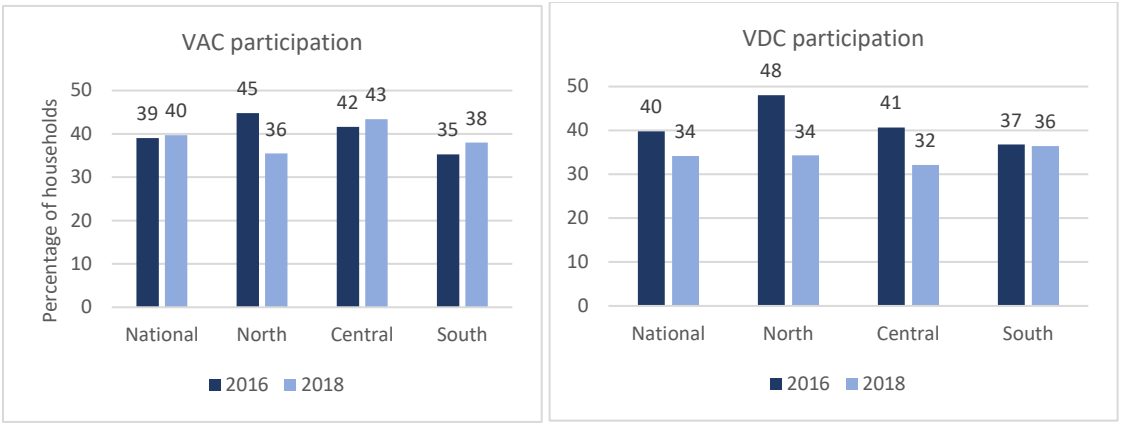
Note: HH = household

4. Status of the Decentralized and Demand-Driven Approach

Due to the multilevel structure of the District of Agricultural Extension Services System (DAESS) in Malawi, the national extension policy passed in Malawi in 2000 relies heavily on various interlinked organizations ranging from the village to district and national levels. The goals of this structure are to (1) reduce information asymmetry between users and service providers; (2) have platforms for demand articulation and aggregation; (3) coordinate and harmonize the activities and messages of extension service providers; and (4) improve accountability among various service providers to provide better quality extension services. Put differently, with an emphasis on improving coordination and making agricultural extension services more demand-driven, the Government of Malawi has promoted the creation of various connected structures at various levels, starting with farmers' involvement at the village level. These different organizational levels are MVs and VACs at the village or group village level; Area Stakeholder Panels at the Extension Planning Areas levels; the District Stakeholder Panels; District Agricultural Extension Coordination Committee ; and District Agriculture Committees at the district level; and a National Stakeholder Panel—the Malawi Forum for Agriculture Advisory Services—at the national level.

The data collected in our surveys show that 40 percent of HHs reported participating in VACs in 2018—a slight increase of 1 percent from 2016 (Figure 7). A third of HHs reported participating in VDCs in 2018, a 6 percent decrease compared to 2016. There is an increased percentage of HHs participating in VACs in the central and southern regions, but participation in VACs and VDCs fell significantly in the north.

Figure 7: Percentage of HHs participating in VAC or VDC



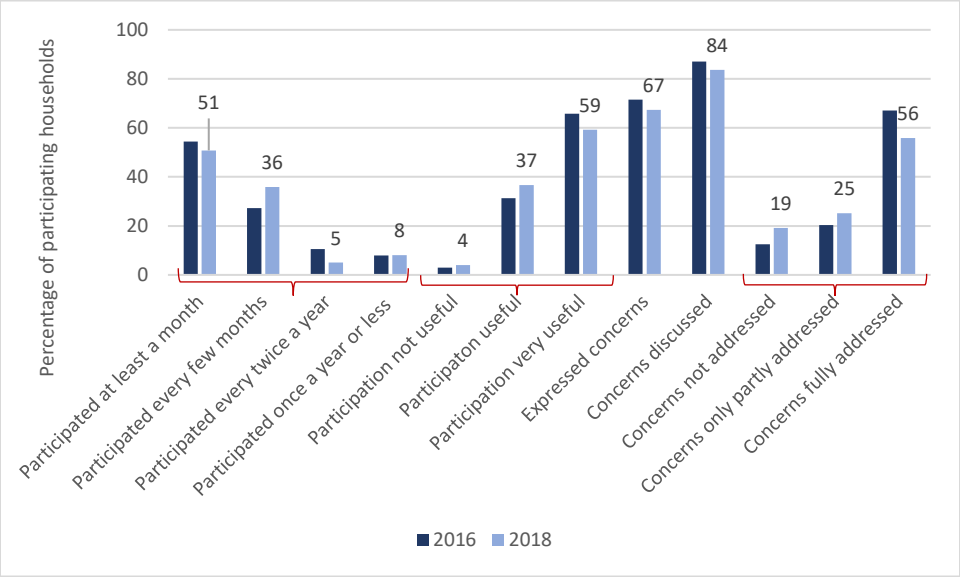
Source: IFPRI household and community surveys (2016 and 2018)

Note: HH = household; VAC = village agricultural committee; VDC = village development committee.

As with the extension services, we also asked HHs to indicate their frequency of participation in and to rate the perceived quality of the institutions they participated in or interacted with. In 2018, most of the HHs were participating frequently in VAC/VDC meetings for several times a year. Their participation is also considered useful or very useful by almost all of the participating HHs. However, only 67 percent reported having the chance to express their concerns. Of those who had the chance to express concerns, 84 percent had their concerns discussed in the meeting, and only 56 percent of them reported having their concerns fully addressed. In short, about 30 percent of participating HHs reported having

their concerns heard and addressed in VAC/VDC meetings. Moreover, we see slightly worse ratings for 2018 compared to 2016 (Figure 8). This can be an area for further improvement.

Figure 8: Frequency of participation and HH ratings (conditional on participation) of VDCs/VACs



Source: IFPRI household surveys (2016 and 2018).

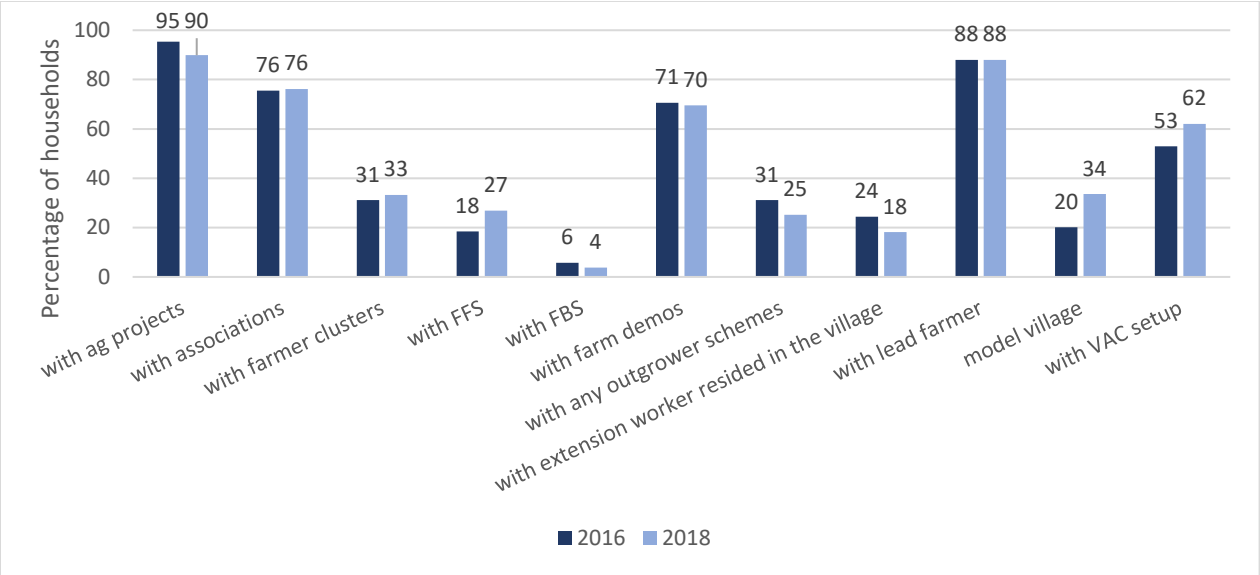
Note: The values are for 2018; 2016 values are not included so that they do not crowd the graph. HH = household; VACs = village agricultural committees; VDCs = village development committees.

4.1 Community-level indicators

In addition to the questions asked to HHs regarding the various DAESS organizational structures, the two IFPRI surveys also contained community-level questions asked during the community questionnaire section.

In the answers to these questions, we saw similar patterns between 2016 and 2018 (Figure 9). However, more communities reported being involved with FFS, MVs, and VACs, and fewer communities reported containing out-grower schemes, resident extension workers, and the farmer business schools (FBS).

Figure 9: Community-level access to extension organizations



Source: IFPRI community surveys (2016 and 2018)

Note: ag=agricultural; FFS =farmer field schools; FBS = farmer business schools; VAC = village agricultural committee.

Further disaggregating this information, Table 9 below reports the community-level statistics (reported by the community members) on the presence of these various structures along with other, descriptive, community factors.

Table 9: Community-level reported statistics

	2016				2018			
	Average	**SD**	**Min**	**Max**	**Average**	**SD**	**Min**	**Max**
Average number of participants in VACs	**96**	250	0	3350	**38**	73	5	500
% of population participating in VACs	**12**	22	0	100	**7**	20	0	100
Average number of lead farmers	**3**	3	0	40	**4**	4	0	35
Average number of agricultural projects	**3**	2	0	9	**2**	2	0	11
Average number of farm demos	**2**	2	0	11	**2**	2	0	14
Average number of out-grower schemes	**0**	1	0	4	**0**	1	0	5
Distance to nearest agent (km)	**7**	8	0	45	**7**	8	0	50
Average number of agents working with community	**1**	1	0	8	**1**	1	0	5
Average number of associations	**2**	2	0	15	**2**	2	0	10
Average number of farmer clusters	**2**	7	0	60	**1**	4	0	30

Source: IFPRI community surveys (2016 and 2018). **Note:** km = kilometers; VACs = village agricultural committees.

In looking at the data in the table, we can see similar patterns in 2016 and 2018. The reported number of lead farmers, agriculture projects, farm demos, and out-grower schemes do not change much at all. Neither did the number of extension agents, distance to extension agents, nor the number of associations or farm clusters.

The primary disparity we see between the two years is that of significantly fewer participants in VACs in 2018. The average number of participants fell from 96, with a median of 30, in 2016 to an average of 38 and median of 10 in 2018.

5. Performance of the Agriculture and Food System

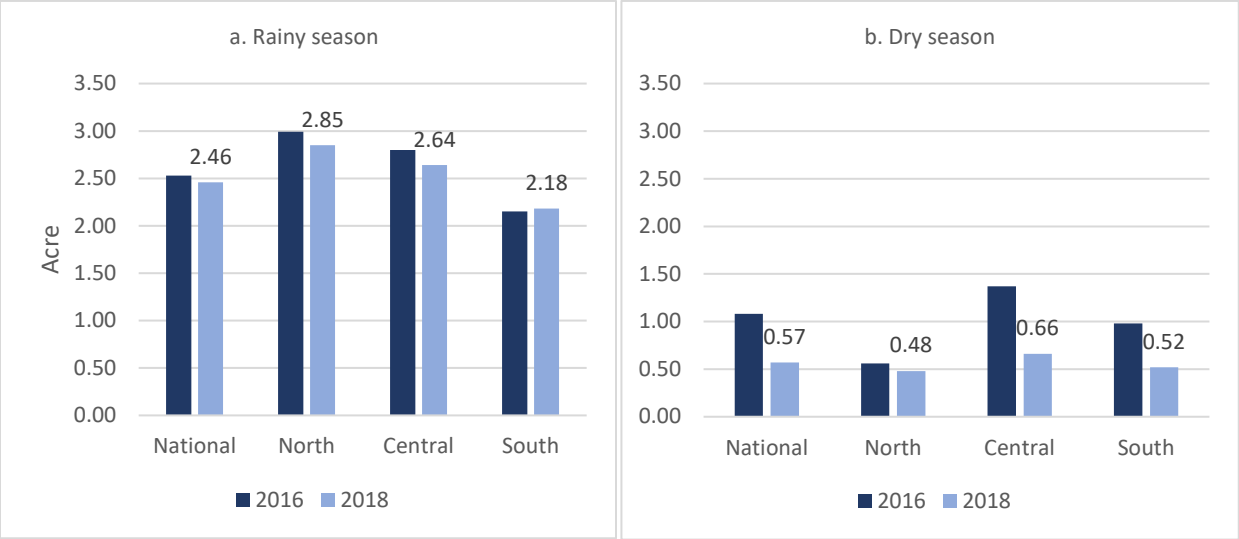
This section presents results of the HH surveys with regards to agriculture and the food system. Topics covered include cropped area, yield, and diversification.

5.1. Area expansion

At the national level, plot area cultivated in 2016 and 2018 averaged about 2.5 acres (1 ha) per HH during the rainy season and half an acre during the dry season. Acreage cultivated during the rainy season mostly stayed the same, while acreage cultivated during the dry season decreased from 2016 to 2018.

On average, we see larger acreage levels in the north during the rainy season, and larger amounts of acreage in the central region during the dry season (Figure 10). The percentage of HHs cultivating dry season plots decreased from 2016 to 2018.

Figure 10: Average land area cultivated (acre)



Source: IFPRI household surveys (2016 and 2018).

Note: The values are for 2018; 2016 values are not included so not to crowd out the graphs; 38 percent of households plant during the dry season.

5.2. Commercialization (percentage of harvests sold)

Most of the maize produced in the HH (95 percent) is consumed in the HH and not sold. Similarly, only 4 percent of "other cereals" was sold. Vegetables harvested are also mainly consumed by the HH and not sold (6 percent).

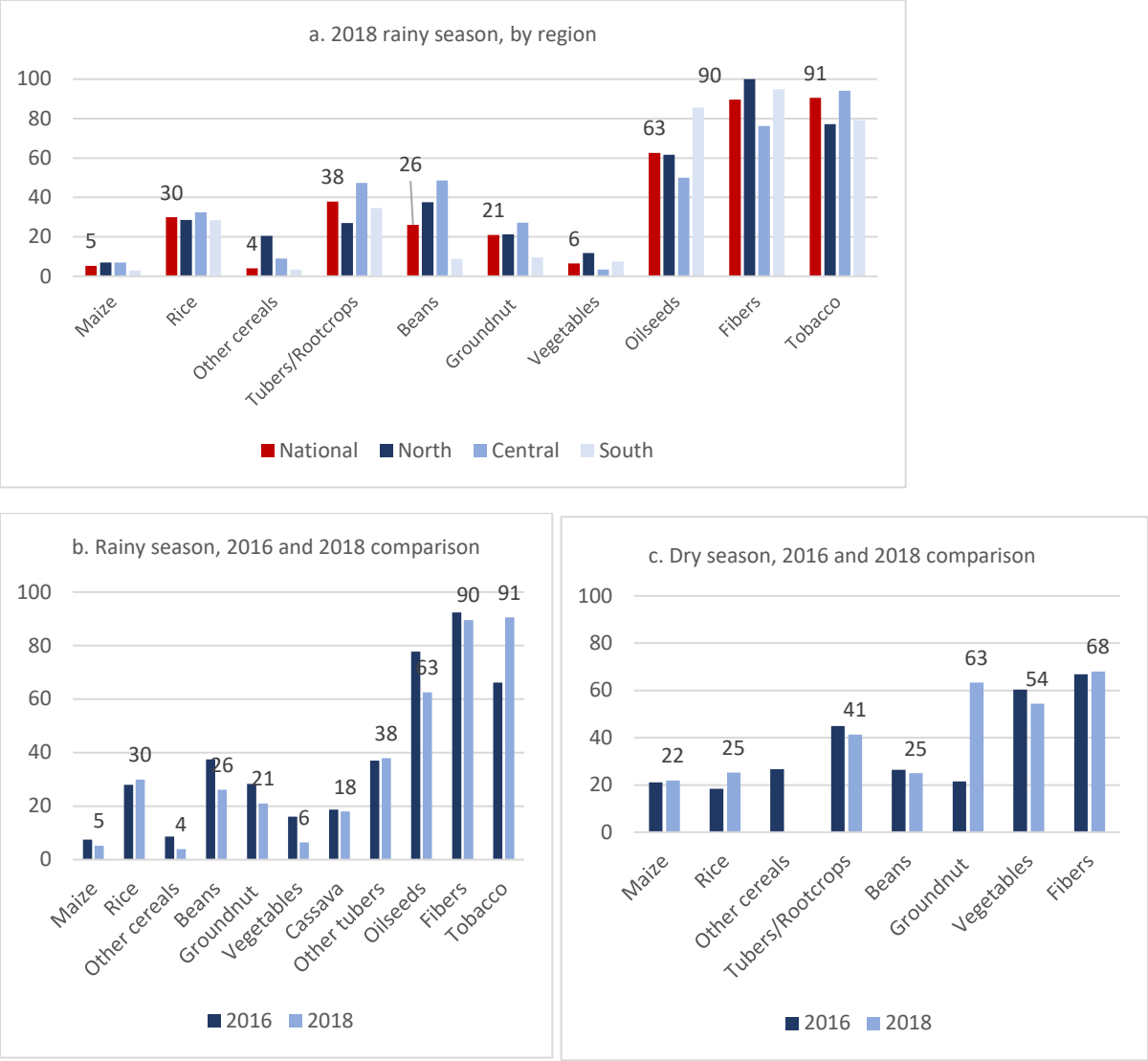
For other crops, such as rice, about 30 percent of home production was sold (Figure 11). Also, about a third of tubers/root crops are sold; while 21-26 percent of groundnuts and other legumes are sold.

There were similar patterns in terms of the percentage of harvest sold between the 2016 and 2018 rainy season, except for a slight decline in the percentage sold for beans, groundnuts, and vegetables.

From the qualitative interviews, we learned that HHs seem to take care of home consumption first and any surplus food will be sold. So, improvements in yield and harvests will likely improve HH food consumption, as well as increase incomes through sales of surplus.

Finally, there is usually less acreage cultivated and much less harvest during the dry season, but the percentage of harvest sold is much higher than in rainy season. This is because dry season production is often aimed as providing funds for other consumption.

Figure 11: Crop commercialization—Percentage of HHs selling



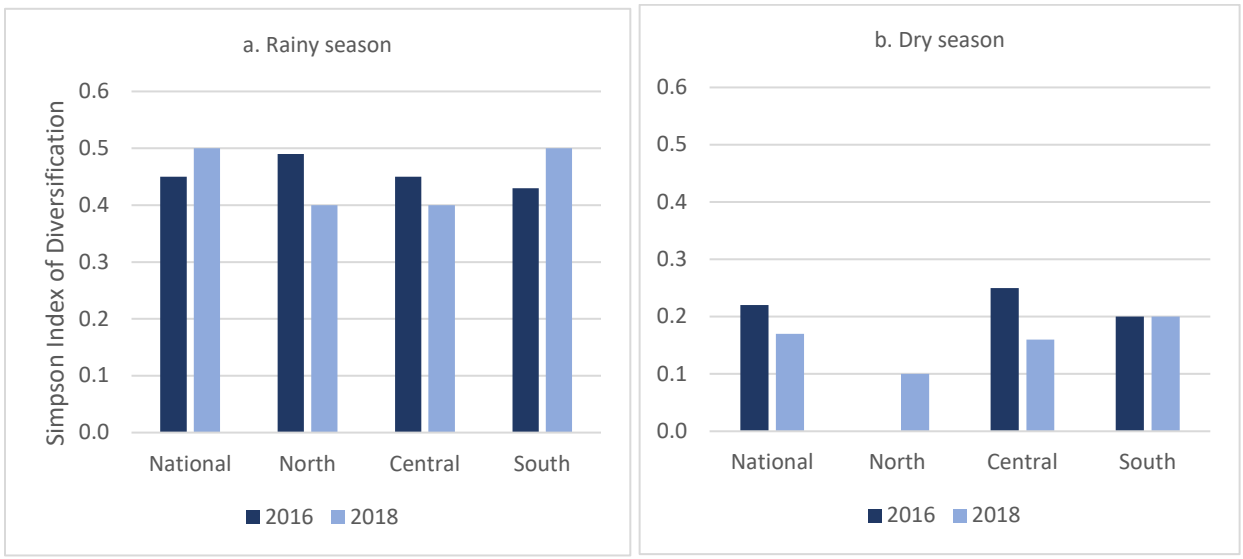
Source: IFPRI household surveys (2016 and 2018)

Note: HH = household. The values are for National level in (a); and 2018 in (b) and (c); others did not contain the values so not to crowd out the graph.

5.3 Measures of diversification

Figures 12 and 13 below demonstrate the extent of crop diversification, and the changes in diversification between the two panel years, using the Simpson index and percentage of plot acreage, respectively.

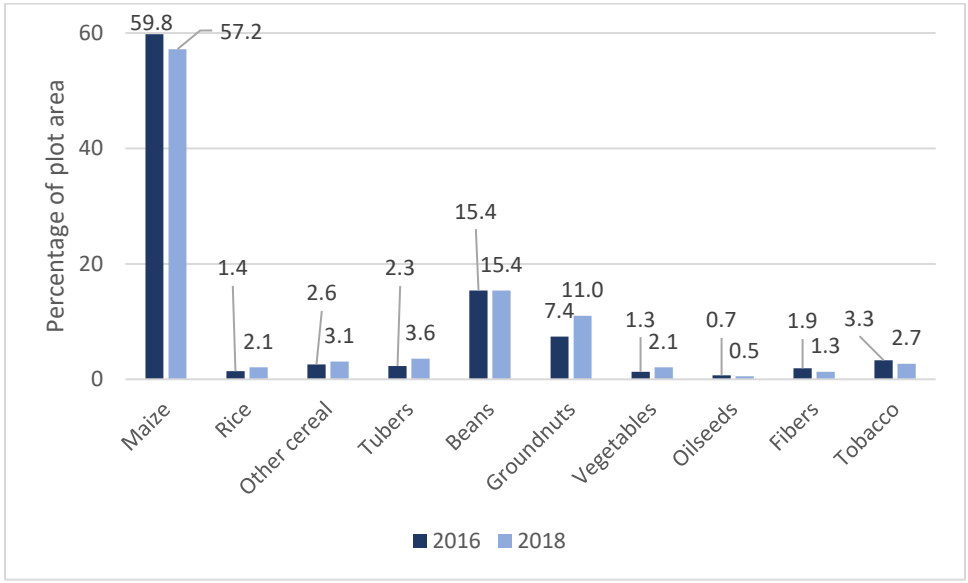
Figure 2: Crop diversification—Simpson Index



Source: **IFPRI household surveys (2016 and 2018)**

Note: The Simpson Index of Diversification (SID) is defined at the household (HH) level as 1 minus the summation of the square of the share of land allocated to each crop. SID is 0 if all land is allocated to one crop. Some HHs have a SID close to 1, which is possible, and it is determined by both the number of crops grown and how equally land is allocated across crops.

Figure 3: Crop diversification—Percent of plot area cultivated by crop



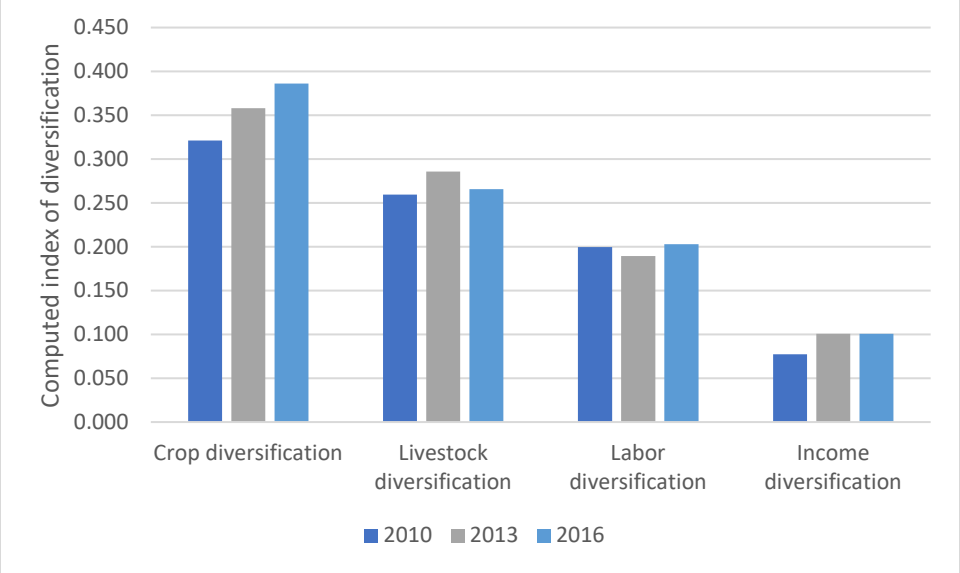
Source: **IFPRI household surveys (2016 and 2018)**

Both figures show us that crop diversification improved in the 2018 rainy season, with the gains coming from the South. Figure 12 shows increases in the Simpson index at the national level being driven by an increase in crop diversification in the southern region. Furthermore, the results in Figure 13 lead us to believe that these gains are because of reduced maize cultivation and more cultivation of other crops, mainly groundnuts.

However, we do see that there is reduced crop diversification during the dry season. Figure 12 shows that this dry season reduction is being driven most by the central region.

To compare diversification figures with those of the IHPS data, Figure 14 shows HH level diversification indices calculated from the IHPS. These indices display diversification of crops, livestock, labor, and income. These numbers are the average at the national level. We can see that for all the diversification indices, the index of diversification increased from 2010 to 2016. Labor diversification did undergo a drop from 2010 to 2013, and livestock diversification decreased from 2013 to 2016. But overall, the pattern is quite promising regarding diversification and reinforces the results found in the IFPRI surveys.

Figure 4: Measures of HH diversification (IHPS)



Source: Integrated HH Panel Survey (IHPS)

Note: HH = household.

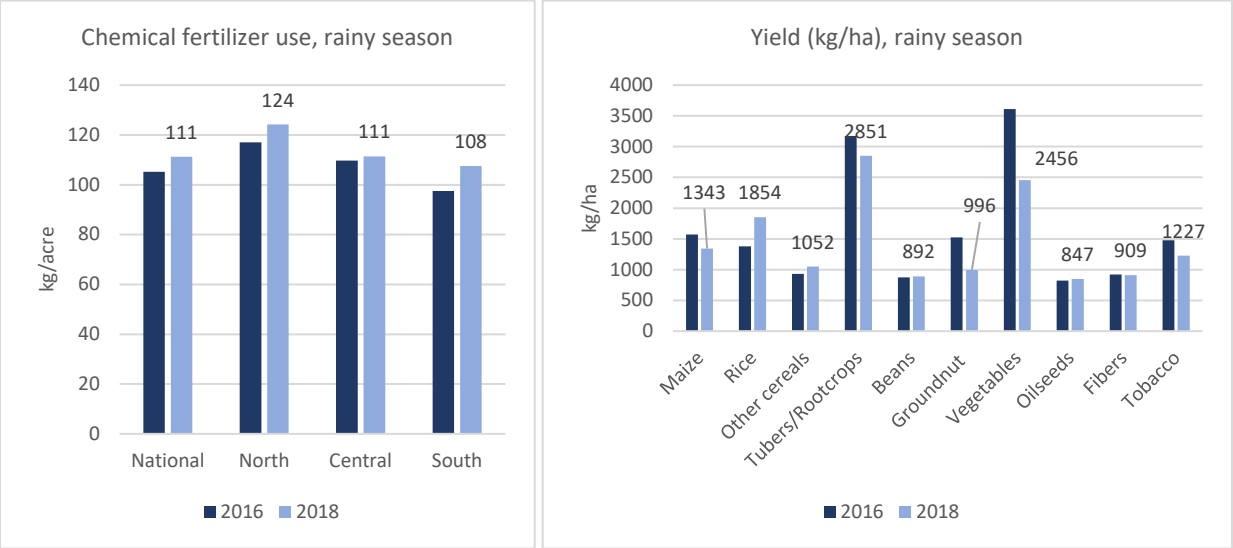
5.4 Fertilizer use and crop yield

Figure 15 below shows the results of HH chemical fertilizer use and crop yields from the IFPRI surveys. Chemical fertilizer use is presented at the national and regional averages. While crop yields are broken down by crop and presented as national averages.

We can see that HHs began using more kilograms (kgs)/acre of chemical fertilizer from 2016 to 2018. This is true at the national, and all regional, levels. However, over this same period, HHs had lower

average yields for maize, tubers, groundnuts, vegetables, and tobacco. Rice and "other cereals" showed increases in yields over this period.

Figure 55: HH chemical fertilizer use and yield

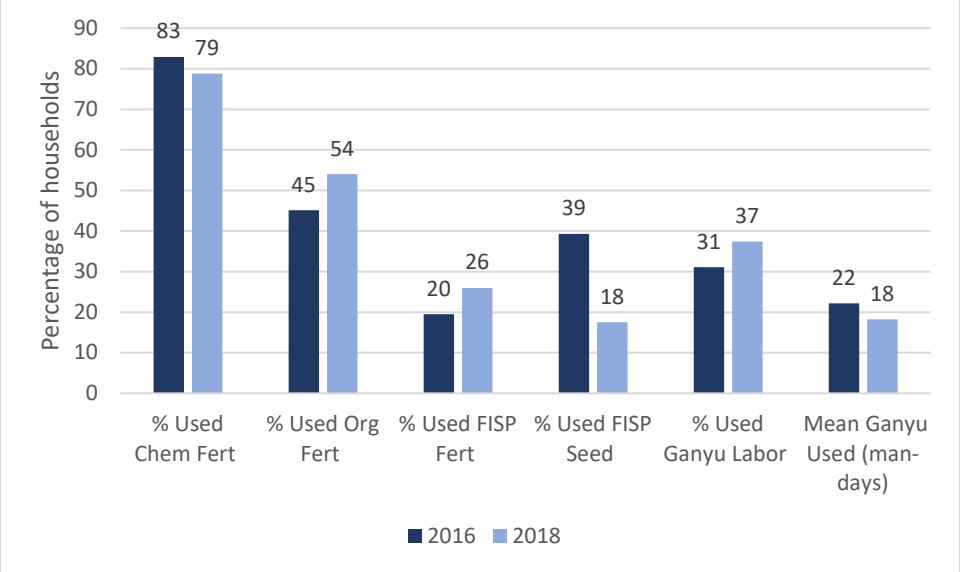


Source: IFPRI household and community surveys (2016 and 2018)

Note: kg = kilograms; ha = hectares; HH = household.

Despite the increases in kilograms of chemical fertilizer used per acre, Figure 16 shows that HH use of chemical fertilizer dropped from 2016 to 2018. This would imply that fewer HHs are using more chemical fertilizer.

Figure 6: HH input use



Source: IFPRI household and community surveys (2016 and 2018). Note: FISP = Farm Input Subsidy Program ; HH = household.

Contrary to the drop in chemical fertilizer use, there was an increase in the percentage of HHs using organic fertilizer (54 percent in 2018, up from 45 percent). As well, there was an increase in the percentage of HHs receiving fertilizer subsidies but a reduced percentage of HHs reporting receiving seed subsidies. From 2016 to 2018, there was an increase in the percentage of HHs using ganyu (hired) labor. However, the average person-days of this labor decreased over the same period.

5.5 Awareness and adoption of agriculture- and nutrition-related practices and technologies

Table 10 shows some of the major agricultural management practices that are being promoted by various government programs. This is just illustrative, and not intended to be comprehensive, to help to understand the level and gaps related to awareness and adoption of some of these major technologies being promoted.

In the past, extension and advisory services have focused on disseminating information regarding improved varieties. We still see this to some extent. Yearly reminders from extension agents (or at least those more active ones) are still being sent out on proper and timely planting, proper spacing, and planting densities (which are often referred to by farmers as the "Sasakawa program-promoted technologies"), as well as on row planting and soil fertility management practices, such as intercropping and use of inorganic and organic fertilizer. The promotion of tree planting in field crops has also increasingly been emphasized in recent years. Composting toilets, both as a soil fertility and a public health and sanitation–related practice, are also being promoted by some projects in recent years. Practices to control for erosion and flooding are also being promoted, such as contour bunds and planting Vetiver grass.

Due to growing concerns regarding the effects of climate change, drought mitigation or moisture retention measures are increasingly being promoted. These include conservation agriculture, which combines minimum tillage, soil cover or mulching, intercropping or crop rotation with legumes, and water harvesting in box ridges, pits, swales, or tanks. There is also growing interest in promoting crop diversification and integrated crop-fish-livestock farming to reduce reliance on maize.

Table 10: Some major agricultural practices promoted by government programs in the last 3 years

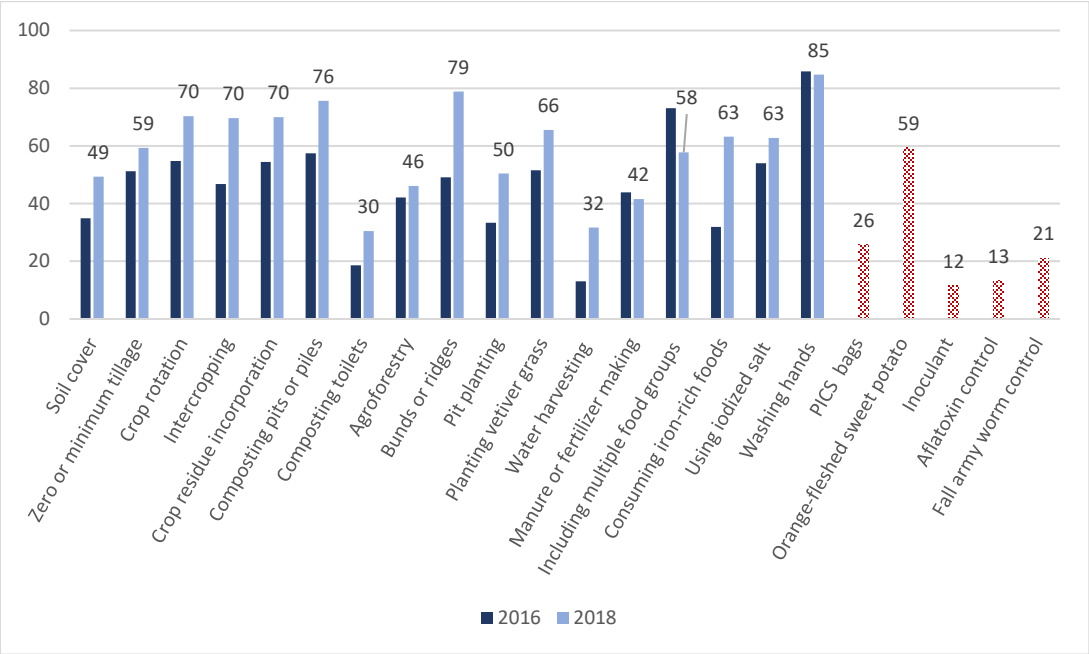
Major groupings	Department of Research Services (DARS)	Department of Crops	Lilongwe Agricultural Development Division (ADD)
Improved varieties	Many different improved varieties are being developed and promoted by DARS. Their focus is varietal research. They also research and promote management practices to maximize the yield of the improved varieties	Promotes improved varieties, especially hybrid varieties for maize and rice	Promotes improved varieties, especially high-yielding maize varieties
Soil fertility	Chemical + organic fertilizer; intercropping with legumes	Chemical + organic fertilizer; intercropping with legumes	Manure use; under-sowing with tree crops; intercropping with legumes
Drought mitigation or moisture retention	Conservation agriculture (CA), which includes crop residue, crop rotation, or intercropping; minimum tillage is a soil fertility and moisture–retaining practice	Promotes CA; water harvesting	Promotes CA; manure use; planting sorghum, millet, cassava, or sweet potato for improved water infiltration (this targets semi-commercial farmers); rainwater harvesting in box ridges, swale, planting pits, or tanks; planting legumes for reduced evaporation
Sustainable land management			Contour ridging for reduced soil erosion; gully reclamation to rehabilitate degraded land
Farm mechanization		Use of tractors, ploughs, ridgers and oxcarts	
Pest and disease management	Farmers are advised to consult with plant clinics or plant doctors	Safe application of pesticides; integrated pest management	
Postharvest handling	Farmers are encouraged to use postharvest machines and apply storage chemical (and appropriate safety practices), proper storage structure, and bagging	Farmers are encouraged to use metallic silos and apply pesticides during storage (and appropriate safety practices)	
Crops/livestock/ fisheries diversification		Farmers are encouraged to diversify from maize to other crops: rice, legumes, wheat, and other oil seeds like soya beans. Farmers are taught to monitor these new crops	Pasture establishment; stall feeding for improved animal nutrition; integrated crops-fish farming; fish polyculture; growing indigenous vegetables for nutrition improvement

Source: Various interviews with representatives of agencies.

Figure 17 shows that more HHs reported knowledge or awareness in 2018 than 2016 of most agricultural technologies and management practices being promoted. The only exception is for multiple food groups (dietary diversity), where fewer HHs reported having knowledge or awareness of this advice.

Of the new questions asked in 2018, there was widely reported adoption of orange-fleshed sweet potato (59 percent of HHs). Awareness of PICS bags (26 percent of HHs), fall army worm control (21 percent of HHs), and aflatoxin control (13 percent) can be further improved.

Figure 7: Percentage of HHs who are aware or have knowledge of specific technologies

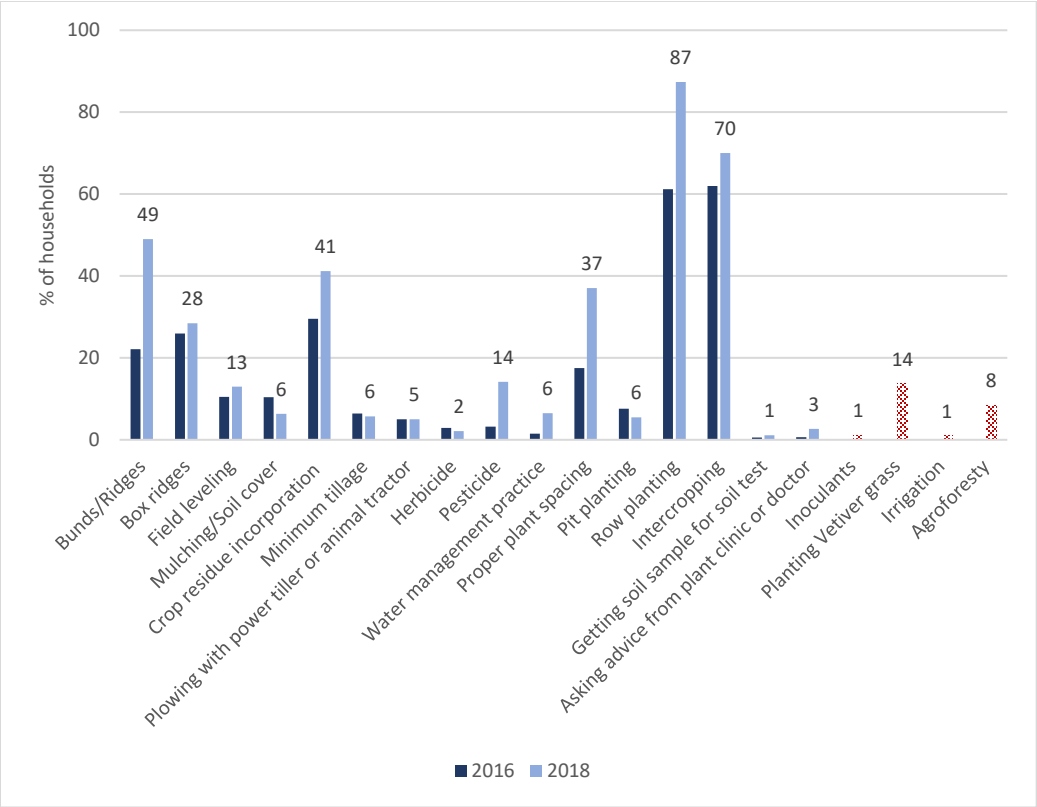


Source: IFPRI household surveys (2016 and 2018). The values are for 2018; 2016 values are not included so not to crowd the graph.

Note: HH = household; PICS = Purdue Improved Crop Storage. Dotted red bar (PICS bags, orange-fleshed sweet potato, inoculant, aflatoxin, fall army worm control) means only 2018 data were collected.

Looking at plot-level management practices and production data, we see major improvements in technology adoption from 2016 to 2018 (Figure 18). In 2018, more HHs reported adopting the agricultural technologies being promoted. Major improvements were seen in the adoption of bunds/ridges, crop residue incorporation, proper plant spacing, water management, row planting, and intercropping. We also see higher usage of pesticides, maybe due to fall army worm. We do not see improvements in soil cover or mulching, minimum tillage, and pit planting.

Figure 8: Percentage of HHs adopting specific technologies

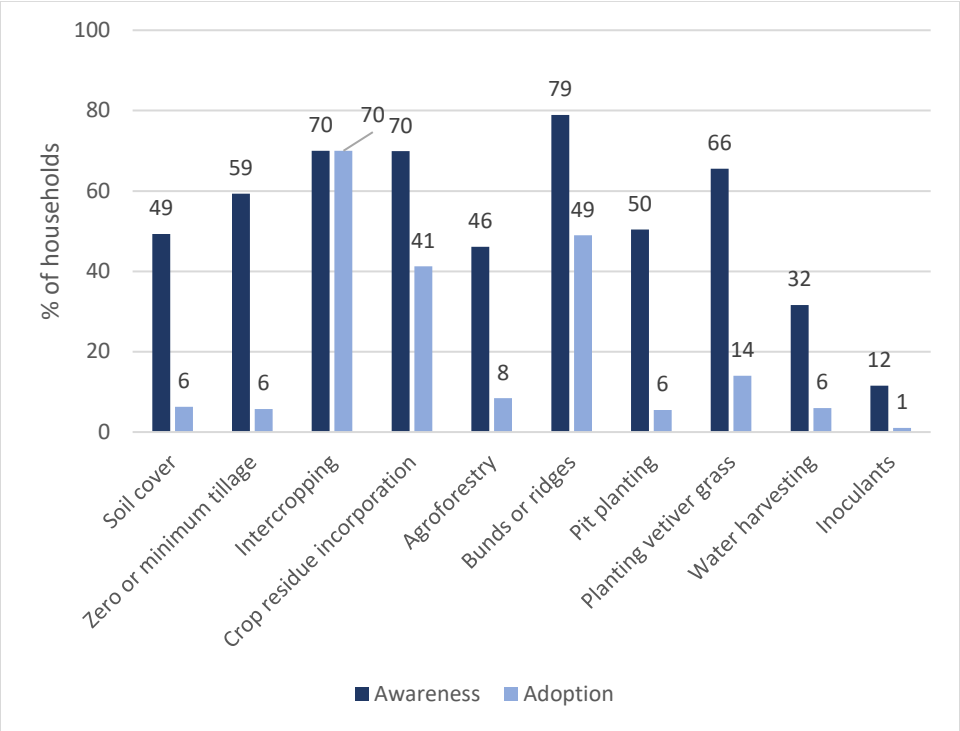


Source: IFPRI household surveys (2016 and 2018)

Note: HH = household; Dotted red bar (inoculants, vetiver grass, irrigation, agroforestry) means only 2018 data were collected.

Comparing awareness and adoption, in Figure 19, we see major gaps. Aside from intercropping, there are large gaps between the awareness of and the actual adoption of practices/technologies being promoted.

Figure 19: Gap in the percentage of HHs who are aware of versus adopt specific technologies, 2018



Source: **IFPRI household surveys (2016 and 2018). Note: HH=household**

To help explain the gap between awareness and adoption of technologies, we ran several statistical and regression analyses to identify the significant determining factors and whether the type/topic of advice, source of advice, or method/approach of extension services matter in explaining these gaps. Table 11 shows the results.

First, extension services are important in technology awareness, with all methods being statistically significant determinants of technology awareness. Second, face-to-face visits, radio, and farm demos are the most significant in increasing the likelihood of HHs being aware of soil cover. Printed materials, phone/SMS, farm demos, and radio are the most significant in increasing the likelihood of HHs being aware of minimum tillage. However, for technology adoption, the farm demo is most impactful. For minimum tillage promotion, printed materials and face-to-face visits also help in promoting technology adoption.

Table 11: Logit regression results on determinants of awareness and adoption of soil cover and minimum tillage, 2016 and 2018

	Soil cover						Minimum tillage					
	Awareness			Adoption			Awareness			Adoption		
	Marginal effect	Std. err.		Marginal effect	Std. err.		Marginal effect	Std. err.		Marginal effect	Std. err.	
Community/group meeting	0.19	0.08	***	-0.20	0.19		0.22	0.08	***	-0.28	0.19	
Face-to-face visit from agent	0.64	0.09	***	0.09	0.20		0.23	0.09	***	0.35	0.20	*
Phone/SMS	0.09	0.16		0.49	0.30		0.54	0.20	***	0.03	0.32	
Printed materials	0.24	0.20		0.52	0.34		1.20	0.28	***	0.64	0.32	*
Radio	0.57	0.07	***	-0.24	0.18		0.35	0.08	***	0.09	0.18	
Farm demonstration	0.50	0.10	***	0.72	0.21	***	0.51	0.11	***	0.90	0.21	***
Age of head	0.00	0.00		0.00	0.01		0.00	0.00		0.01	0.01	
Male head	0.31	0.09	***	-0.02	0.23		0.50	0.10	***	-0.15	0.23	
Education level of head	0.03	0.01	***	0.04	0.03		0.06	0.01	***	0.00	0.03	
HH asset (MWK)	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Total crop acreage	0.03	0.02	*	0.09	0.04	**	0.04	0.02	**	0.16	0.04	***
Constant	-1.11	0.23	***	-1.92	0.57	***	-1.02	0.25	***	-2.79	0.61	***
Number of observations	5,717			2,273			5,717			2,960		

Source: IFPRI household and community surveys (2016 and 2018)

Note: HH = household; MWK = Malawian kwacha. *** Highly significant at 1 percent level; ** Significant at 5 percent level; * Weakly significant at 10 percent level. Includes community controls and district dummies. Models are estimated using correlated random effects.

6. Discussions and Conclusions

This paper is largely descriptive and demonstrates changes in various indicators over time, along with spatial and gender differences in these indicators. Below we highlight some of the insights from the datasets:

- We see improvements in the coverage of extension services (more HHs reporting access), with the most notable improvement being in nutrition and marketing (an additional 6 percent of HHs)
- Radio is becoming the most dominant source/method of extension services with regards to both agriculture and nutrition (48 percent of HH reporting)
- The most noticeable improvements are that more HHs reported sourcing agriculture advice from NGO extension workers, other farmers, lead farmers, and SMS/phone
- For nutrition advice, the main sources were still health workers and hospitals, as in 2016. The percent of HHs reporting accessing nutrition advice from radio, NGOs, other famers, and AEDO/AEDC increased in 2018. This may imply greater integration of nutrition into the agricultural extension system.
- Coverage of lead farmers remains small: 20 percent of HHs reported interaction with lead farmers in 2018; and in terms of receiving agriculture/nutrition advice only 13 percent of HHs reported receiving advice in the last 2 years, and 7 percent of HHs received advice in the last 12 months.
- There were high ratings for extension services. We did see a slight decrease from 2016 to 2018 (and a decrease from 2010 to 2016 based on the IHPS), but ratings largely remained high. What is noticeable are fewer HHs reporting that they demanded or requested the advice they received—down from 12-13 percent of HHs in 2016 to only 1-4 percent of HHs in 2018.
- Comparing the IHPS and IFPRI survey (2016), they are generally similar, with a few exceptions: there was lower coverage of "other farmers" but slightly higher coverage of "lead farmer" in IFPRI surveys, while both surveys show high ratings on advice. There were higher ratings in IFPRI surveys than in the IHPS, but both surveys show worsening ratings over time.
- About 40 percent of HHs reported participating in VACs in 2018. The percent of HHs participating in VACs in the central and southern regions increased, likely because of activities of the Strengthening Agricultural and Nutrition Extension (SANE) project, but there was reduced VAC participation in the north, likely because of the completion of Agricultural Sector Wide Approach (ASWAp) support. We see slightly worse ratings on VAC participation from 2016 to 2018. Major issues expressed with these participatory approaches are high expectations and difficulty in sustaining participation. Discontent can grow among stakeholders, as the participatory process often does not lead to actual policies and actual action implementation—as seen in Burkina Faso and Senegal (Resnick and Birner 2010).
- In our dataset, we also see fewer participants in VACs, from an average of 96 and median of 30 in 2016 to an average of 38 and median of 10 in 2018 (village-level numbers).
- Crop diversification improved: HHs are growing less maize and more groundnuts and other crops.
- But HHs are selling less. Only small proportions of maize, vegetables, and cereals harvests are sold (5-6 percent). HHs also sell a quarter of groundnuts/legumes, and a third of tubers are sold. It is vital to increase productivity, but we see minimal improvements in yield in 2018.
- We see improvements in rates of technology awareness and adoption. However, aside from intercropping, there remain large gaps in the awareness and actual adoption of practices/technologies being promoted. In promoting awareness, we find that method does not

matter much, so cost-effective measures are best used (for instance, mass media). However, in promoting adoption, more intensive learning is needed to translate awareness into adoption (farm demonstrations are critical for most agricultural management systems; face-to-face visits and printed materials also help).

- There is wide coverage of orange-fleshed sweet potato adoption (59 percent of HHs), and good coverage for PICS bags (26 percent of HHs) and fall army worm control (21 percent of HHs). The adoption of aflatoxin control (13 percent) could be further improved.

References:

Ragasa, C., N. L. Aberman, and C. Alvarez-Mingote. 2019. "Does Providing Agricultural and Nutrition Information to Both Men and Women Improve Household Food Security? Evidence from Malawi." *Global Food Security* 20: 45-59.

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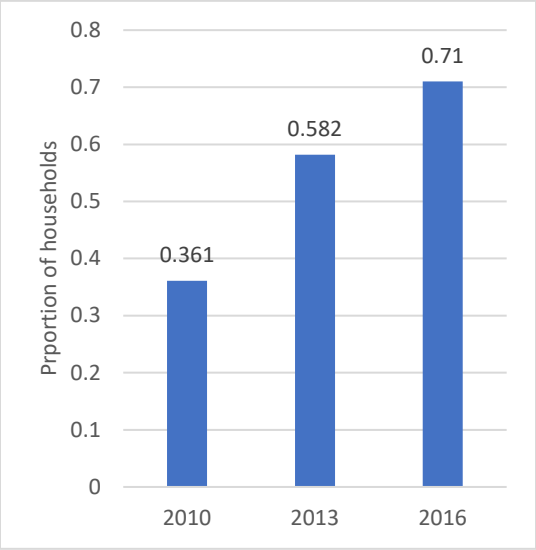
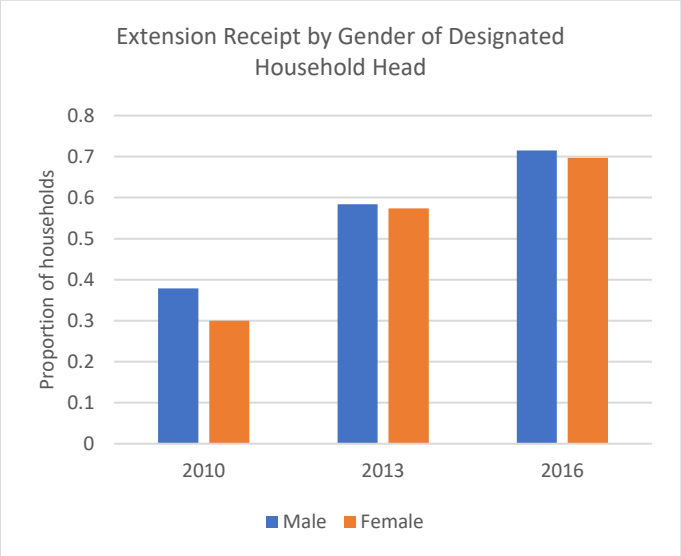
Resnick, D., and R. Birner. 2010. "Agricultural Strategy Development in West Africa: The False Promise of Participation." *Development Policy Review* 28 (1): 97–115.

Annex 1: Percent of HHs receiving advice (IHPS)



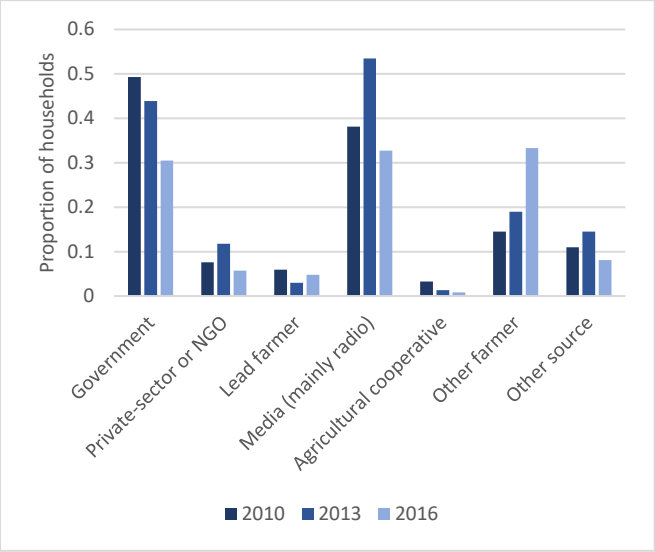
Source: IHPS (2010, 2013, 2016), weighted. Note: HH = household.

Annex 2: Proportion of HHs by gendered access to agricultural advice (IHPS)



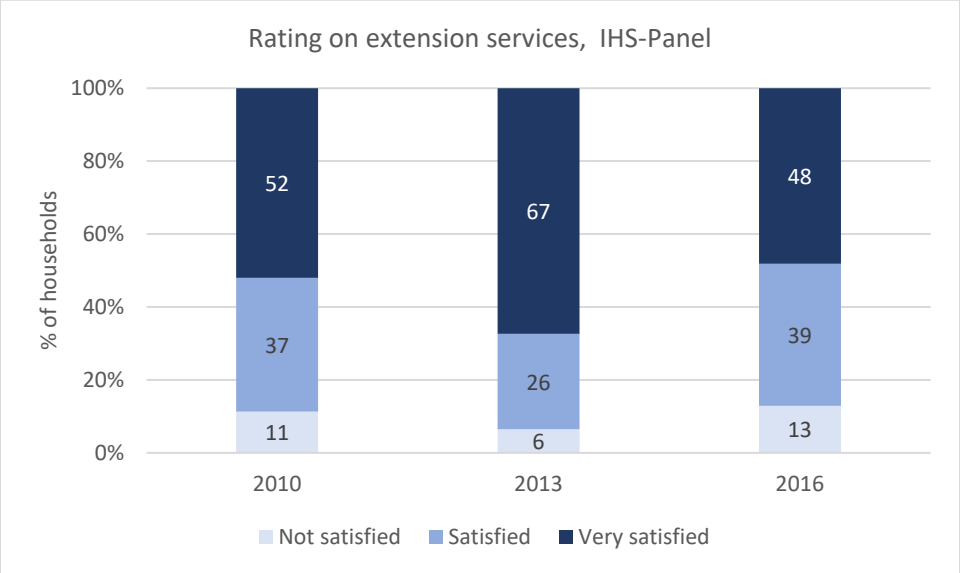
Source: IHPS (2010, 2013, 2016), weighted. Note: IHPS = integrated household panel survey

Annex 3: Proportion of HHs by source of agriculture advice (IHPS)



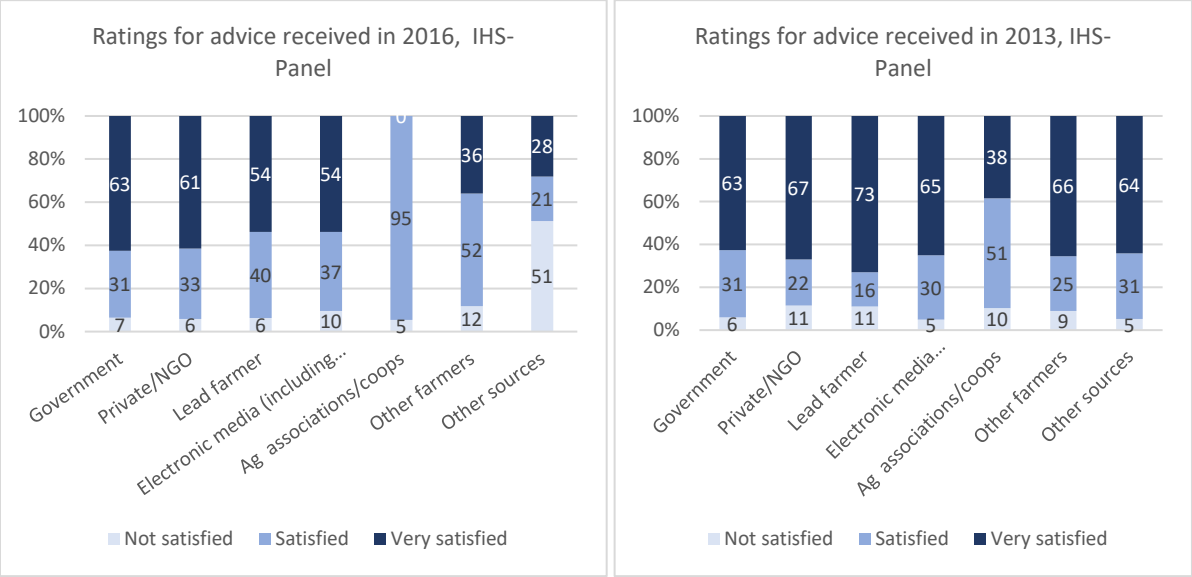
Source: IHPS (2010, 2013, 2016), weighted. Note: HH=household; IHPS = integrated household panel survey; NGO = nongovernmental organization.

Annex 4: Percentage of HHs by rating of extension service (IHPS)



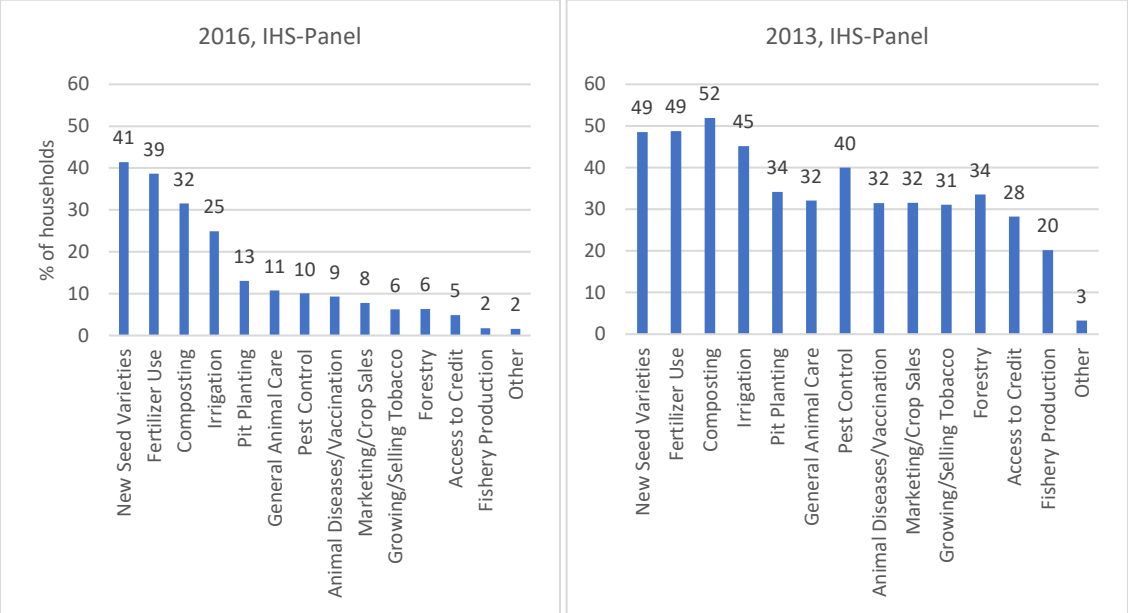
Source: IHPS (2010, 2013, 2016), weighted. Note: HH=household; IHPS = integrated household panel survey.

Annex 5: Percentage of HHs by ratings for advice received (IHPS)



Source: IHPS (2010, 2013, 2016), weighted. Note: HH=household; IHPS = integrated household panel survey; NGO = nongovernmental organization.

Annex 6: Percent of HH by adoption of promoted technologies (IHPS)



Source: IHPS (2010, 2013, 2016), weighted. Note: HH = household; IHPS = integrated household panel survey.

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