Promoting Participation in Value Chains for Oilseeds and Pulses in Malawi

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Smallholder participation in value chains – associated household and spatial factors

- Simple exploratory assessment of **types of households** that might commercially produce **oilseed** and **pulses** and **where** they are found
- Motivation for analyses:
  - By directing larger shares of their harvests to the market, smallholders can significantly accelerate local development
  - Their increased income enhances demand for the goods, services, and labor supplied by other households in their community
    - Important **second-round economic development benefits** from targeting agricultural development towards commercially oriented farming households
- Who and where are these Malawian smallholders who might most effectively increase their production of oilseed and pulses for sale?

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Analytical approach

- **Spatial analysis** of where in Malawi oilseed and pulse crops can be grown
  - Based on spatial crop suitability analysis done by the Malawi Land Resources Evaluation Project from 30 years ago
- **Tabular analysis** of oilseed and pulse production and sale by households
  - First for all households and then by categorizing households into four groups by level of economic productivity and maize sales
  - Using data from 2016/17 fourth Malawi Integrated Household Survey (IHS4)
- **Econometric analysis** of household characteristics associated with oilseed and pulse production, sale, and level of sales by households
  - Also using data from IHS4
- First, present in some detail analyses of oilseed crops, followed by a more rapid presentation of the results for pulses

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OILSEEDS

- Focus is on **groundnut**, **soyabean**, and **sunflower**
  - Considered in aggregate
- Groundnut important food crop historically, but also sold
- Soyabean and sunflower more recently introduced crops, almost exclusively grown for sale
  - Sunflower not a common crop

- Groundnut and soyabean primarily grown in the mid-altitude plateau of Central region and Mzimba district
- Sunflower grown in Phalombe and Mulanje districts. But also in areas of the mid-altitude plateau in Central and Northern regions

Average, 2013/14 to 2018/19	Groundnut	Soyabean	Sunflower
Production, mt	34,000	167,000	18,000
Yields, kg/ha	620	990	1,020
Potential yields, kg/ha	2,500	4,000	3,000

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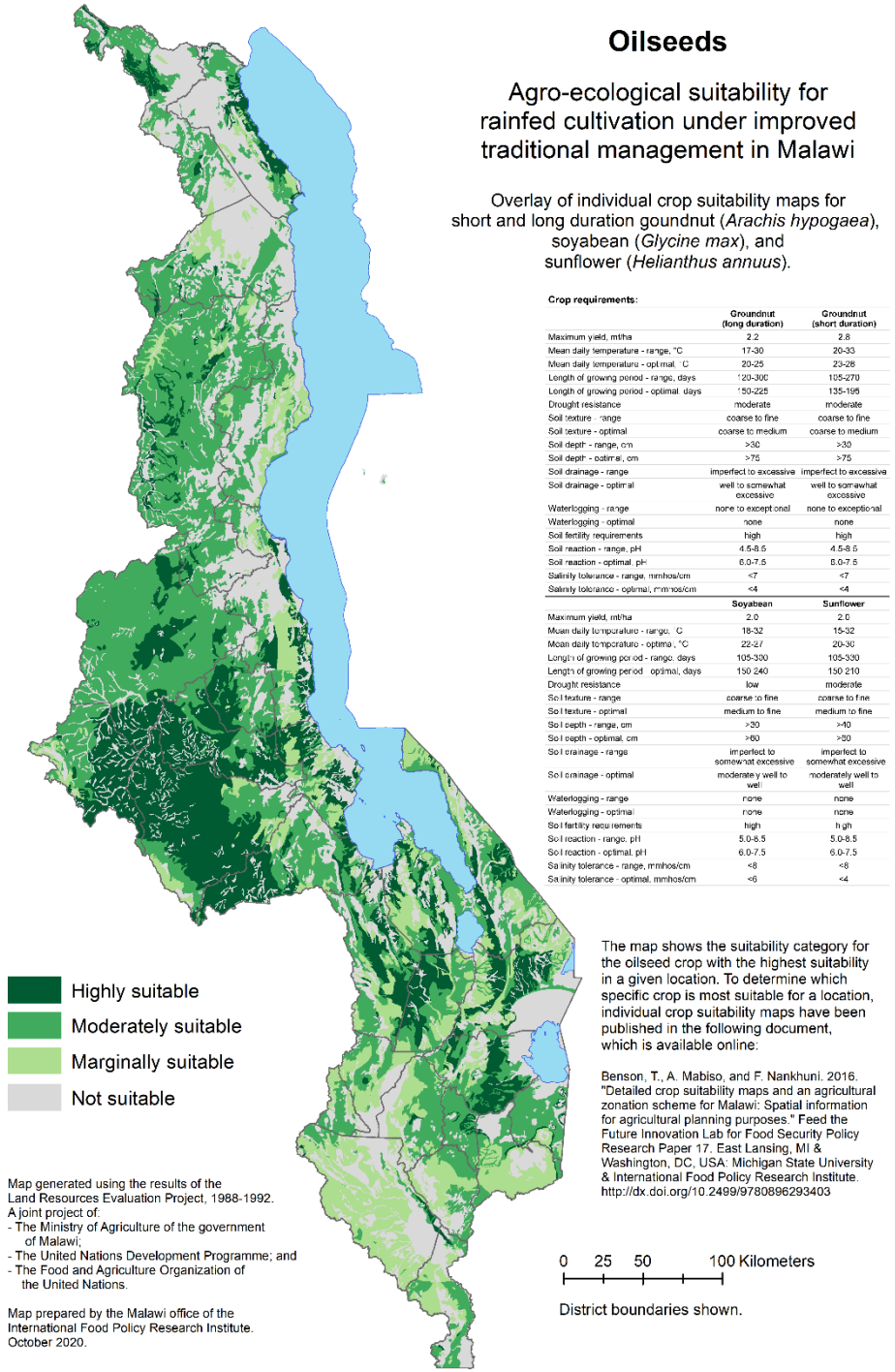
Oilseeds - agronomic suitability

- Determined by optimal agro-ecological conditions for crop
  - From agronomy literature
  - Primarily based on **average** conditions
- Climate conditions
  - Temperature regime; length of growing period (rainfall; soil water balance)
- Soils
  - Texture, depth, drainage & waterlogging, pH, salinity, fertility levels
- Much of mid-altitude plateau suggested to be well suited for producing oilseed. But also the lakeshore and Upper Shire Valley
  - Lower Shire Valley is marginal



Oilseeds – tabular analysis of households producing and selling

- Analysis of IHS4 (2016/17) data for all crop producing households
- Some specialization within oilseed
  - Few farmers grow more than one type
- Greater share of farm area dedicated to soyabean and sunflower than to groundnut
- Also, soyabean and sunflower more likely to be sold than is groundnut, with greater shares of harvest sold

	Oilseed	Groundnut	Soyabean	Sunflower
Produce crop, % HHs engaged in crop agric.	24	15	10	1
If produce, % share of total cropped area	28	17	35	35
Sold some of crop, % of crop producers	69	57	82	77
If sold any, % share of crop harvest sold	67	58	77	84
… sold more than half of crop, % of crop sellers	69	58	81	83

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Oilseeds – what sorts of households produce and sell (1)

- All IHS4 sample households placed into one of four economic categories
  - To better understand what sorts of households commercially produce oilseeds or could do so
- Categorized based on their:
  - Level of economic productivity
  - Location, i.e., rural versus urban
  - Share of maize production that they sold

1. **Commercially-oriented smallholders**
   - Rural; not ultra-poor; produce considerably more maize than they consume within their own households
2. **Other productive rural households**
   - Rural, economically active; do not sell much, if any, of their maize
   - Most Malawian households in this category
3. **Not economically productive**
   - Ultra-poor; more non-workers than workers in household
4. **Urban households**
   - Urban; economically productive
   - 30 percent report engaging in some farming

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Oilseeds – what sorts of households produce and sell (2)

- Commercially oriented smallholders make up a small share of population
- More likely than other households to:
  - Produce oilseed (considerably so)
  - Sell some of their oilseed
  - Sell a significant share of their oilseed
- But if produce, do not dedicate a notably large share of their farm area to oilseed

	All households	Commerci-ally oriented smallholder	Other productive rural	Not economically productive	Urban
Share HHs in population, %	100	6	67	9	19
Engage crop agriculture, %	76	100	85	89	30
Produce oilseed, % HHs engaged in crop agric.	24	36	24	16	17
If produce, % share of total cropped area	29	26	29	29	26
Sold some, % of oilseed producers	69	83	68	68	57
If sold any, % share of oilseed harvest sold	67	70	66	65	71
… sold more than half of crop, % of oilseed sellers	69	75	68	63	72

- Oilseed appears to be one of any number of crops with commercial potential that commercially oriented smallholders will produce
  - But oilseed production not restricted only to such households

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Oilseeds – household characteristics associated with oilseed production and sale – dependent variables

- Analysis extended by conducting three logistic analyses using IHS4 data
  - Identify factors that might be driving households to produce oilseeds and to sell some of their harvest
    1. For all **crop-producing households**, what factors are associated with their **producing an oilseed crop**
    2. For all **oilseed producing households**, what factors are associated with their **selling any of their production**
    3. For **households that sold any of their oilseed**, what factors are associated with their **selling more than half of their production**
  - Dependent variables are all 0/1 (dummy) variables, so use logistic models

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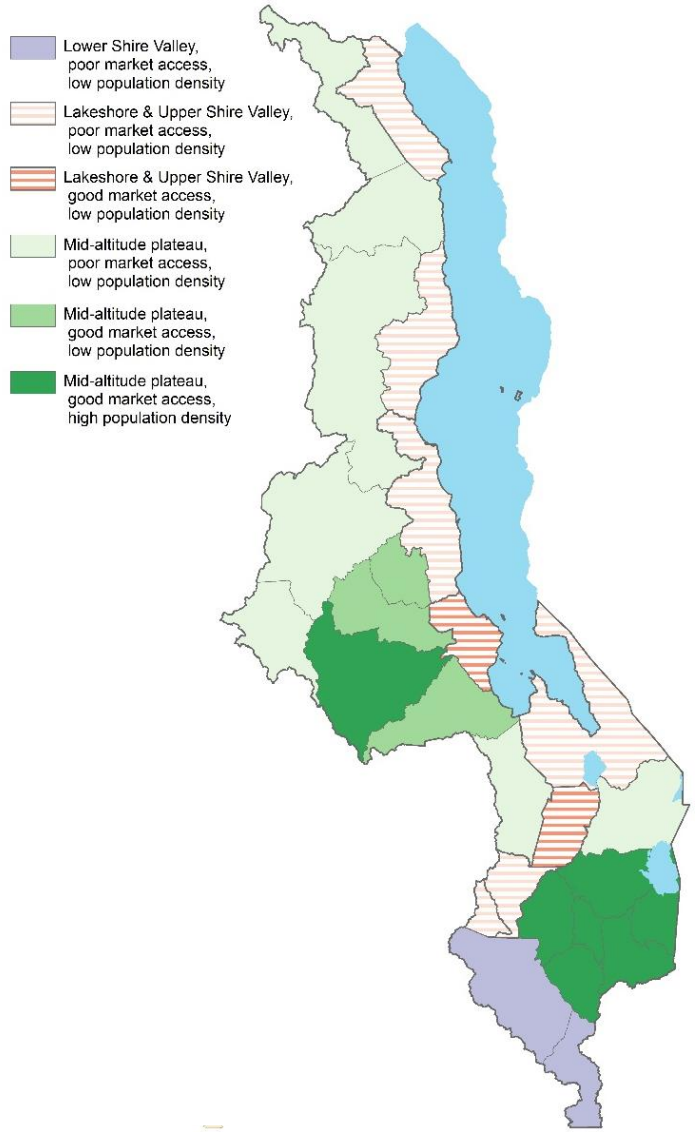
Oilseeds – household characteristics associated with oilseed production and sale – explanatory variables

- Same explanatory variables used in all three models
  - Various household demographic characteristics
  - Maximum educational attainment within the household
  - Agricultural production characteristics
  - Non-farm livelihoods, credit use
  - Share of maize consumed by household in past week that was purchased
    - Proxy measure of relative dependence on market for HH consumption
  - Development domains – All districts assigned to one of six (*map*)
    - Defined by intersection of 3 agro-ecological zones – Lower Shire Valley; Lakeshore & Upper Shire Valley; Mid-altitude plateau
    - 2 market access levels – travel time to nearest city
    - 2 levels of population density – high and low
  - Household economic category (*only for production model*)



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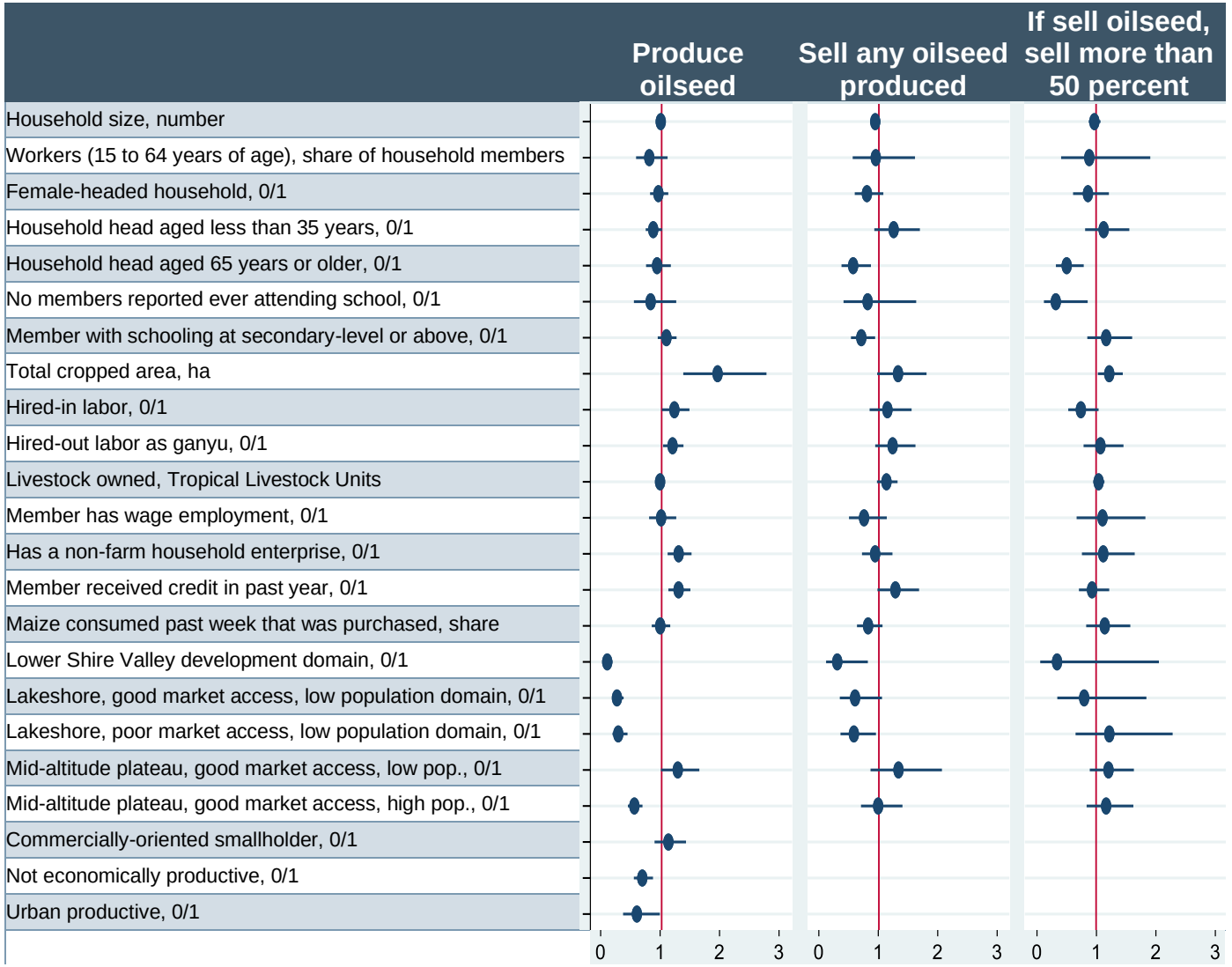
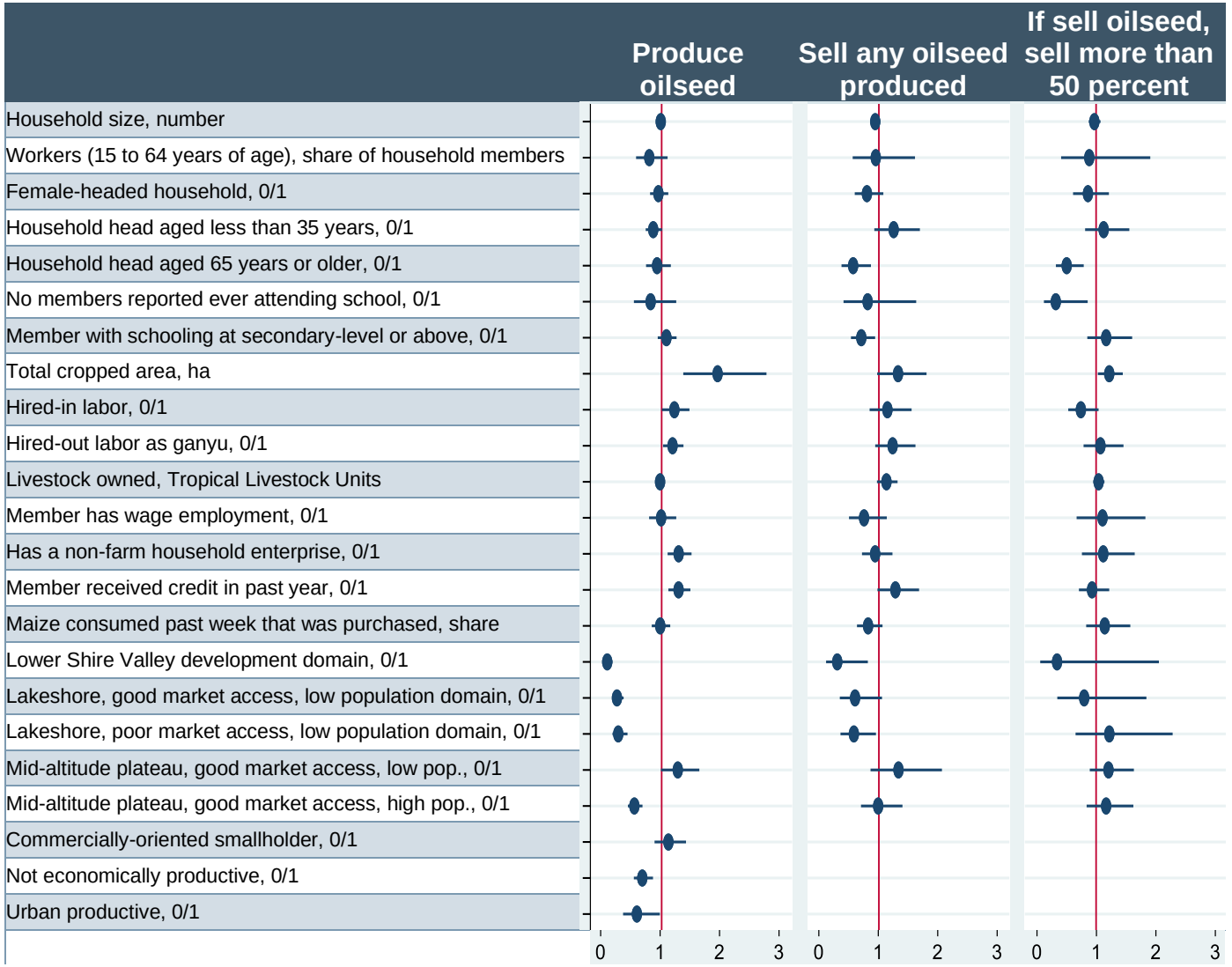
Oilseeds – household characteristics associated with oilseed production and sale – results (1)

- Plots of odds-ratio for each explanatory variable
  - Variables are statistically significant factors if 95% confidence interval line does not cross 1.0 odds-ratio line
- Some key findings:
  - **Demographic characteristics** not uniformly strong determinants of oilseed production or sales
  - **Educational attainment** not a factor in deciding to produce oilseeds. The more educated less likely to sell any
  - Households with **more cropland** are significantly more likely to produce, to sell, and to sell a large share of their oilseed than other households
    - Strongest, most consistent pattern seen across the three oilseed models



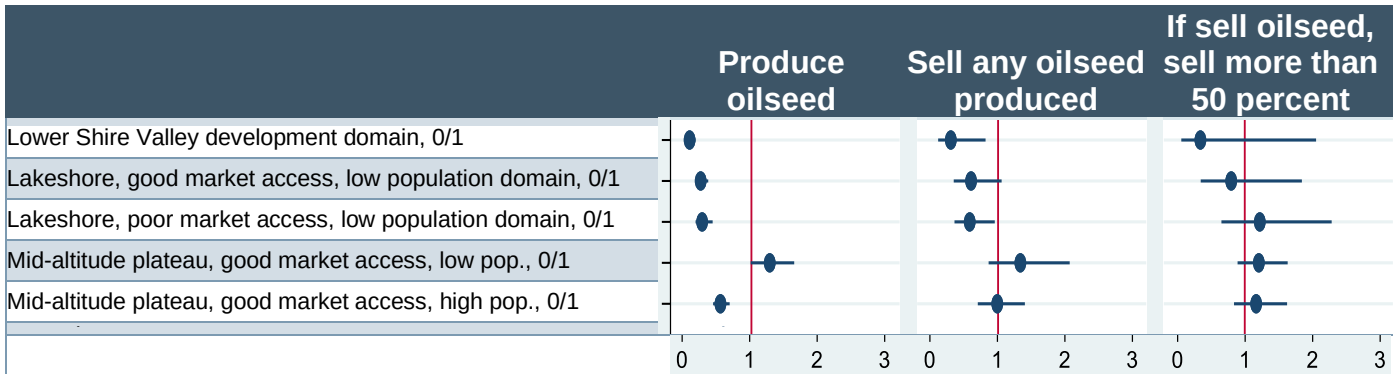
Oilseeds – household characteristics associated with oilseed production and sale – results (2)

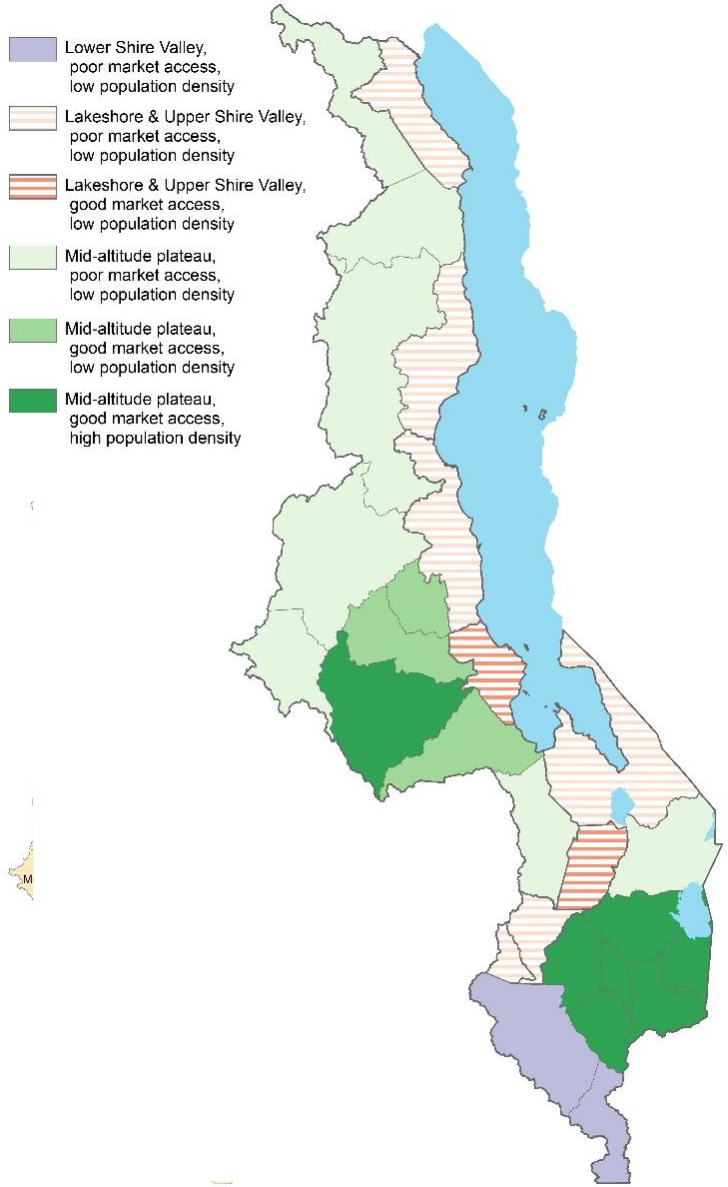
- Additional findings:
  - **Hiring in or hiring out labor** and **livestock** not important for oilseed production or sales
  - **Wage employment** not important, but **having a HH enterprise** is associated with production, but not sales
  - **Household being dependent on market** not important
  - Commercially-oriented smallholders and other productive rural households (*base category*) equally likely to produce oilseed, while the not economically productive or urban are significantly less likely to do so.



Oilseeds – household characteristics associated with oilseed production and sale – spatial results

- Production:
  - Base development domain is “Mid-altitude plateau with low population density and poor market access”
  - Only households in “Mid-altitude plateau with low population density and good market access” more likely than households in base domain to produce oilseed
  - Households in other four domains significantly less likely to produce oilseed
  - Likely reflects agro-ecological constraints to production and, where population density is high, insufficient land to both meet staple food needs and produce oilseed
- Sales:
  - Households in poor market access development domains less likely to sell oilseed
  - No development domains in which oilseed-selling households are significantly more likely than those in other domains to sell more than half of their output





Oilseed analyses - key takeaways

- Efforts to increase small farmers' production of oilseed in Malawi should focus on farmers with larger landholdings in the mid-altitude plateau zone
  - Land availability appears an important consideration in farmers' decisions to produce oilseed and how much of their harvest to sell
  - Labor availability is not as important in such decisions
- Higher education levels are not important now in determining whether a household produces or sells oilseed – a challenge
  - Given low oilseed yields, farmers should be encouraged to use more knowledge-intensive higher-yielding techniques in production
  - Will require farmers to be better educated, as this will enable them to use such techniques effectively. And also to knowledgably and profitably engage in the market
  - Continuing to improve education levels should contribute to improved overall productivity and an expansion of the oilseed sector

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PULSES

- Focus is on **common bean**, **cowpea**, and **pigeonpea**
  - Considered in aggregate
- Bean and cowpea important for own consumption, but part of harvest also sold
  - Cowpea far less common than bean or pigeonpea
- Pigeonpea similarly grown for own consumption
  - But also has a reasonably strong, if variable, export market in India

- Bean grown in mid-altitude plateau of Central and Southern (Shire Highlands) regions
- Cowpea found in Lower Shire Valley and south and southwest of Lake Chilwa
- Pigeonpea centered in the Shire Highlands and in lowland areas of the Upper Shire Valley and around Lake Chilwa

Average, 2013/14 to 2018/19	Common bean	Cowpea	Pigeonpea
Production, mt	194,000	41,000	385,000
Yields, kg/ha	560	440	1,570
Potential yields, kg/ha	2,000	2,000	2,500

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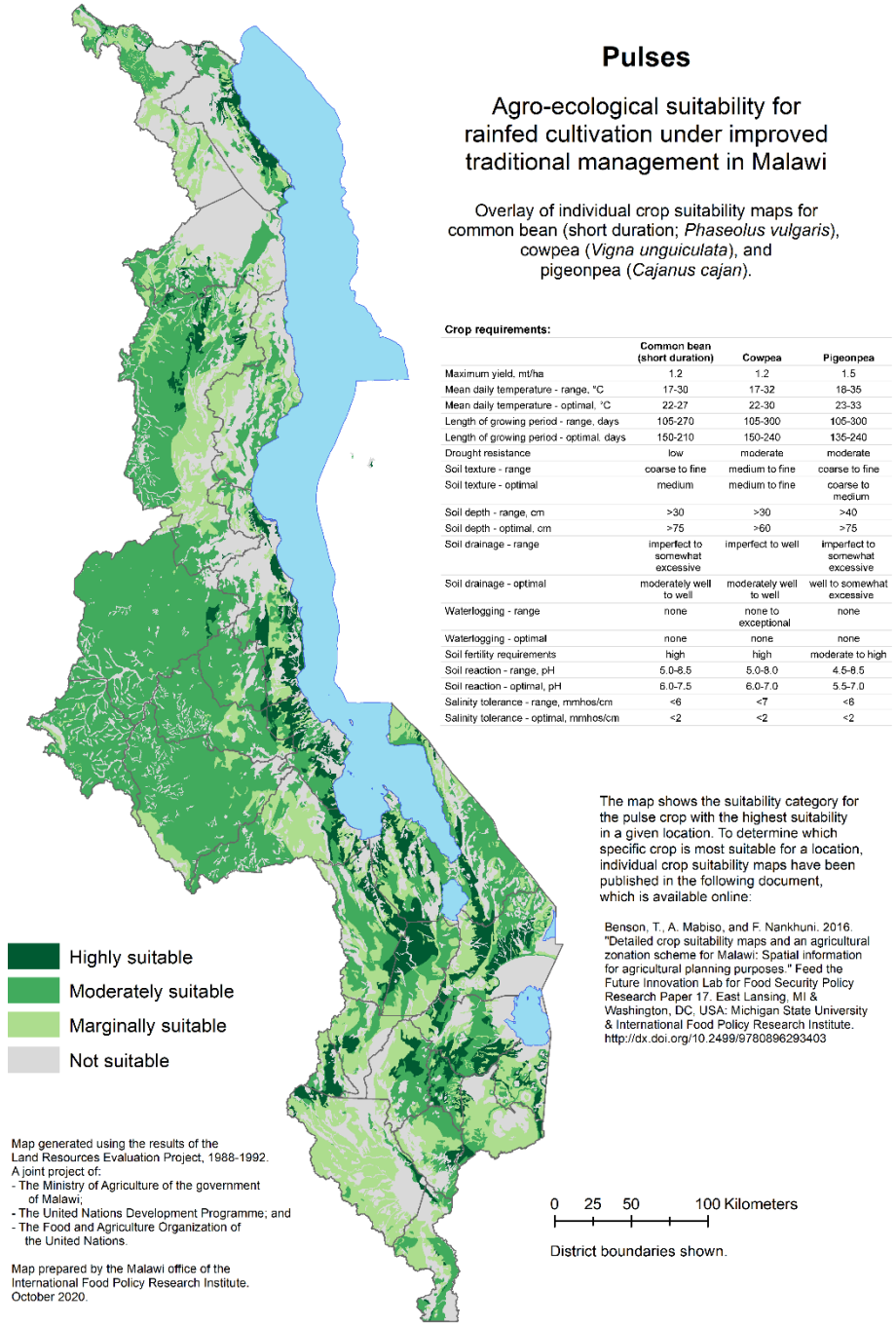
Pulses - agronomic suitability

- Much of mid-altitude plateau suggested to be well suited for producing pulses. But also lakeshore and Upper Shire Valley
  - Pattern of suitability for production of pulses is similar to that for oilseed
  - Areas subject to flooding and the Rift Valley escarpments are principal areas where pulses unlikely to do well



Pulses – tabular analysis of households producing and selling

- Analysis of IHS4 (2016/17) data for all crop producing households
- Farmers more likely to produce pulses than oilseeds
- Few farmers grow more than one type of pulse
- Greater share of farm area dedicated to pigeonpea than to bean or cowpea
  - Likely reflects pigeonpea production in Southern areas of Malawi where landholdings are smallest
- Similar share of producers sells each type of pulse.
- No one type of pulse producer sells a greater share of their harvest than do producers of other types

	Pulses	Common bean	Cowpea	Pigeonpea
Produce crop, % HHs engaged in crop agric.	35	12	2	22
If produce, % share of total cropped area	49	38	34	50
Sold some of crop, % of crop producers	34	31	21	35
If sold any, % share of crop harvest sold	61	68	61	59
… sold more than half of crop, % of crop sellers	55	59	57	54

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Pulses – what sorts of households produce and sell

- Little difference between the four household categories in share that **produce** pulses
- For **sales**, commercially oriented households more likely to sell some of their pulse harvest
- But, when disaggregated by crop, more complex patterns emerge
  - Commercially oriented smallholders far less likely to produce pigeonpea than other households
  - Due to surplus maize producing households – hence, commercially oriented smallholders – being rare in southern Malawi, where most pigeonpea is grown.

	All households	Commerci-ally oriented smallholder	Other productive rural	Not economically productive	Urban
Share HHs in population, %	100	6	67	9	19
Engage crop agriculture, %	76	100	85	89	30
Produce pulse, % HHs engaged in crop agric.	35	35	35	36	31
If produce, % share of total cropped area	49	47	48	52	52
Sold some, % of pulse producers	34	48	35	29	28
If sold any, % share of pulse harvest sold	61	67	61	60	60
… sold more than half of crop, % of pulse sellers	55	58	55	51	60

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Pulses – household characteristics associated with pulse production and sale

- Replicate for pulses the earlier three logistic analyses for oilseeds
  - What factors might be driving households to produce pulses and to sell some of their harvest
- Dependent variables are defined in same manner
- Use the same set of explanatory variables

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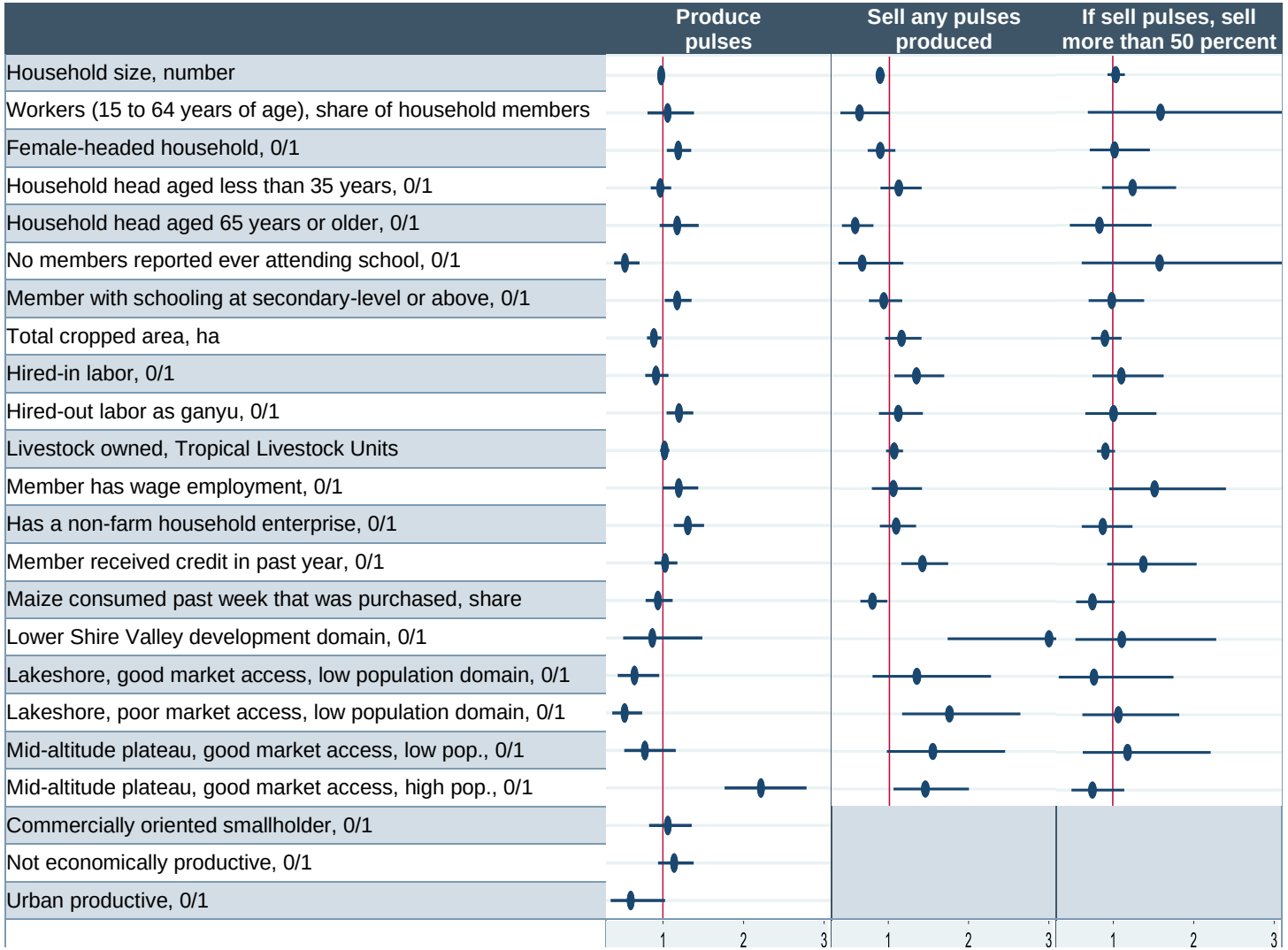
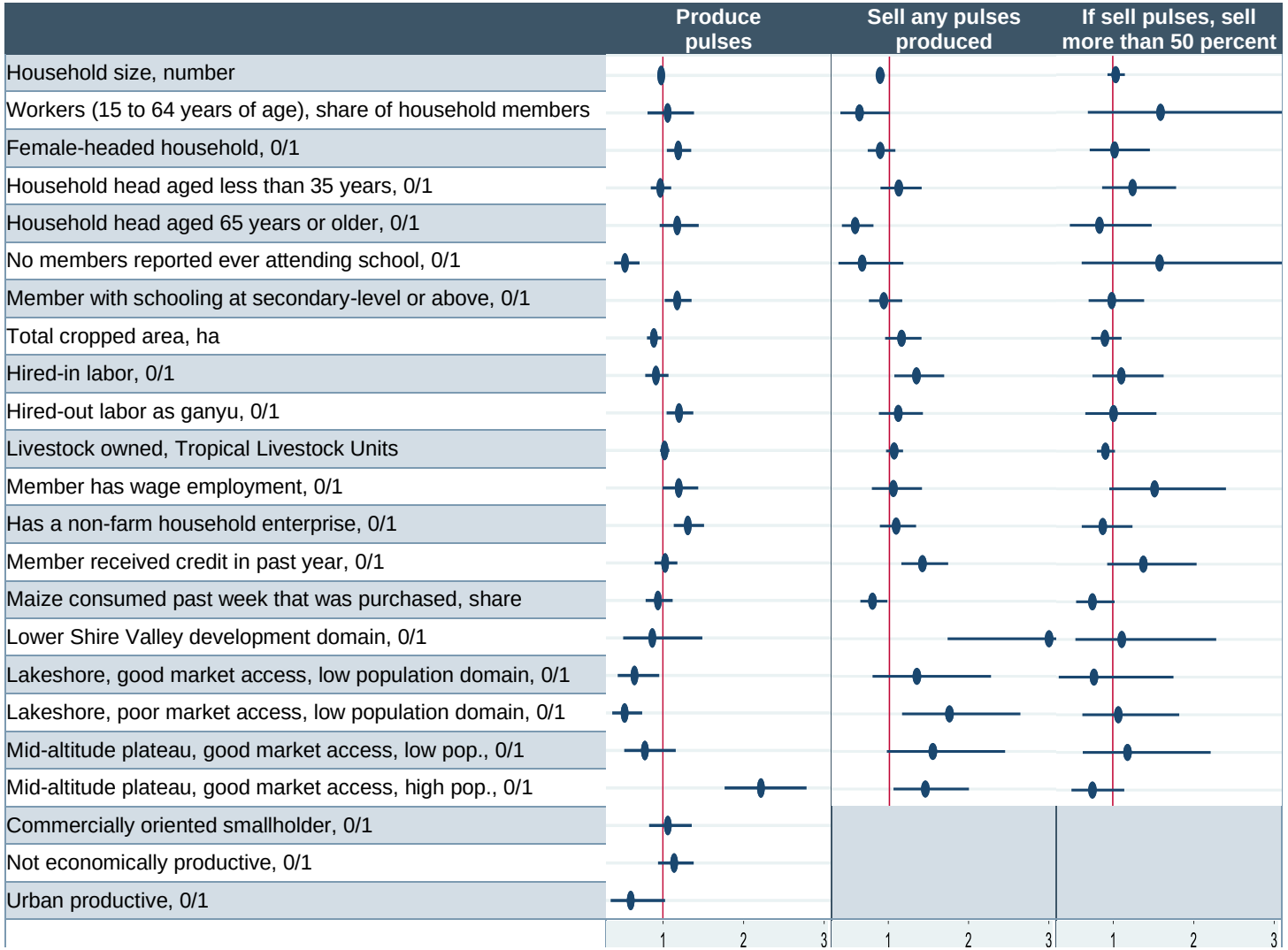
Pulses – household characteristics associated with pulse production and sale – results (1)

- Some key findings:
  - **Female-headed households** more likely to produce pulses. However, they are no more likely to sell any share of their harvest
  - **Larger households**, those with **greater share of workers**, and those with **older heads** have lower propensity to sell pulses produced. Own-consumption likely principal aim of production for these HHs
  - **Educational attainment** directly associated with pulse production, but not sales
  - Households with **smaller land-holdings** significantly more likely to produce pulses, but not to sell. Subsistence motivation, likely



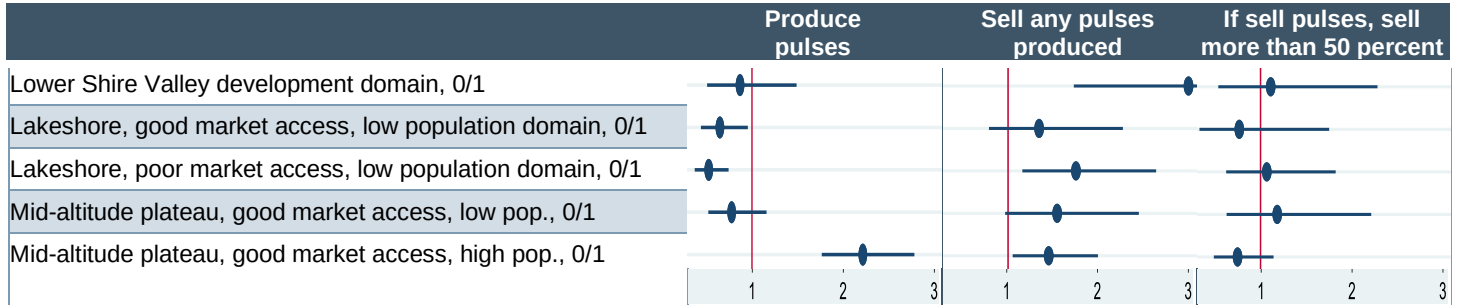
Pulses – household characteristics associated with pulse production and sale – results (2)

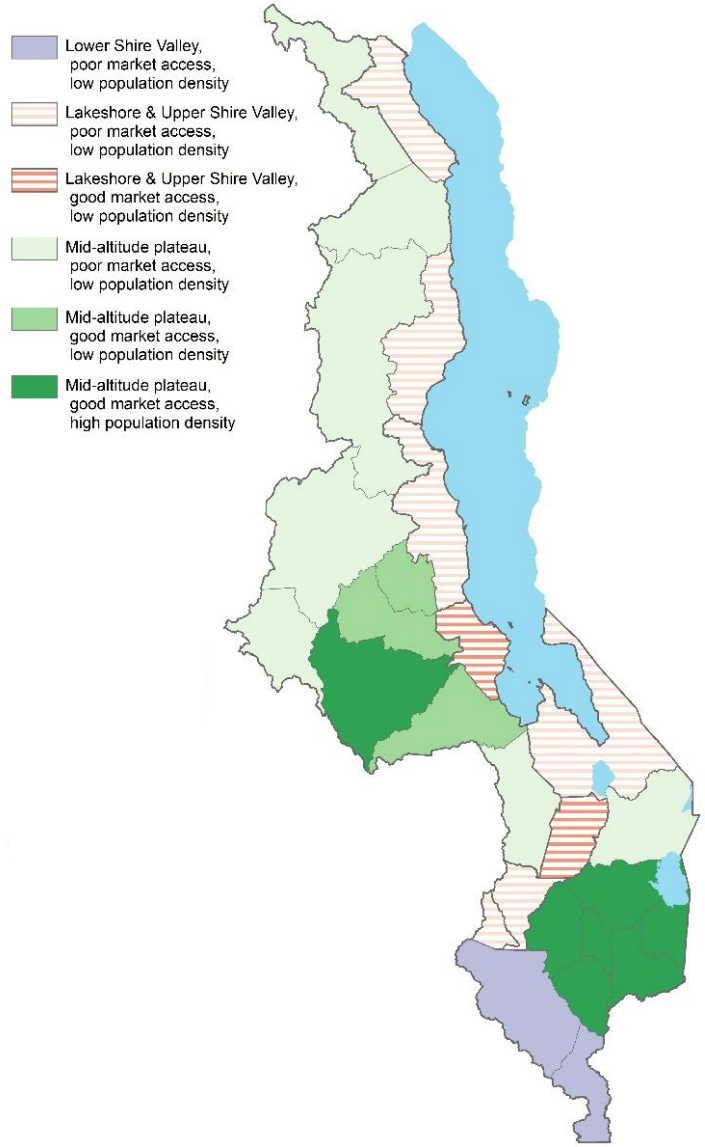
- Additional findings:
  - Possible **labor dimension**
    - Households that **hired out labor** (ganyu) more likely to produce pulses, but no pattern with sales
    - While households that **hired in** additional labor more likely to sell what pulses they produced
  - **Wage employment** and operating a **HH enterprise** both associated with pulse production, but not sales
  - Households that **consume** higher amounts of **purchased maize** less likely to sell any pulses produced
    - Somewhat counterintuitive, as commercial pulse production could help finance the maize purchases
    - Own consumption of pulses valued at higher than their market price



Pulses – household characteristics associated with pulse production and sale – spatial results

- Production:
  - Base development domain is “Mid-altitude plateau with low population density and poor market access”
  - Only households in “Mid-altitude plateau with high population density and good market access” more likely to produce pulses
    - Reflects concentration of pigeonpea production in densely-populated Shire Highlands and production of groundnut around Lilongwe
  - Households in the two Lakeshore domains significantly less likely to produce pulses
    - Likely reflects agro-ecological challenges to pulse production on Lakeshore
- Sales:
  - In contrast to production, if households in other domains produce any pulses, they are more likely to seek to market some of them than are pulse producers in the base development domain
  - But, for lakeshore and Lower Shire domains, quantities produced and sold are small





Pulses analyses - key takeaways

- Pulses are primarily produced for own consumption to assure household food security
  - Appear to be particularly good crops for farmers with smaller landholdings
- Nonetheless, with effective demand, can be sold
  - Both groundnut and pigeonpea can be important commercial crops
  - But both have suffered from market disruptions of various sorts, reducing producer incentives
- Quite strong regional patterns of production for each pulse crop
  - Crop suitability analysis suggests potential for expansion of area where these pulses are grown
  - But will likely require both agronomic adaptation of current varieties and fostering of stronger markets in any new production areas

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Contrasting households engaged in production and sale of oilseed and pulses, respectively

- For production and sale decisions, groundnut and the three pulses are more similar than are groundnut versus soyabean and sunflower
  - Groundnut and the pulses can be used for own production, while also finding a market if cash needed by household
  - Soyabean and sunflower, in contrast, are difficult to use within the household. Commercial considerations motivate their production
- Increasing commercial orientation of smallholders easier with soyabean and sunflower, particularly if demand is growing
- Doing so around pulses and groundnut will require much stronger food markets than Malawi currently has
  - So long as households view relying on the market for much of the contents of their current food baskets as too risky, these crops will be mainly grown for consumption
  - However, where there is demand, pulses can be part of commercialization strategies
    - Groundnut and pigeonpea have shown this repeatedly in the past, if not consistently so

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Improving or extending the analyses

- Spatial analysis
  - The crop suitability maps show the lakeshore as suitable for oilseed and pulses, but logistic analyses show relatively limited production there
    - Smallholder in their farming likely know better than the crop suitability analysts
  - Crop suitability maps based on average agro-climatological conditions
    - But, need to take into account seasonal variability in those conditions, as an important source for risk for farmers
- Update analysis with data from IHS5 (2019/20), now available
  - Are we seeing any changes in drivers of production or commercialization of oilseed and pulses over time?
- Simple econometric analyses here
  - Potentially more insightful if use more continuous variables and refine model specifications
    - Any LUANAR students interested in doing so?

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Thanks for your attention – Zikomo!

- These studies were funded by the United States Agency for International Development (USAID) through the Strengthening Agricultural Markets and Breaking the Humanitarian Cycle project

- Presentation draws on results presented in two Policy Notes:
  - Oilseed – http://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/134078/filename/134290.pdf
  - Pulses – http://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/134154/filename/134366.pdf
- The Land Resources Evaluation Project crop suitability mapping analysis for Malawi is described here:
  - https://ebrary.ifpri.org/digital/collection/p15738coll2/id/130494

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