Are the drivers of production and sales of maize, groundnut and soyabean by farming households in Malawi changing?

Analysis of recent household surveys

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Smallholder participation in commercial value chains – associated household and spatial factors

- Assessment of **types of households** that might commercially produce **maize, groundnut**, and **soyabean** and **where** they are found
- Motivation for analyses:
  - All seen as priority crops for agricultural development in Malawi
  - By directing larger shares of their harvests to the market, smallholders can significantly accelerate local development
    - Increased income of commercial smallholders spurs demand for goods, services, and labor supplied by other households in their communities
    - Important **second-round economic development benefits** from targeting agricultural development towards commercially oriented farming households

Analytical approach

- **Spatial analysis** of where in Malawi maize, groundnut, and soyabean can be grown
  - Based on spatial crop suitability analysis done by the Malawi Land Resources Evaluation Project
- **Tabular** and **trend analysis** of household production and sales of maize, groundnut, and soyabean
  - Using data from the 2019/20 (IHS5) and 2016/17 (IHS4) Malawi Integrated Household Survey rounds
- **Econometric analysis** of household characteristics associated with maize, groundnut, and soyabean production, sale, and level of sales by households
  - First, using IHS5 for cross-sectional analysis
  - Second, using pooled data from IHS4 and IHS5 for temporal (trend) analysis

The crops – current production patterns

	Why grown	Where grown
Maize	Almost all farming households in Malawi grow maize for consumption, with some selling a part of their harvest	Highest yields in Lilongwe-Kasungu plain, upland districts in Northern region, and in parts of Shire Highlands in Southern region
Groundnut	Both consumed by producers and sold	Primarily grown in the mid-altitude plateau of Central region and in Mzimba district
Soyabean	Almost exclusively grown for sale for industrial processing or for livestock feed	85 percent of soyabean produced in Malawi is grown in the mid-altitude plateau agro-ecological zone, particularly in Central region

Average, 2013/14 to 2019/20	**Maize**	*Local maize*	*Improved maize*	**Groundnut**	**Soyabean**
Production, mt	**3,205,000**	*260,000*	*2,945,000*	**340,000**	**140,000**
Yield, kg/ha	**1,870**	*680*	*2,220*	**920**	**1,040**
Potential yield, kg/ha	***7,000***	*3,000*	*7,000*	***2,500***	***4,000***

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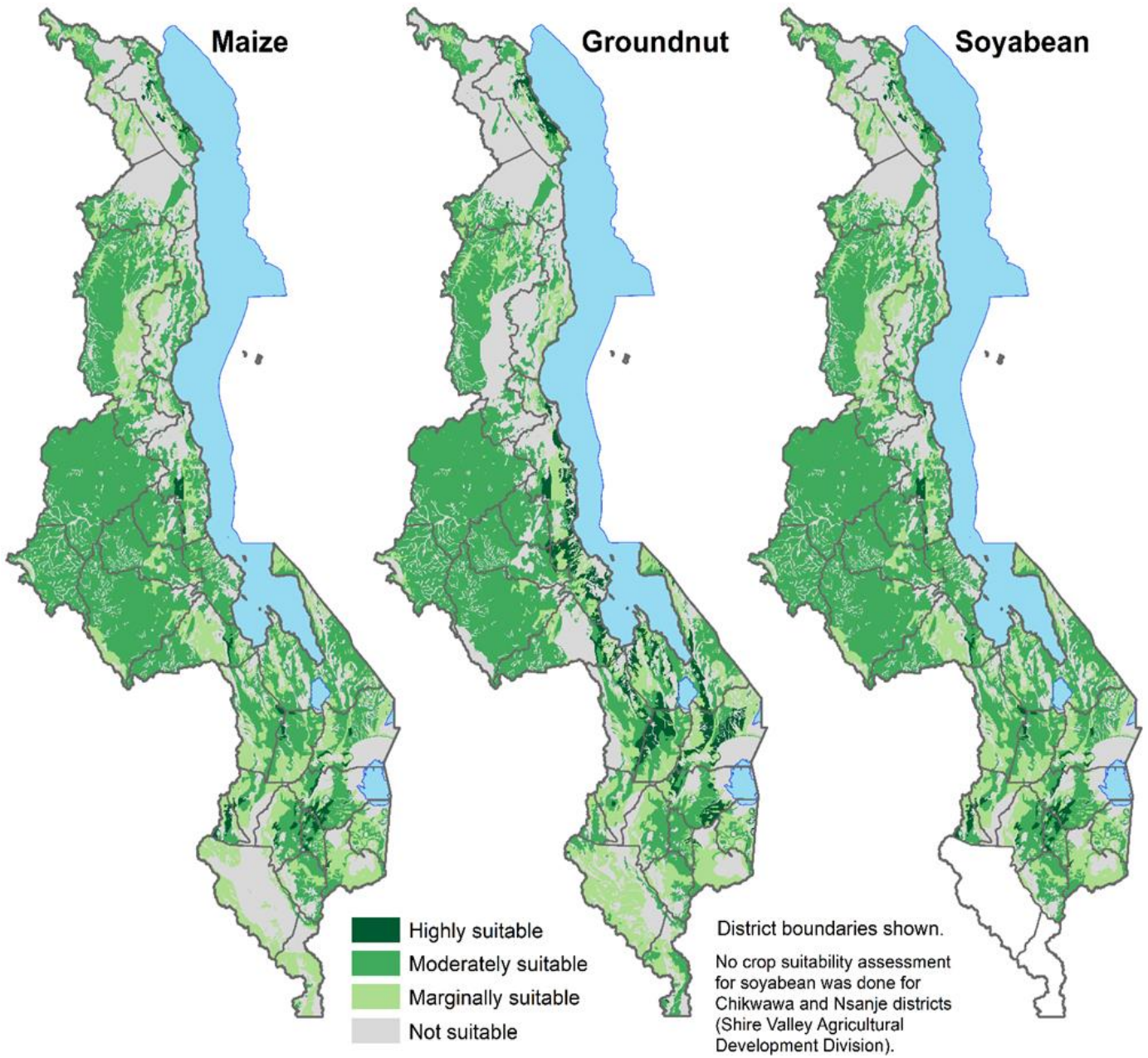
Agro-ecological suitability

- The three crops are generally well suited for production across the country
  - Most areas of mid-altitude plateau suited for all three crops
  - None of the crops likely to do well around Lake Chilwa, parts of Lower Shire Valley, and Rift Valley escarpments
  - Maps show lakeshore as suited for growing the three crops, but find that farmers there do not intensively produce them



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Levels in 2019/20 and trends since 2016/17 in production and sale of the three crops by farming households

	Maize (all)	Groundnut	Soyabean
Produce, % of households engaged in crop agriculture	**92.3**	**26.8**	**15.6**
Change between 2016/17 and 2019/20, percentage point	*+1.1*	*+11.9*	*+5.8*
Sold, % of producers of crop	**21.1**	**57.5**	**82.9**
Change between 2016/17 and 2019/20, percentage point	*+5.1*	*+0.3*	*+0.7*
If sold any, share of harvest sold, %	**32.3**	**60.6**	**81.9**
Change between 2016/17 and 2019/20, percentage point	*–2.3*	*+1.5*	*+3.9*
If sold any, sold more than half of crop, % of sellers	20.3	67.4	91.4
Change between 2016/17 and 2019/20, percentage point	*–2.8*	*+0.4*	*+1.5*

- Shares of farming households producing groundnut or soyabean increased strongly between 2016/17 and 2019/20
- 5 percentage point increase in share of maize producers selling some of their harvest

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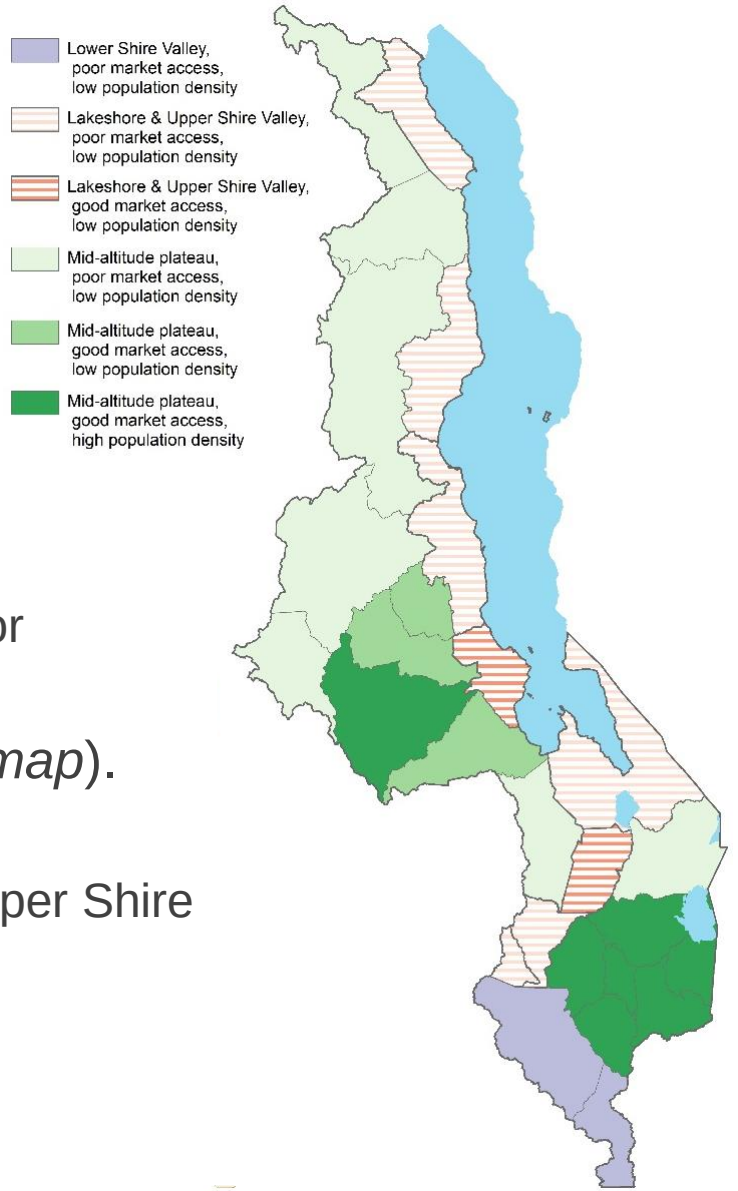
Econometric analysis – characteristics associated with crop production and sale – dependent variables

- Developed crop-specific household models using IHS5 data
  - To identify factors that might be driving households to produce any of the three crops and to sell some of their harvest
    1. For all **crop-farming households**, what factors associated with their deciding to **produce maize, groundnut,** or **soyabean**, respectively
    2. For all **households producing maize** or **producing groundnut**, what factors are associated with their deciding to **sell any of their harvest**
       - *We assume soyabean is produced only for sale, so no additional models*
    3. For **households that sell any maize** or **groundnut**, what factors are associated with their deciding to **sell more than half of their harvest**
  - Dependent variables are all 0/1 (dummy) variables, so use logistic models

Econometric analysis – characteristics associated with crop 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 in past week that was purchased
    - Proxy measure of relative household dependence on market for 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



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Maize – characteristics associated with production and sale – results

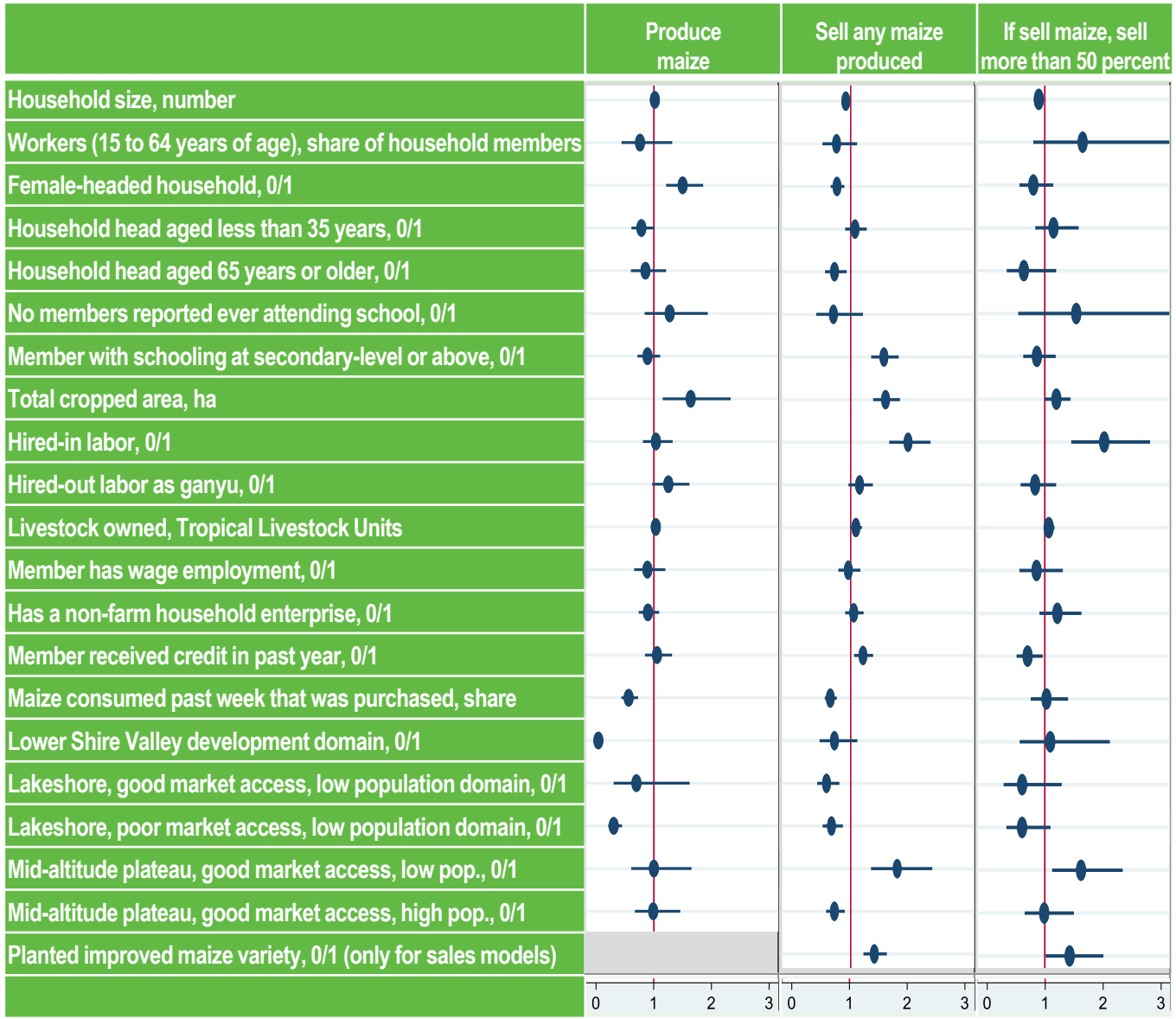
- Plots of odds-ratio for each explanatory variable
  - Statistically significant if 95% confidence interval line does not cross 1.0 odds-ratio line
- Selected significant determinants:
  - **Production:**

    (+) cropland, female headship;

    (–) market dependence, Lower Shire Valley or lakeshore
  - **Sales:**

    (+) cropland, hiring-in labour, improved seed, mid-altitude plateau with good market access & low population density;

    (–) female headship, lakeshore



Groundnut – characteristics associated with production and sale – results

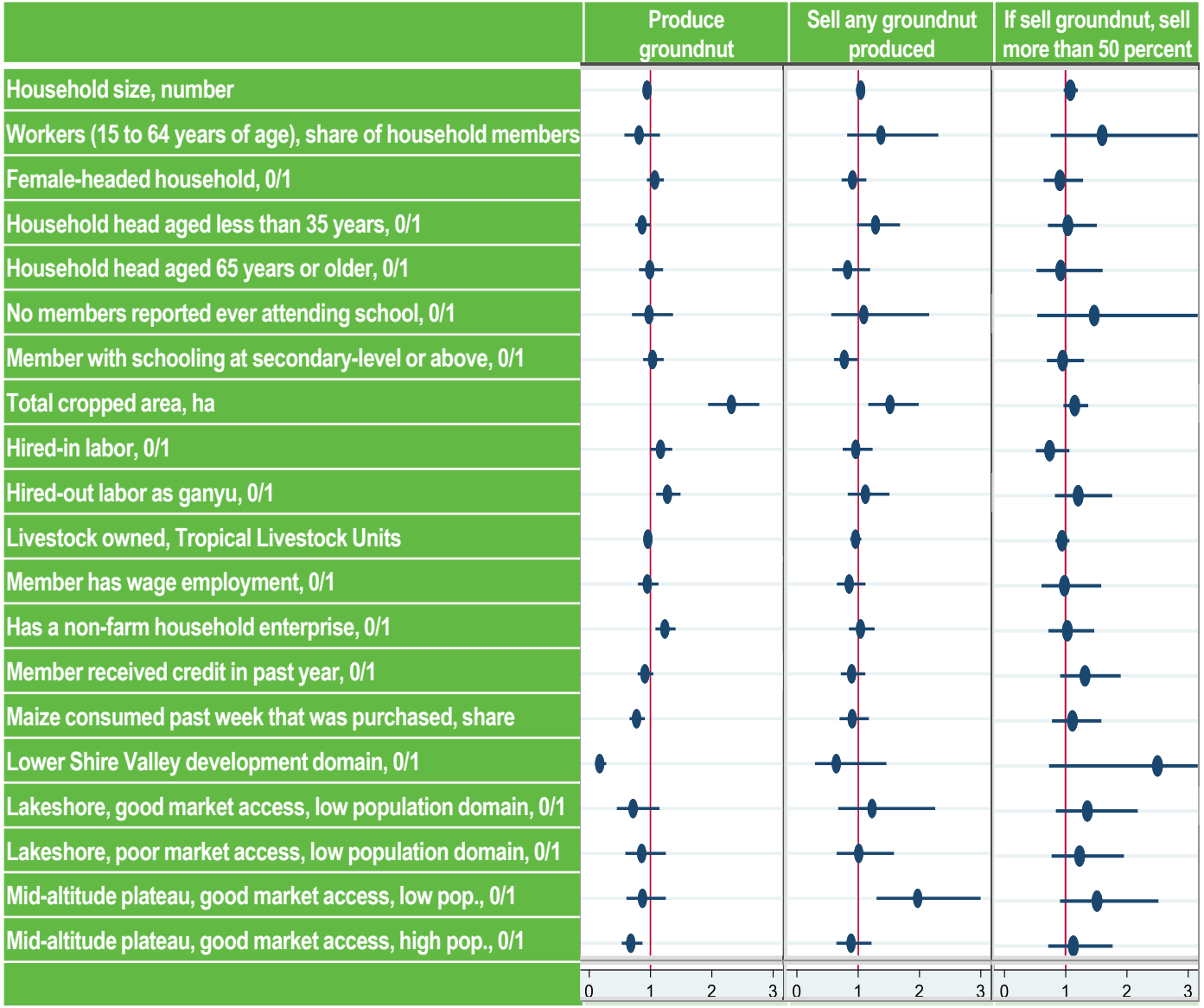
- Selected significant determinants:
  - **Production:**

    (+) cropland, has non-farm enterprise;

    (–) LSV, mid-altitude plateau with good market access & high population density
  - **Sales:**

    (+) cropland, household with younger heads, mid-altitude plateau with good market access & low population density;

    (–) higher education level

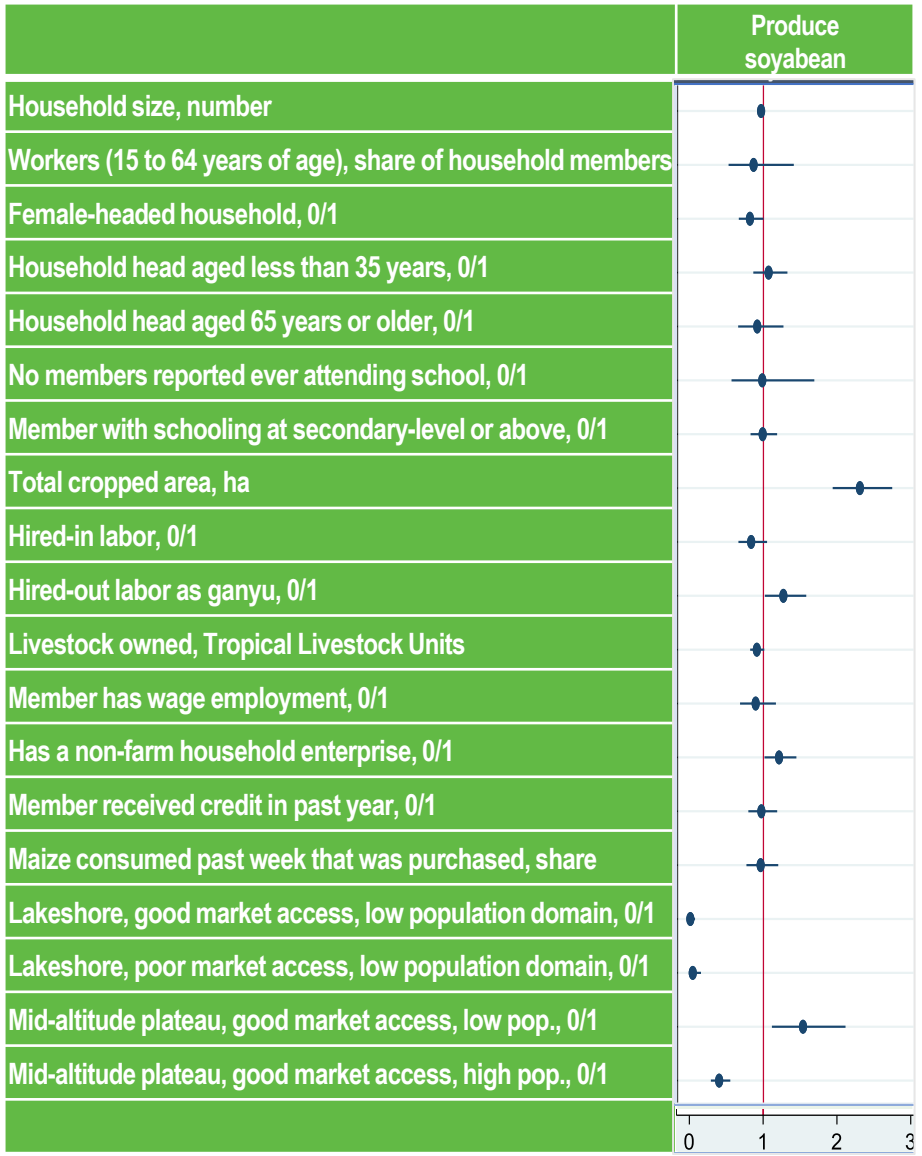


Soyabean – characteristics associated with production – results

- Selected significant determinants of **Production**:

  (+) cropland, mid-altitude plateau with good market access & low population density;

  (–) female headship, lakeshore, mid-altitude plateau with good market access & high population density



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Are drivers of production and commercialization of these crops changing? – temporal analysis

- Chow test-type analysis
  - Use pooled data from IHS4 of 2016/17 and the IHS5 of 2019/20
  - Are model coefficients estimated using IHS5 different from those estimated using IHS4?
- Generally, “No”. Limited evidence of change in the drivers of households deciding to produce maize, groundnut, or soyabean, or to sell maize or groundnut
- Only a few statistically significant changes:
  - Associations between landholding size and sales of maize and production of groundnut or soyabean intensified
    - Insufficient land will keep increasing numbers of farming households from producing maize for sale or producing groundnut and soyabean altogether
  - Few changes seen in strength of associations between dependent variables and the development domains

Strengthening value chains for maize, groundnut, and soyabean in Malawi - Key takeaways

- Focus on farming households with larger landholdings in mid-altitude plateau zone
  - Land availability is an important consideration in farmers' decisions to produce these crops for market sale
  - Agro-ecological suitability for crop production and access to markets also important
- Efforts also should be directed to female-headed household with sufficient land
  - Most now only produce maize and groundnut for subsistence, rather than income
  - Less likely than male-headed households to produce soyabean
- More education not now important in determining whether a household engages in commercial production of maize, groundnut or soyabean – a challenge
  - Given yields far below potential, more knowledge-intensive higher-yielding techniques should be used in production
  - Will require farmers to be better educated to use such techniques effectively and to then profitably engage in the market

Improving or extending the analyses

- Spatial analysis
  - The crop suitability maps show the lakeshore as suitable for oilseed and pulses, but both the annual crop estimates from the Ministry of Agriculture and our logistic analyses show relatively limited production there
    - Smallholders in their farming likely know better than the crop suitability analysts
  - The crop suitability maps are based on average agro-climatological conditions
    - But need to consider seasonal variability in those conditions, since this variability is an important source for risk for farmers
- Employed simple econometric analyses here
  - Potentially more useful insights could be obtained if further analyses used continuous variables
  - Also refine the specifications of the models, particularly in the types of explanatory variables used

Thank you for your attention!

- *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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