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Assessing access and adoption of common bean improved varieties in Zambia

By

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Presentation Outline

- Introduction
- Purpose of the study
- Research methods
- Findings
- Conclusion & Recommendations

Introduction

- NARES in Zambia has to date released 11 improved bean varieties
- Varieties have high yield potential (1-2 tons/ha)
- Earliness of bush varieties has enabled many bean growers in high-rainfall northern region of Zambia to grow at least 2 bean crops in a single season
- Most varieties developed so far are adapted to relatively low soil fertility conditions
- Improved varieties have been disseminated through a number of channels:
 - On-farm variety demonstrations
 - Bean utilization demonstrations
 - Off-season production
 - Bean production and utilization brochures

Purpose of the study

Given the background:

- Main purpose of this study was to provide estimates of rates of adoption of improved bean varieties in northern Zambia
- Study meant to:
 - provide an analysis of **access, adoption & diffusion** of improved varieties
 - analysis of **drivers of adoption, gender perspectives** in bean production & **marketing**, as well as benefits derived from adopting improved varieties

Research Methods (1)

Conceptual framework:

- Descriptive analysis employed using t-test statistic, ANOVA and Chi-Square statistics
- Descriptive analysis is anchored on sustainable livelihoods framework
- Asset pentagon
- Econometric analysis also used to provide insights into factors that influence decision on whether or not to adopt improved varieties

Research Methods (2)

Sample survey design:

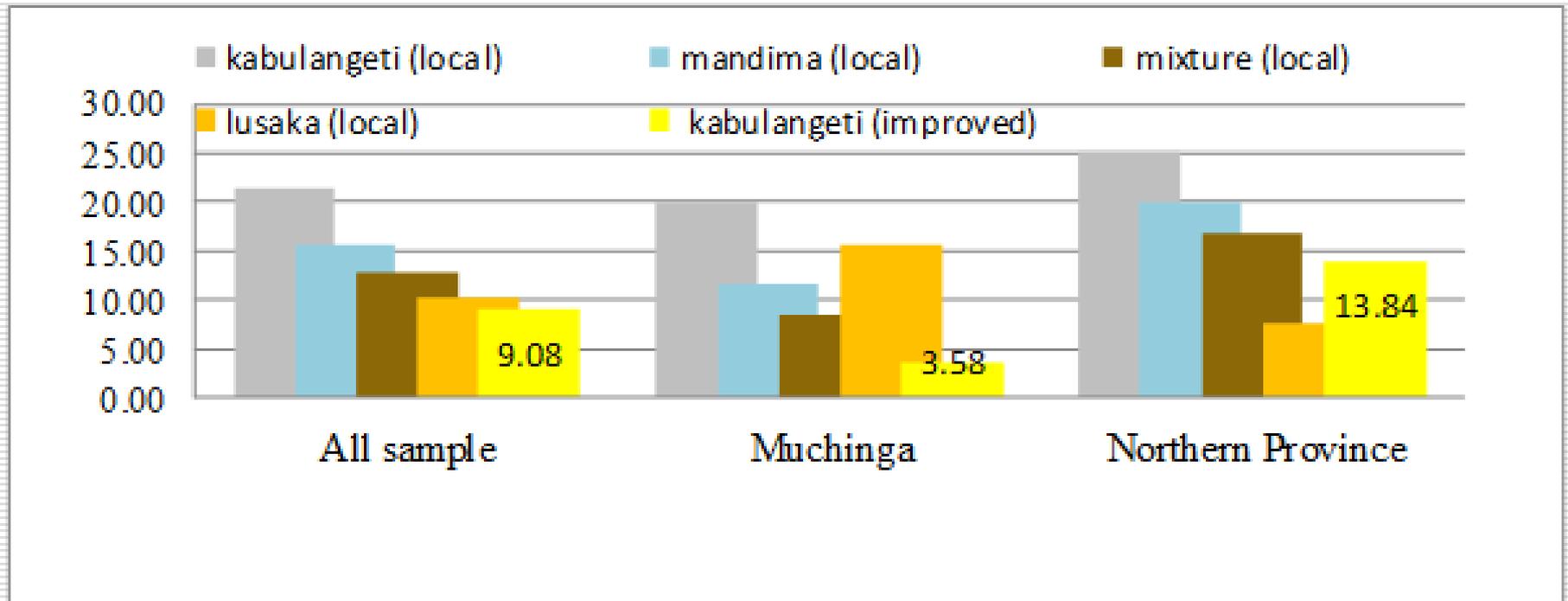
- 7 districts (Chinsali, Mpika, Nakonde, Kasama, Mbala, Mpoulungu & Mporokoso) – based on importance of bean crop & area under production
- Two-stage cluster sample selection method used
- 1st stage, villages randomly selected from each district according to proportion of villages within the selected districts
- 2nd stage, households were systematically selected within each village
- 67 villages (# villages randomly selected proportionally to # of villages/district)

Research Methods (3)

Data Collection:

- Household level questionnaire - 402 hhs
- Village level questionnaire
- Bean vendors/marketeers instrument

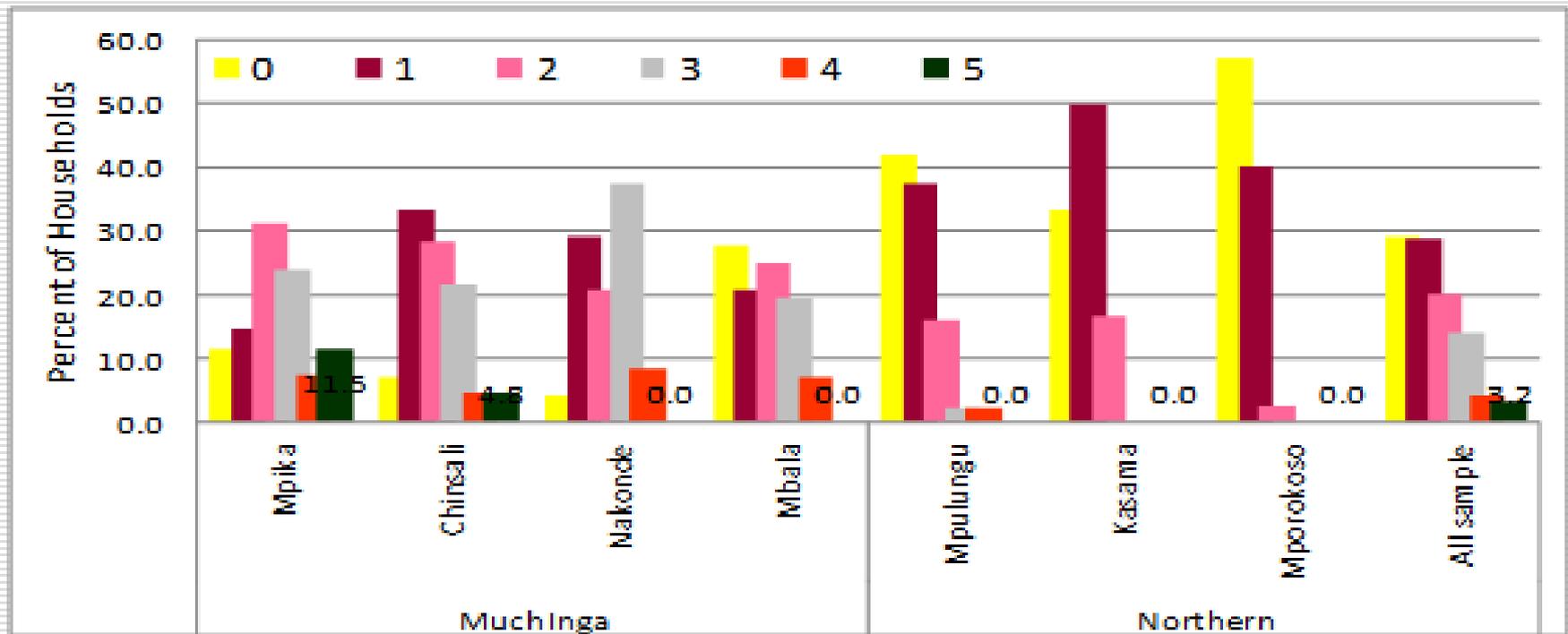
Five popular varieties and their frequency (%) of occurrence in each province



Awareness, adoption and dis adoption of improved varieties

- About 71% farmers are aware of at least one improved variety
- Overall, 6 improved varieties were known and grown
- The varieties included: Chambeshi, Lukupa, Kapisha, Luangeni, Lyambai and improved Kabulangeti
- Improved Kabulengeti (released 2007) is so far the most known & grown improved variety across study area
- Information about improved bean varieties was frequently accessed between 2000 and 2012 when bean research and technology dissemination has been more active

Number of varieties known by sampled households across study districts (1)



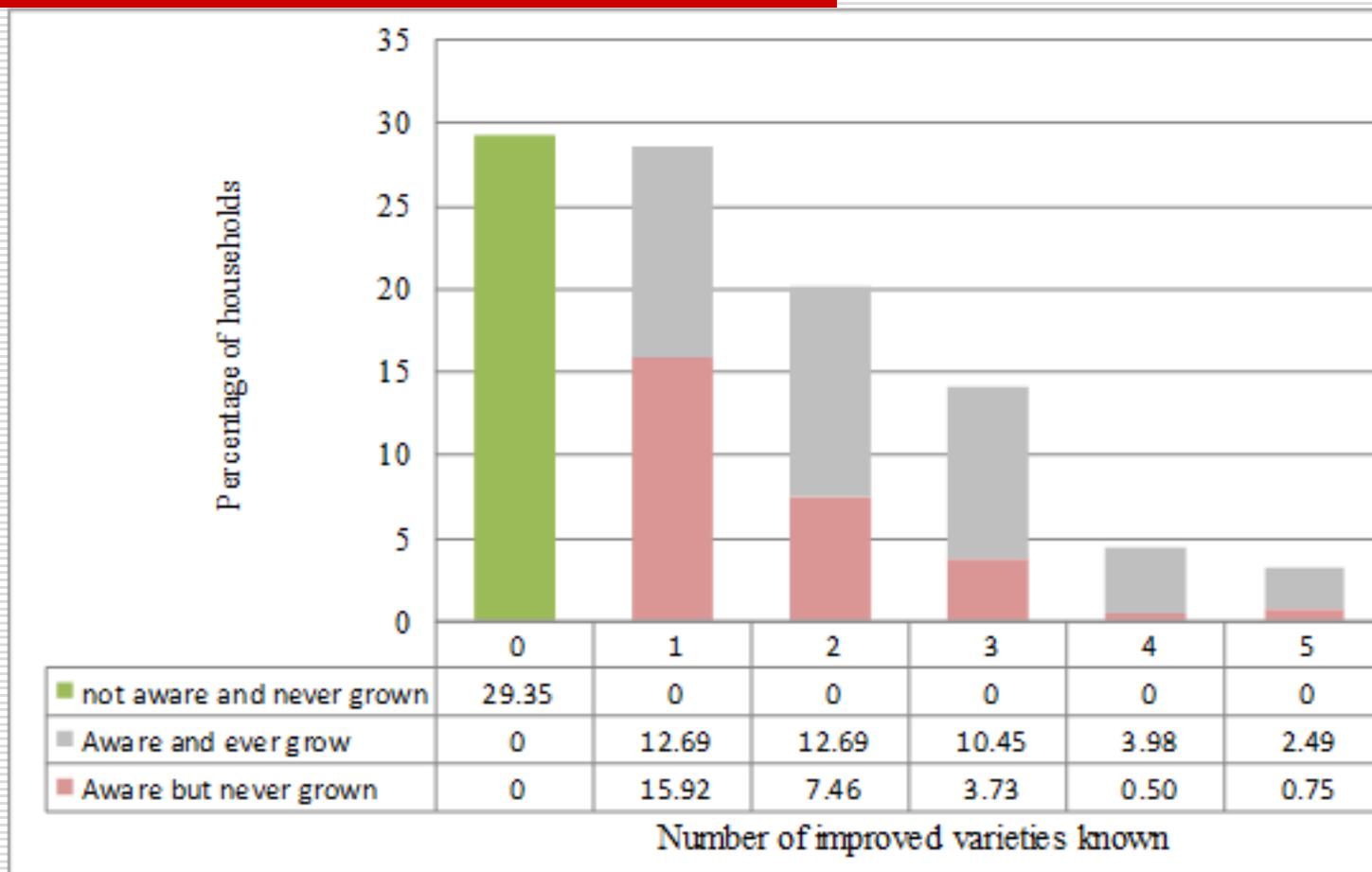
Number of improved varieties known by sampled households across study districts (2)

- Of 71% of hhs that are aware of at least one improved variety only 42.3% have ever grown an improved variety
- 28.4% of hhs are aware but have never grown an improved bean variety
- Lack of access to seed of improved variety is the most frequent reason for non-adoption or abandonment after first planting
- unavailability of seed is main underlying constraint to seed accessibility that hinders farmers from trying out a new variety
- Other reasons for dis-adoption were variety specific; such as poor performance in terms of consumption or production attributes.

Number of varieties known by sampled households across study districts (3)

- The incidence of ever grown a new variety increases with number of varieties known
- This could be perhaps because farmers are more motivated to try out and learn more about improved varieties when they know many
- Hence, there is need to multiply and disseminate a diversity of varieties to farmers

Percentage of households who are aware & have ever grown the varieties by number of varieties known



Improved variety adoption rate and intensity of use in 2012/2013 cropping season (1)

- Rate of improved variety use per agricultural season is modest
- 26.9% of hhs grew improved varieties in 2012/2013 season
- Adoption of improved varieties is not significantly different between the two provinces
- Estimated adoption rate per cropping season is far below the rate of experimentation with the technology which was reported to be 42.3% of the households
- This is partly because some households abandon cultivation of the variety after experimentation and partly implies that adoption is dynamic.

Improved variety adoption rate and intensity of use in 2012/2013 cropping season (2)

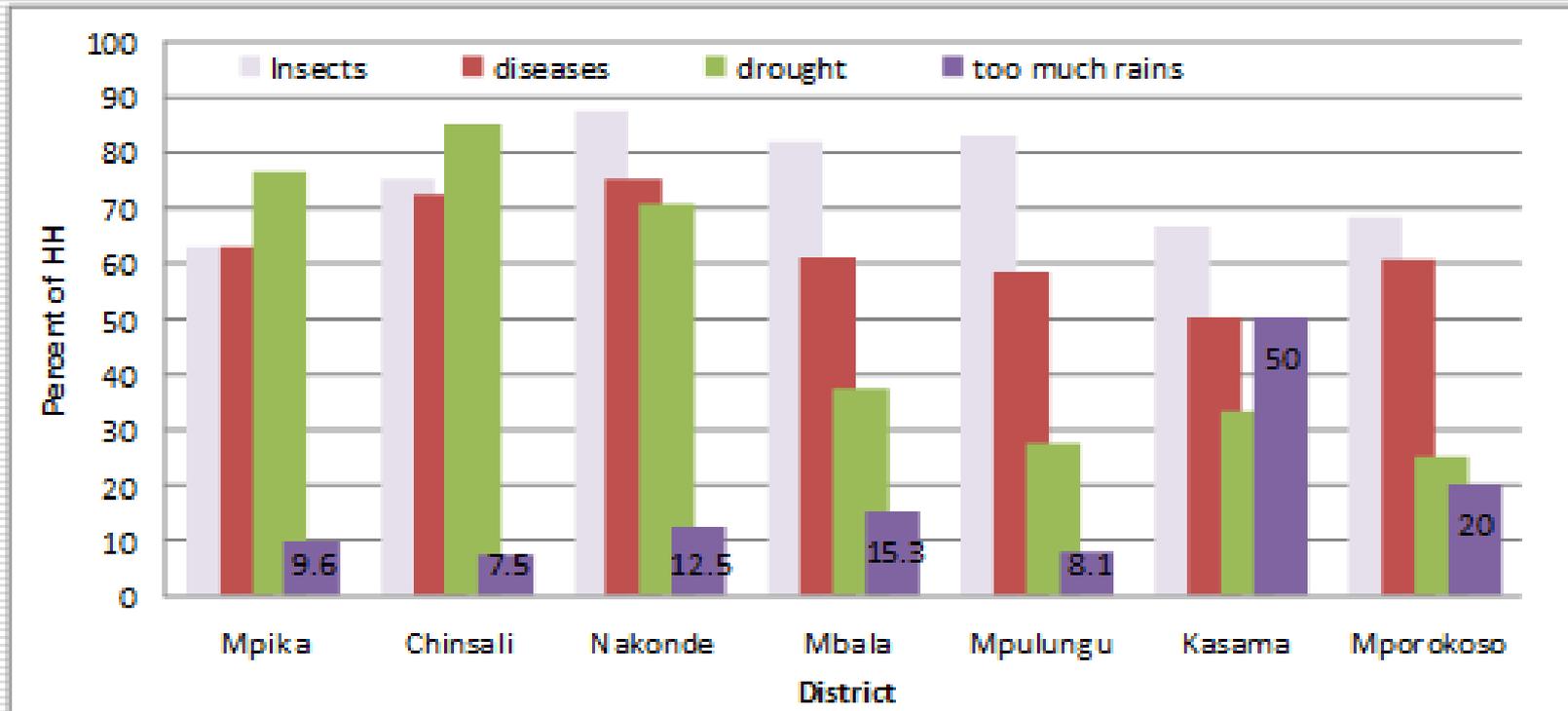
- Some farmers may interchange varieties by season (i.e. they grow an improved variety in one season and local varieties in another season)
- At plot level, improved varieties are mainly grown in a mixture with local varieties.
- Out of 479 bean plots in the sample, 8.3% were cultivated with improved varieties; 15.9% planted both local and improved varieties in a mixture and 75.7% local varieties

Percentage of households, plots; and area planted with improved bean varieties, by province

Variable	Muchinga		Northern Province		All Sample	
	N	Percent	N	Percent	N	Percent
Households level adoption	162	27.78	243	26.34	405	26.91
Plots level adoption						
No adoption	146	76.44	218	75.69	364	75.99
Full adoption	15	7.85	24	8.33	39	8.14
Partial adoption	30	15.71	46	15.97	76	15.87
Percent of area under improved varieties	191	14.7	288	16.20	479	15.6

Common bean is prone to a number of biotic and abiotic stresses

- Insects and diseases common across study districts
- Drought incidences reported to be severe in recent years



Determinants of probability of awareness (1)

- Probability of being aware about improved varieties varies among hhs based on:-
 - Geographical location
 - Household characteristics
 - Degree of remoteness
- Study results are consistent with literature (Feder et al., 1985) that cost of information acquisition reduces with education of decision maker

Determinants of probability of awareness (2)

- Likelihood of being aware of at least one improved bean variety is higher among hhs headed by individuals with more years of schooling
- Information dissemination mechanisms ([extension services & membership in farmer association](#)) were found to be positively correlated with access to information about improved varieties

Determinants of adoption of improved beans varieties (1)

- **Soil quality:-** soil quality of bean plot & households' access to alternative soil fertility management strategies are most important factors that explain the probability that a plot pre-allocated to bean production will be cultivated with improved bean varieties
- **Soil type:-** new improved bean varieties are better adapted to sandy soils than clay soils
- **Access to chemical fertilisers:-** farmers that use chemical fertilizers able to overcome soil fertility constraints & obtain higher yields, hence less motivated to adopt improved varieties
- **Variety diversity:-** adoption of improved varieties significantly increases with variety diversity

Determinants of adoption of improved beans varieties (2)

- **Variety Mixtures:-** farmers that prefer variety mixture over pure stands are more likely to be attracted to new improved bean varieties as they would like to enrich their mixtures with new varieties
- Household demographic characteristics influence adoption of improved bean varieties
- FHHs depend largely on social networks for seed of improved varieties
- Diffusion of improved varieties in social networks still low, meaning FHHs experience more constraints with regard to accessing seed of improved varieties than MHHs.
- Household assets such as education influences adoption through its effect on information acquisition while household wealthy (represented by value of farm equipment, livestock) do not seem to be important in the adoption of improved bean varieties.

Conclusion (1)

- A number of varieties released by NARES are known and used by farmers in study communities but their adoption in terms of percentage of bean producing hhs & area occupied is modest
- In aggregate, about 27% of bean producers are cultivating improved varieties & allocating a total of 15.6% of the area pre-allocated to the production of these varieties
- A number of factors explain the observed adoption of improved varieties:-
 - Importance of information acquisition facilitating factors ([extension & social capital in form of membership in association](#))
 - Need to expand on variety dissemination targeting a range of varieties to provide farmers with a wide choice.

Conclusion (2)

- A significant percentage of farmers that are aware of improved bean varieties have not adopted largely because seed is either not available to facilitate experimentation and eventual adoption or unaffordable for some farmers
- Lack of seed is also a frequent reason provided for dis-adoption
- Problem of seed access partly attributed to fact that most farmers add new varieties to existing mixtures, thereby limiting area allocated to seed of improved variety and consequently constrains ability of early adopters from bulking sufficient seed to facilitate subsequent diffusion on the farm as well as community through farmer to farmer exchange of seed
- Variety specific characteristics and adaptability to physical environment play an important role in adoption

Conclusion (3)

- Bean improvement research should continue to be supported to enable further adaptation of varieties to changes in environment and physical conditions where constraints are currently increasing
- Finally study results suggest:
 - A substitution effect from non-varietal soil fertility management options such as access and use of chemical fertilizers
 - Offering support to breeding for resistance and adaptability to physical conditions as a pro-poor strategy to sustain bean production