

# Linking seed accessibility to nutrition in the context of ethnic minority groups in Northern Vietnam: An application of a Multi-level Structural Equation Model (MSEM)

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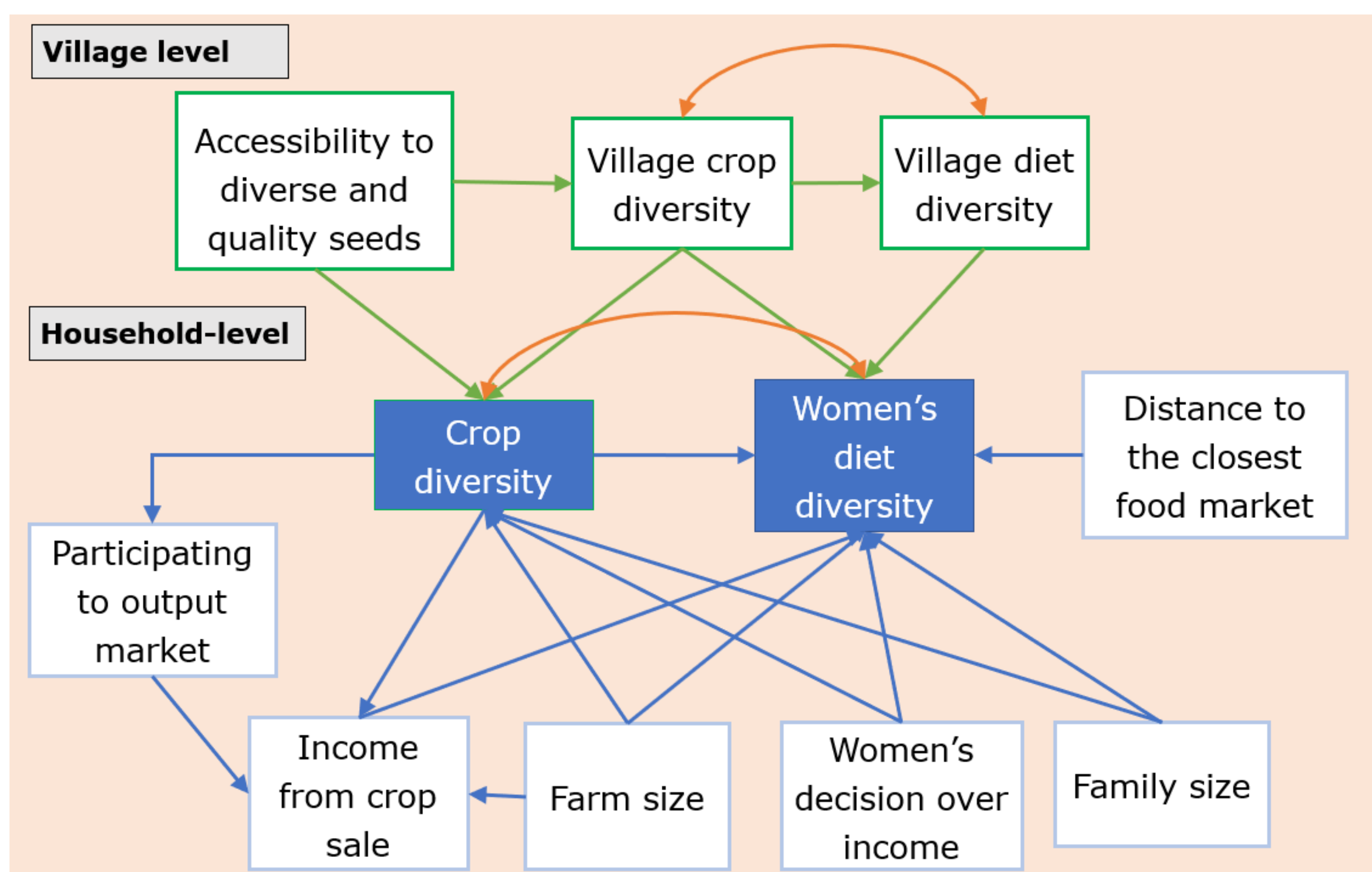
## Introduction

- ✓ Ethnic minority groups in Vietnam's mountainous region face serious undernutrition, with stunting at 35% in 2010, double the national average.
- ✓ Crop diversification for diet diversity is a potential solution.
- ✓ By diversifying crops, smallholder farmers can enhance their diet through direct consumption, or trade for other healthy food.
- ✓ Yet, the role of seed accessibility for nutrition remains poorly understood, despite its cruciality to any agriculture system.

## Objectives

- ✓ Describe the seed accessibility of ethnic minority farmers in the mountains of Northern Vietnam, focusing on vegetables and legumes
- ✓ Explore the empirical linkages between seed accessibility and women's diet diversity, focusing on vegetables and legumes

## Analytical model (AM)



## Defining constructs

- ✓ **Seed accessibility (SA)** =  $\sum_{i=1}^N \frac{SD_i * PQ_i}{D_i}$   
N: Number of sources accessible by the villagers; SD<sub>i</sub>: Number of types of seeds available in each source; PQ<sub>i</sub>: Village perceived seed quality score
- ✓ **Diet diversity and crop diversity (at village level)**: Total number of unique vegetable and legume cultivars grown and consumed (by 10 random households)

## Data

- ✓ **Household surveys**: The two end-line surveys of a 2020-2022 Randomized Controlled Trial (RCT) in 38 villages -December 2021 to March 2022 (639 households), and another in July 2022 (506) households. Interventions were providing diverse legumes and vegetable seeds, and nutrition training. Attrition was non-random for respondents' age and education.
- ✓ **Seed accessibility survey**: 38 village group interviews and 56 seed vendor interviews at 14 seed selling points in July 2022.

## Analysis

- ✓ We estimated the AM using Multilevel Structural Equation Modelling (MSEM).
- ✓ We fine-tuned the AM to comply with acceptable thresholds for goodness of fit indices.

## Results



Figure 1: Local seed vendor

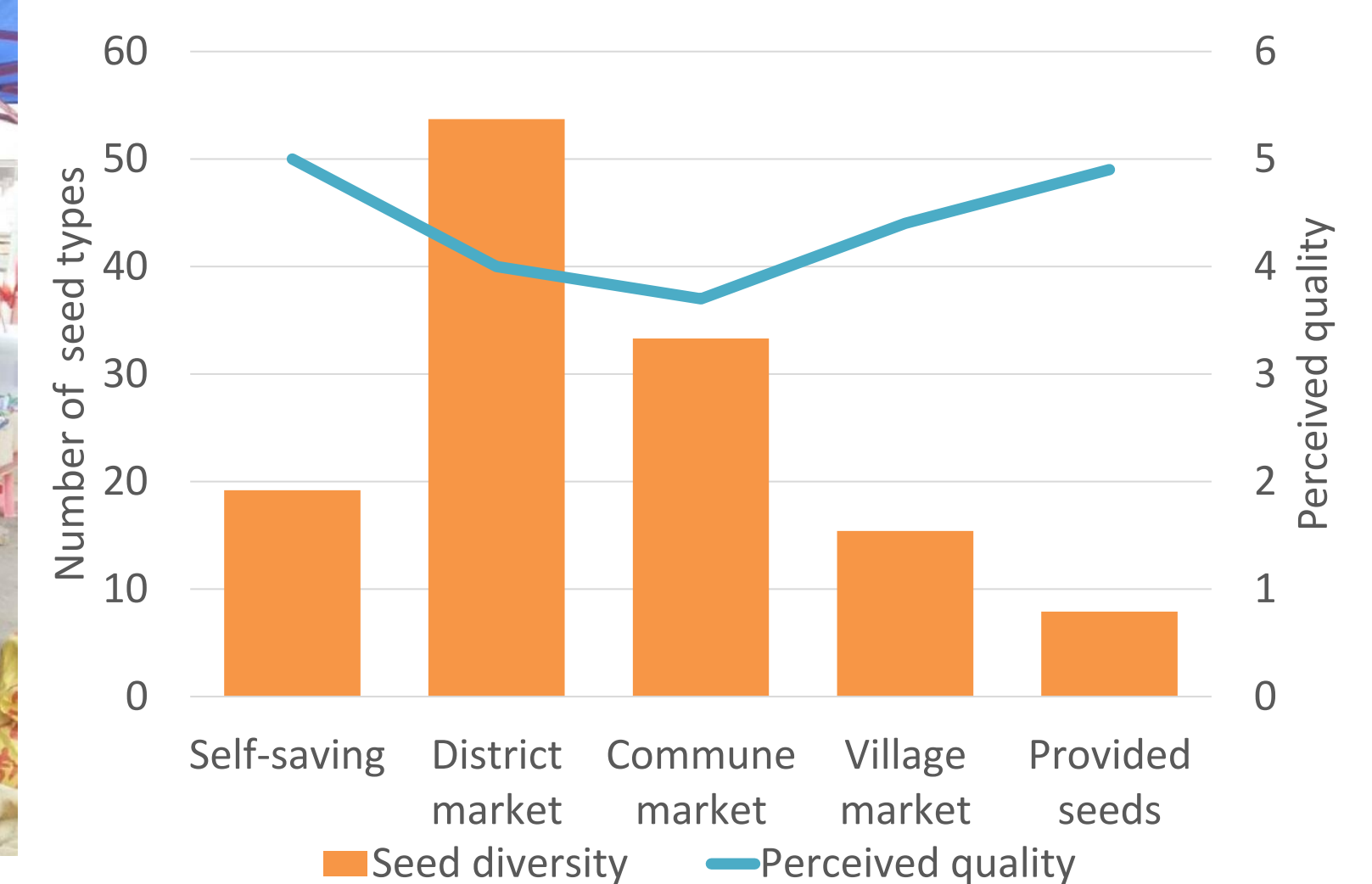


Figure 2: Seed diversity and perceived quality of various seed sources

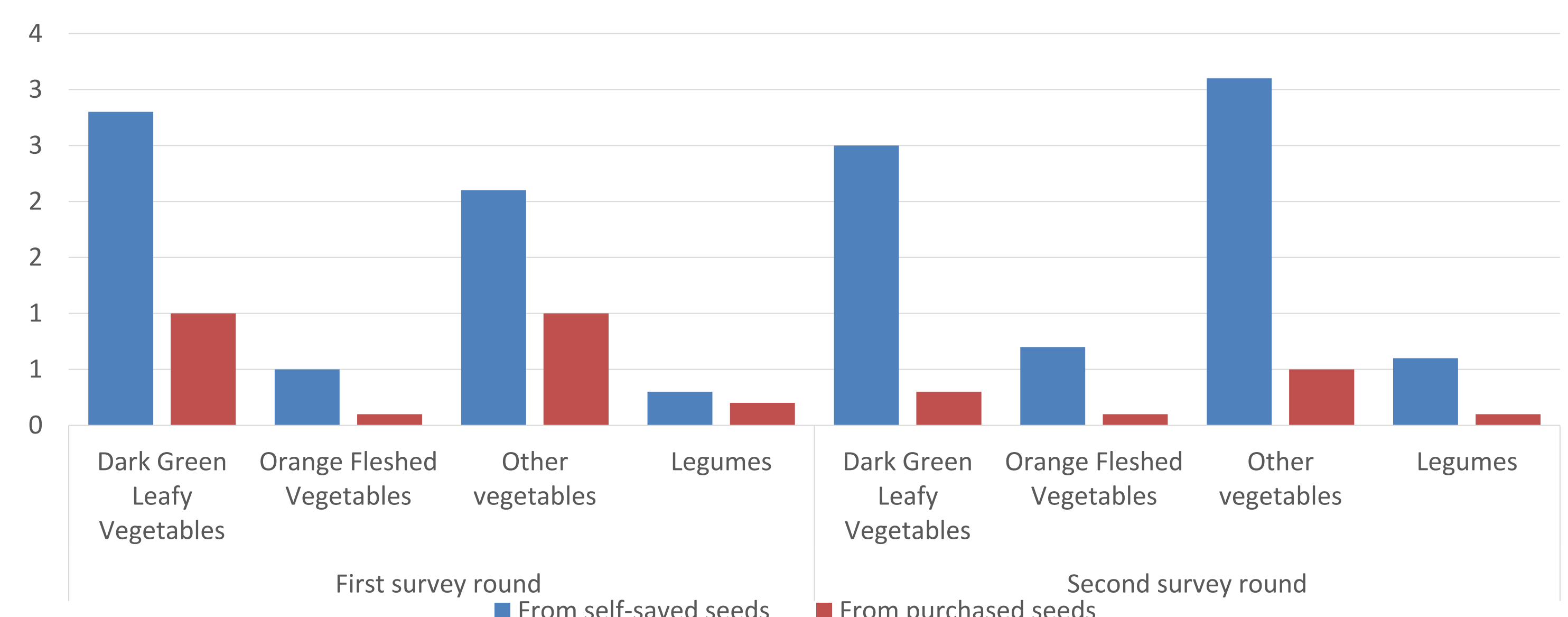


Figure 3: Number of crops with seeds procured by self-saving and purchasing

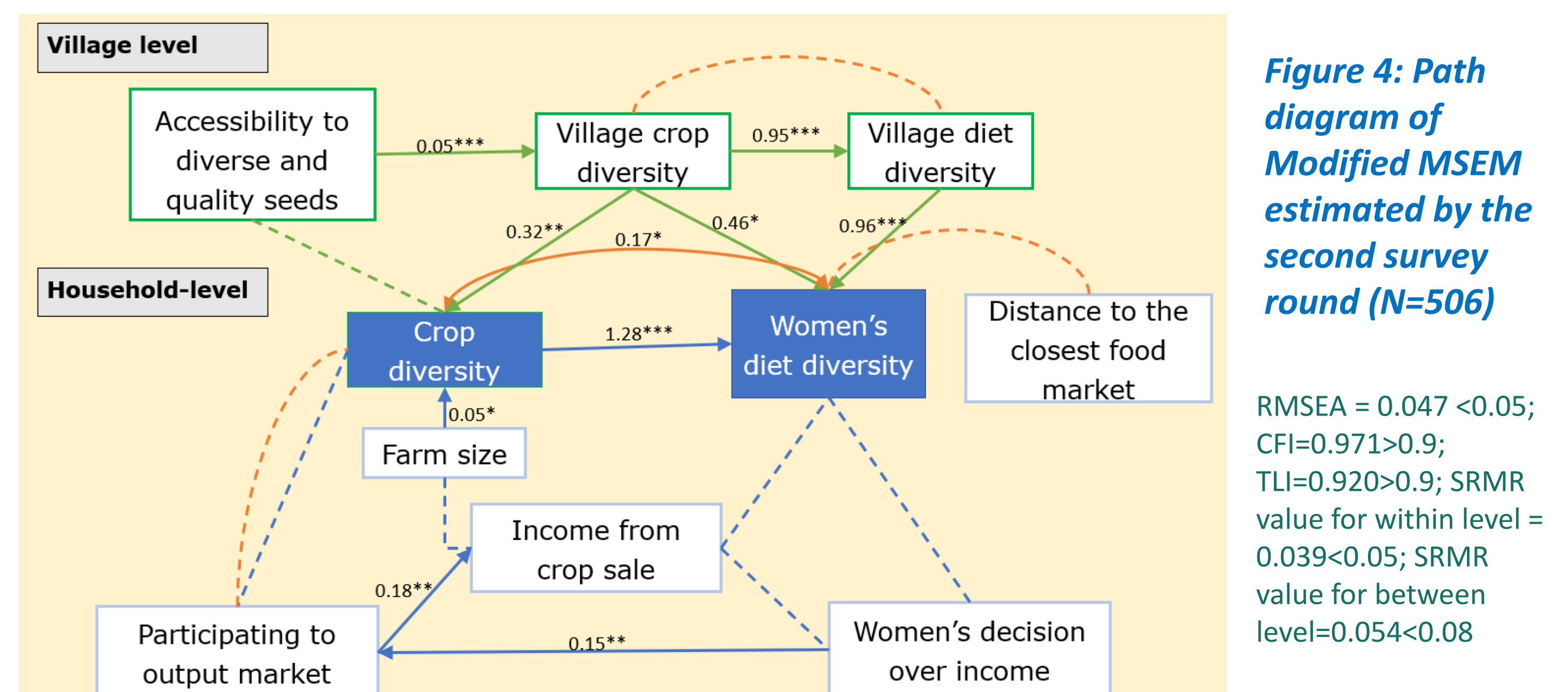
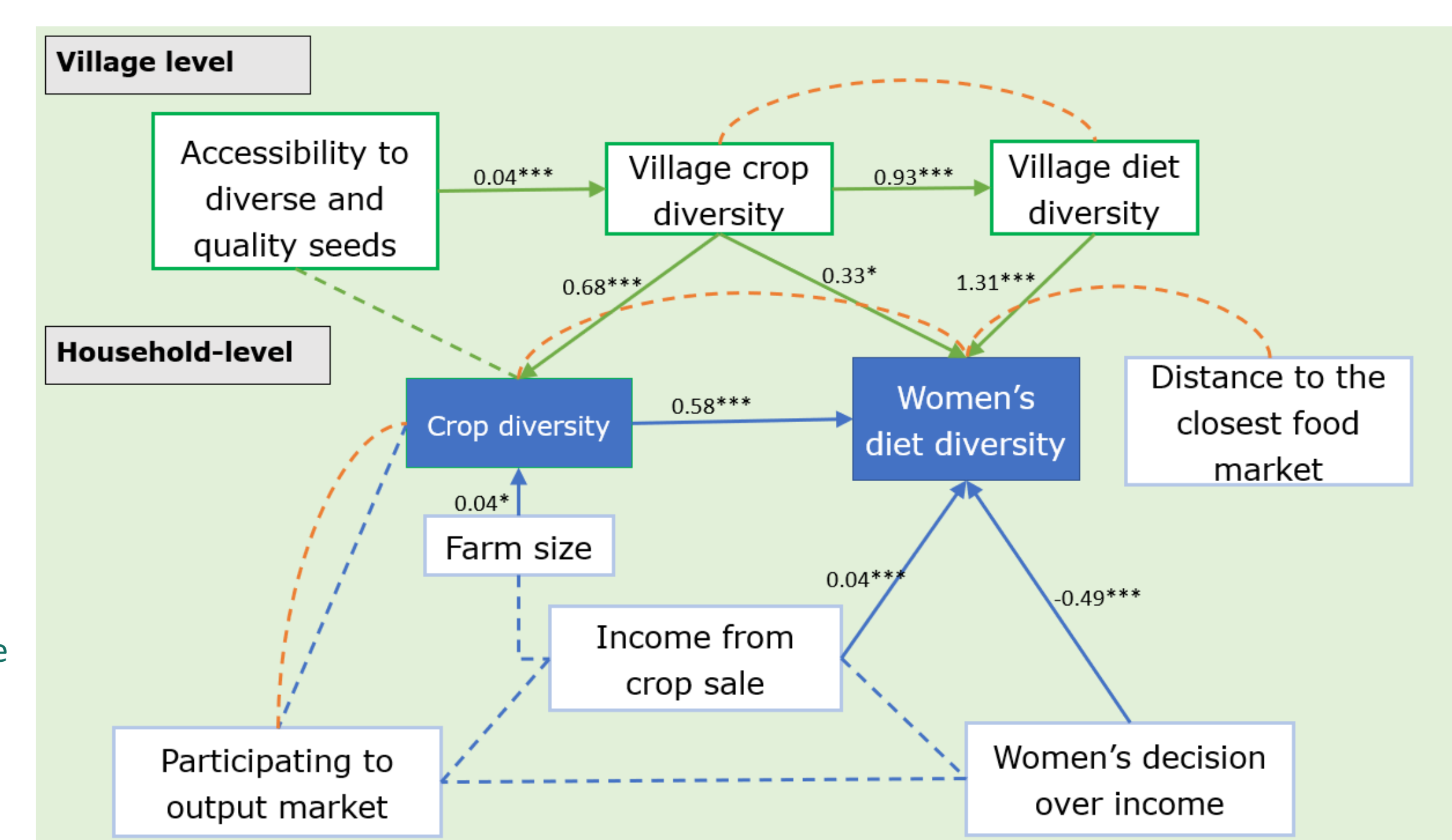


Figure 4: Path diagram of Modified MSEM estimated by the second survey round (N=506)

RMSEA = 0.047 < 0.05; CFI = 0.971 > 0.9; TLI = 0.920 > 0.9; SRMR value for within level = 0.039 < 0.05; SRMR value for between level = 0.054 < 0.08

Figure 5: Path diagram of Modified MSEM estimated by the first survey round (N=639)

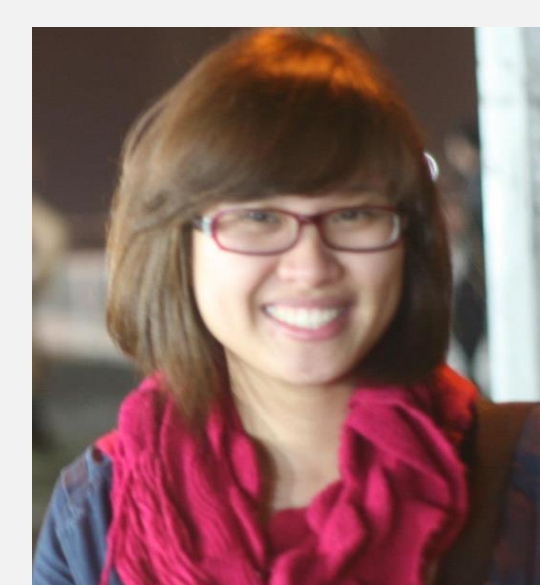
RMSEA = 0.045 < 0.05; CFI = 0.971 > 0.9; TLI = 0.922 > 0.9; SRMR value for within level = 0.027 < 0.05; SRMR value for between level = 0.019 < 0.05.



(\*) p-value < 0.05; (\*\*) p-value < 0.01; (\*\*\*) p-value < 0.001. Dashed lines present an insignificant correlation (p-value > 0.05)

## Highlights

- ✓ Seed accessibility (SA) is important to improve the diet quality of smallholder farmers
- ✓ SA can affect diet indirectly through village crop diversity and may also have a direct impact via household crop diversity. However, in this study, the direct influence of SA on household crop diversity might be weak because SA is translated to household crop diversity with a one-season delay.
- ✓ Both self-saved and market-purchased seeds are important for the diet quality of smallholder farmers



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