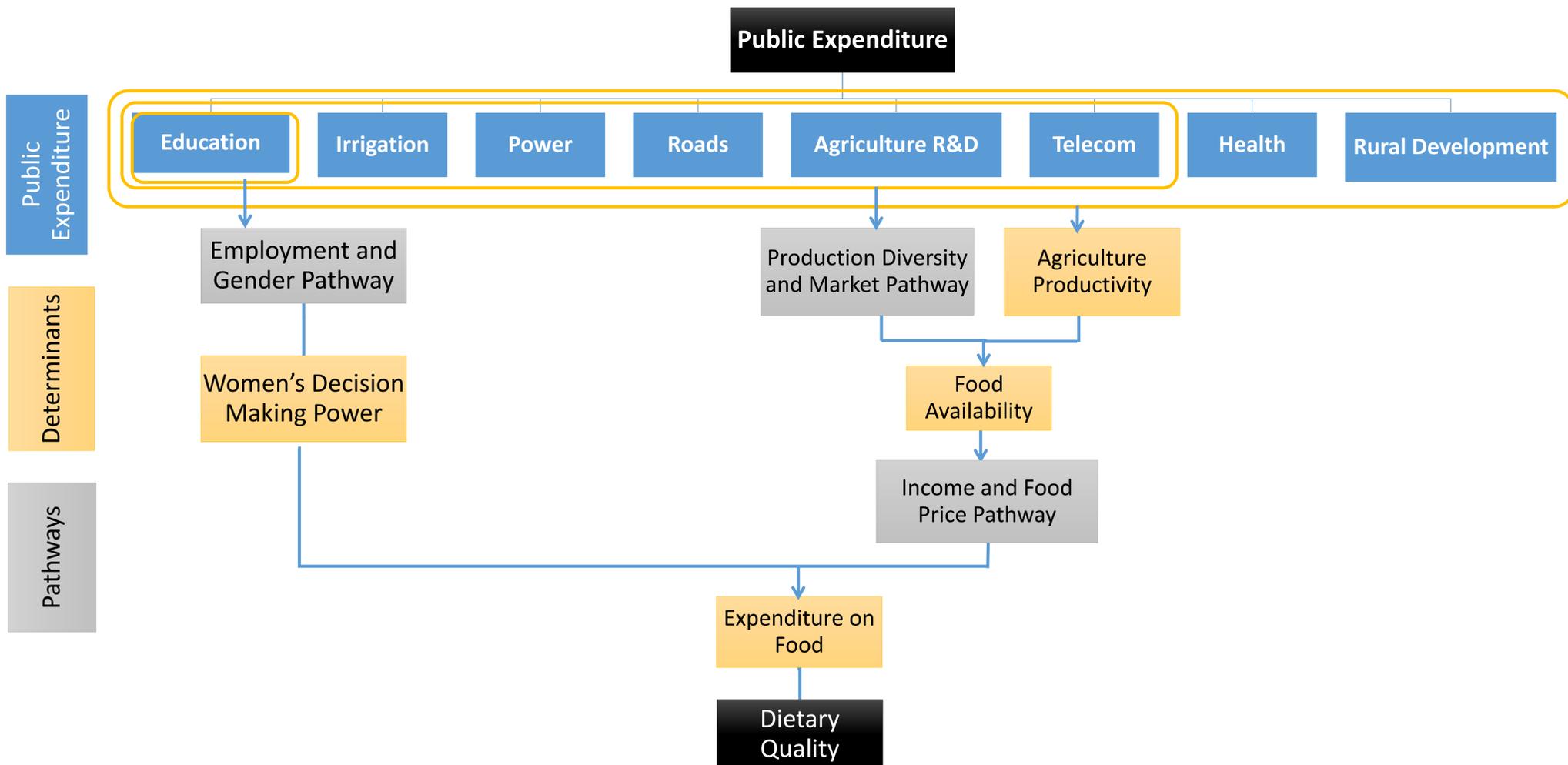


# Public Investment, Agriculture Strategy and Diet Diversity in India

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**Background:** There exists a disconnect between India's growth rate and prevalence of malnutrition. Even though the Indian government spends large sums on rural development, it remains a mystery as to why it does not translate into improved nutrition outcomes. Thus, there is a case for making government expenditures 'nutrition-sensitive' to address the Indian malnutrition challenge. A part of the solution lies in the agriculture sector, which has proven to be better at reducing poverty than non-agriculture sectors. It is theorised that there exist three main pathways from public investment to diet diversity - income and food price; production diversity and market; and employment and gender pathways. The three pathways influence diet diversity through rural public investments in eight categories; namely education, irrigation, power, roads, agriculture research and development (R&D), telecommunication, health and rural community development. The proposed research aims to evaluate *how nutrition-sensitive are rural public expenditures in India?*



## Methodology

- Using state-level data from 1972 to 2012, a simultaneous equations system will be used to measure both direct and indirect effects of public investments in education, health, irrigation, roads, agriculture R&D, telecommunication and rural development on diet quality.
- The direct effects arise from the rural community development investments that increase the intake of food, such as food security bill and employment guarantee programmes.
- The indirect effects are related to the investments made in rural infrastructure, agricultural research, health, and education that stimulate both agricultural and non-agricultural growth, leading to improvements in income earning ability and access to cheaper and more diverse food baskets.
- These direct and indirect interactions between public investments and diet quality are explicitly considered by the use of a simultaneous equations model.
- The system of equations allows us to endogenise economic variables that are likely to be generated in the same economic process, therefore, reducing or even eliminating the bias resulting from the endogeneity of these variables in the empirical econometric estimation of the various effects.
- Certain economic variables affect nutrition through multiple channels. For example: women's education improves nutrition outcome as their ability to provide improved dietary intake increases. Educated women are also better able to manage care, feeding and health of their children. A system of equations able to capture these different effects.
- Dietary quality will be measured as the headcount ratio of nutrient deprived households in terms of intake of key macro and micronutrients vis-à-vis their recommended dietary allowance.

## System of Equations

- Diet Quality (DQ) is a function of poverty (P), diversity in production (FVP), female labour force participation (FEMP) and time trend (T)

$$DQ = f(P, FVP, FEMP, T)$$

- The income and food price pathway is captured by the equation

$$P = f(TFP, WAGES, NAEMPLY, TT, LANDN, POP, RAIN, T)$$

- Where poverty is a function of total factor productivity growth in agricultural production (TFP), change in agricultural wages (WAGES), change in non-agricultural employment (NAEMPLY), terms of trade (TT), change in the percentage of landless households (LANDN), population growth rate (POP), annual rainfall (RAIN) and time trend (T).

- The production diversity and market pathway is captured by

$$FVP = f(RDE, RDE^{-1}, \dots, RDE^{-i}, IR, TEL, PVELE, ROADS, LITE, TT, T)$$

- Where diversity in production is a function of public expenditure in agriculture research and development (RDE), coverage of irrigation (IR), telecommunication (TEL) and electricity (PVELE), road density (ROADS), literacy rate (LITE), terms of trade (TT) and time trend (T).

- Lastly, the employment and gender pathway is given by

$$FEMP = f(WGAP, LITEF, ROADS, TFP, T)$$

- Where female labour force participation is a function of wage gap (WGAP), female literacy rate (LITEF), road density (ROADS), total factor productivity growth in agricultural production (TFP) and time trend (T).

- A set of reduced form equations capture the impact of public investments over the years on status of the above-mentioned variables.

## Expected Outcomes

- Estimate the number of people uplifted from nutrient deprivation for every million rupees spent on different categories of rural public investments over four decades.
- Measure the impact of public investments on productivity growth and reduction in nutrient deprivation and ranks them according to their yields, thereby quantify potential trade-offs or complementarities arising from the attainment of the national growth and development objectives.
- In so doing, the research will address the important policy question of *how to allocate public funds more efficiently to attain both economic growth and reduce nutrient deprivation in India.*