

Challenges to making producer-oriented fruit & vegetable value chain interventions more consumer-sensitive in Bihar, India

Authors: Gregory S. Cooper, Bhavani Shankar, Karl M. Rich

Contributors: Suneetha Kadiyala, Nazmun N. Ratna, Mohammad J. Alam, Vinay Rana, Namita Singh, Sharan Nadagouda

Key Points

- Aggregation schemes jointly collect, transport and market production on behalf of multiple small farmers; we study an aggregation scheme for fruit and vegetables in Bihar, India.
- Aggregation incentivises supply to large urban markets ahead of smaller less-lucrative markets.
- There are potential mismatches between the producer-oriented aims of aggregation and the need to distribute fruits and vegetables equitably across space and consumer socio-economic status.
- Internal barriers are reinforced by underdeveloped storage and transport infrastructure.
- Unlocking the potential of aggregation for equitable distribution may require simultaneous changes to both the aggregation scheme and the wider enabling environment.

Objectives

The Market Intervention for Nutritional Improvement (MINI) project aims to understand the barriers and trade-offs associated with increasing the delivery of fruits and vegetables (F&V) to smaller, often less lucrative markets in Bihar, India and Jessore, Bangladesh. As a first step in our project research, we conducted a rapid food value chain analysis (RFVCA) in Bihar to: (i) identify key value chain actors, interlinkages and functions distributing F&V between farm and fork, (ii) conceptualise the flows of F&V, including barriers to equitable F&V distribution, and (iii) scope opportunities to adapt aggregation towards the needs of consumers in semi-rural/rural markets.

Context

Bihar contributes 7-10% of India's total F&V production. However, at 140-180 grams/capita/day, average F&V consumption rates are significantly below the 400 grams/capita/day recommendation of the World Health Organisation, with the 2011 National Sample Survey indicating that rural consumption may lag urban rates by around 10%. Increased horticultural production and trade have traditionally presented first steps in tackling availability and affordability issues. However, in Bihar, improving F&V distribution towards more nutritionally insecure markets and consumers is hindered by (i) the lengthening catchments and pull of urban wholesale markets, (ii) the lack of connectivity to markets outside of urban areas, and (iii) the risks to farmer's profits and loss rates associated with supplying smaller markets.

The 'Loop' aggregation scheme of [Digital Green](#) helps overcome some of the small farmer horticultural supply problems by organising collective transport and marketing. Since early-2016, the scheme has coordinated supplies from over 22,000 farmers, reduced market transport costs, and saved farmers up to eight hours per market day. However, given the pull of urban markets, and the lack of rural transport and market infrastructures, the extent to which aggregation may promote equitable F&V distribution is unclear, and may be grounded in a range of complex, contextual factors.

Approach

We conducted a RFVCA focusing on five districts of Bihar with well-established aggregation operations. First, we conducted 49 semi-structured interviews to explore the roles of different actors, their interrelations, and the challenges faced when purchasing and/or selling F&V. Interviewees included farmers who had participated in aggregation within the past two years, aggregators, commission agents, local and 'inter-state' wholesalers, retailers and consumers. Purposeful and snowball sampling selected a diversity of actors with rounded knowledge of aggregation and/or their segment of the value chain. Interviews in Hindi lasted between 45-60 minutes and were then translated into English by an assistant from Digital Green. Second, we conducted quantitative analyses of the 'Loop dashboard' – a dataset of around 700,000 Loop market transactions recorded since early-2016. The analysis focused on triangulating the information

collected during the interviews, exploring the evolution of aggregation over both time and space.

Findings

Horticulture in Bihar is a complex system, with F&V potentially changing hands five times prior to reaching the end consumers. Markets are roughly split into two tiers. First, in urban markets, produce is exported out-of-district by high capacity distance traders, as well as supplied to nearby markets by roving local wholesalers. Commission agents assist transactions by acting as a middleman for farmers and traders, whilst providing valuable price and quality information. Each district tends to have one or two major hub markets, with daily capacities over 100 tonnes during the peak season. Second, local markets tend to be limited in F&V availability with capacities often under 10 tonnes. Local markets usually lack distant wholesale traders and are located off major transport routes.

Our analysis uncovered numerous benefits of aggregation for farmers. First, aggregation of multiple farmers' supplies reduced market transport costs from 1.5-2.0 Rs/kg (e.g. via private vehicles or public transport) to an average of 1 Rs/kg. In turn, these savings increased the *farmer's share of the consumers price* by 8-10%. Second, farmers participating in aggregation quoted time-savings between 30 minutes and 10 hours per market day and noted how participation has opened-up more distant markets. Farmers also explained that the business relationships between aggregators and traders have helped to break the dependency on personal relationships. Furthermore, farmers and aggregators leveraged

Loop's digital receipts during price negotiations and decisions about market supply.

Despite delivering 80,500 tonnes to 105 markets across Bihar (January 2016–September 2018), 60% of the total aggregated quantity was supplied to only ten wholesale markets. Therefore, supplies skew towards connecting villages to urban wholesale markets able to absorb aggregations averaging 1000 kg per day. Consequently, aggregations bypassed smaller markets en route to urban markets, raising questions such as 'what would need to happen to make supplying smaller markets more feasible?', and 'how may local F&V availability be affected by aggregation scaling-up in the long-run?'

Given the rising popularity of aggregation and Farmer Producer Organisations (FPO) across India and South Asia, various complexities must be considered when investigating how to develop equitable access to nutrition across space, including feedbacks between market and aggregation participation, farmer versus consumer trade-offs, and the strengthening pull of urban markets. Our RFVCA indicates the need for changes to both aggregation and the enabling environment; e.g. subsidising small market transport costs or dynamic aggregation quotas to supply small markets during supply shortages, combined with improved rural transport (e.g. improving rural road infrastructure) and small-scale cold storage facilities to increase market capacities and reduce food losses. Exploring the efficacy of such scenarios on the equitability of F&V delivery and the magnitude of farmer versus consumer trade-offs is a key objective of other research activities in the MINI project.

Further Information

- “Navigating the nutrition-based trade-offs arising from horticultural aggregation schemes: a system dynamics approach”, Cooper, G et al. 5th ANH Academy Week, 2020. <https://youtu.be/-c7SOFZmjoo>
- “Market Intervention for Nutritional Improvement (MINI) – December dissemination workshop”, Patna, 2019. <https://tinyurl.com/y4ntomjb>
- “What a visit to an Indian market reveals about the danger – and importance – of food markets”, by Shankar, B. *Geographical*, 2020. <https://geographical.co.uk/people/development/item/3658-a-visit-to-an-indian-food-market>
- Project website: <https://marketnutritionpro.wixsite.com/mini>

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