

## Extended Abstract

### **Circular migration and child nutrition: a comparison of children from family circular migrant, male migrant, and non-migrant households in Bihar, India.**

#### **Introduction**

India is home to one third of the world's children under five who are chronically undernourished or stunted, and over one half of the world's children under five who are acutely undernourished or wasted (1). The basic causes of poor nutrition include poverty and social marginalization (2), which strongly persist in India. Yet, despite decades of large-scale implementation of nutrition and food security programming by the state targeted to the poor, the prevalence of stunting and wasting in some states of the country has increased in recent years (3).

Over 60 percent of the Indian population relies on agriculture for livelihood, either as farmers or farm labour (4). Agriculture only represents 18 percent of India's GDP (5), however, and in many low- and middle-income countries, the sector does not experience rapid growth proportional to population expansion (6). In India, the majority of land ownership is smallholdings of less than one hectare, which is insufficient for the reproduction of most households (5). In this context, outmigration is a critical component of a multiple livelihood strategy undertaken by many rural households in India to cope with poverty and food insecurity.

Labour migration in India is highly gendered; 85 percent of labour migrants are men, the greatest proportion of whom work in the service sector (42 percent) (7). Among women labour migrants, the greatest proportion (34 percent) migrate for work in agriculture. This pattern demonstrates important gender differences in seasonality, duration and rural versus urban destinations of labour migrants with implications on household structures at home and in destination. For example, rural-to-rural streams of migration can often involve temporary, short-term movement of the whole family, including young children, over short distances.

Theoretically, the pathways from migration to child nutrition can differ substantially among these varying streams. For example, children who remain in the origin may have improved nutrition due to increased food security, improved diet quality and access to health care from remittances sent by migrating male members (8). Conversely, the psychological effects of parental absence, and the reduced time and energy of the remaining caregivers due to additional household responsibilities can have detrimental effects on child nutrition. Children who accompany their parents who migrate for work may benefit from increased income, but unhygienic living conditions in many places of destination may result in poor nutrition outcomes. Children who move are also disconnected from social protections such the Integrated Child Development Services (ICDS), the national community-based child supplementation and early childhood development program, and the Public Distribution System (PDS), the main pillar of India's food security strategy which provides subsidized grains to eligible beneficiaries. Insights into the influences of male and family migration on child nutrition can inform policy to better reach intended beneficiaries at home and in their places of work.

The objective of this study is to compare nutrition status among circular migrant children with non-migrant children – both those in households with male migrant members and households that do not engage in any migration. We further explore differences in the determinants of nutrition status among the three groups including access to health care, water and sanitation, food

security, illness and diet to understand the potential ways migration operates in influencing nutrition status.

## **Methods**

### *Study Context*

There is substantial variability throughout India with respect to poverty, agrarian dynamics, migration outflows, and child nutrition. We conducted our study in the state of Bihar, the third most populous state in India, and the poorest (9). Bihar is also the least urbanized; 87 percent of the population lives in rural areas (10), largely relying on farming for livelihood. Agricultural performance of the state is poor (11); small landholdings, lack of irrigation infrastructure and climate shocks all contribute to very high temporary outmigration from the state.

To study nutrition among children who engage in circular migration with their families, we focused our research in the brick industry. Brick kilns rely on migrant labor for manual brick production, which is seasonal and occurs in the dry months, approximately October to June. Due to the practice of recruiting male-female pairs, whole families including young children migrate and live on-site in rudimentary housing for the duration of the season.

### *Data*

We combined two sources of data from studies implemented by CARE India and Emory University. The first was a stratified cluster survey of children who accompany their families during circular migration; the study was conducted in June 2018 across a total of 519 randomly selected brick kilns in 37 of 38 districts in Bihar. Eligibility criteria included: 1) self-identification as a circular migrant household, defined as living away from their home block (sub-district) for employment purposes for a total of at least 60 days in the previous year, with at least one return home during that year; and 2) presence of at least one child under three years of age at the kiln. For this analysis, we used the subset of children whose state of origin was Bihar, i.e. were intrastate migrants. We combined these data with the June 2018 cross-section from a parallel longitudinal cohort study that aimed to estimate the incidence of severe acute malnutrition by collecting monthly anthropometric measures; the study was implemented in 30 purposively selected villages across ten districts of the state. We identified and included participating households that did not engage in any migration and households that had a male migrant member.

Both studies measured height and weight of children, and collected data on the determinants of nutrition status (food security, illness, feeding practices, access to health care, and water and sanitation) using identical measures.

### *Analysis*

Circular family migration is selective, in that families who circularly migrate are different from families who do not engage in migration in many important aspects that also impact child nutrition, such as wealth, land ownership, parental education, and caste. To create groups of comparable children with respect to important confounders, we conducted propensity score weighting to ensure adequate balance. We weighted on the following covariates: wealth quintile, land ownership (dichotomous), paternal education (any/none) child age in months, child gender, and proportion of district population that are Scheduled Caste (SC) or Scheduled Tribe (ST).

Wealth quintile was calculated using principal component analysis methods of household asset ownership data. For district SC and ST proportion, we used data from the Socio Economic and Caste Census 2011 (21), to classify each district in Bihar as high SC and ST (combined proportion of SC and ST greater than 20 percent) or low SC and ST (combined proportion of SC and ST less than or equal to 20 percent).

We used the multiple groups covariate balance propensity scores (CBPS) method (12), which optimizes both covariate balance and prediction of treatment assignment using generalized method of moments for propensity score estimation. CBPS performs well when covariates are binary and categorical (13). Based on the estimand of interest, the average treatment effect on the treated (ATT), weights were generated and applied to observations from non-migrant and male migrant households, so that children from these groups looked similar to circular migrant children on the specified covariates; weights for circular migrant children were 1. Weighting yielded effective sample sizes of 123 non-migrant children and 121 children from male migrant households.

We first conducted descriptive statistics to explore differences in sociodemographic characteristics by family migrant, male migrant and non-migrant households. We then conducted weighted bivariate analyses between migrant group and the secondary outcomes of interest. To obtain weighted odds ratios for the association of migration group with nutrition status, we ran separate logistic regression models with stunting and wasting as outcomes and migration group as the exposure of interest, adjusting for age in months and child gender. Alpha was set at 0.05. All analyses were conducted in R and SAS. The WeightIt (14) and cobalt (15) packages in R were used to generate propensity score weights and balance diagnostics.

## Findings

After calculating and applying propensity score weights, adequate balance among the three migrant groups was achieved on district SC and ST population, wealth quintile, land ownership, paternal education, and child gender and age.

Adjusting for age and gender, children in non-migrant households that are similar to family circular migrant households are almost three times as likely to be stunted but 55 percent less likely to be wasted compared to children who engage in circular migration. Children in households with a male migrant member are over twice as likely to be stunted and 40 percent less likely to be wasted compared to circular migrant children.

### *Age and sex adjusted estimates of the association between migration type and nutrition status*

	Stunting OR (95% CI)	Wasting OR (95% CI)
Migration type		
Non-migrant HH vs family migrant HH	2.79 (1.87-4.16)	0.45 (0.27-0.73)
Male migrant HH vs family migrant HH	2.26 (1.51-3.40)	0.59 (0.37-0.95)
Child age (months)	1.03 (1.01-1.05)	1.01 (0.99-1.02)
Child gender (Female)	0.82 (0.59-1.15)	0.90 (0.60-1.36)

Children who migrate and are living on brick kilns are more likely to have had ARI in the previous month (eleven percent) compared to similar children from male migrant and non-

migrant households (six percent and three percent, respectively); there was no difference in diarrhea prevalence. There were also no significant differences among the three migration groups in terms of feeding practices – current breastfeeding among children under six months of age (100 percent among all groups), timely initiation of complementary feeding among children six to eight months and minimum acceptable diet among children 6 to 23 months. Circular migrant families were less likely to experience any food insecurity in the previous year compared to households that didn't engage in any migration. Access to community-based health and nutrition interventions delivered by front line health workers was lower among children in circular migrant households compared to male migrant and non-migrant households; this included ever receiving any immunization, iron supplementation and deworming medicine. Access to an improved water source was slightly higher among migrant families during migration, whereas open defecation was similar across all groups, over 90 percent.

## **Implications**

Our divergent findings with respect to the association of migration and chronic versus acute undernutrition imply that migration, and especially the context surrounding movement for livelihood, is an important factor in considering how the pathways of child nutrition operate. Specifically, determinants of nutrition such as food security, hygiene environment, and health access are not static and can vary throughout the year depending on whether a child is at home or is migrating.

For instance, we found that food security is higher among migrant households compared to similar non-migrant households. Indeed, our qualitative analysis of the changes in food environments between home and destination, circular migrant respondents overwhelmingly shared that food was more affordable during migration because of regular income for food purchases [unpublished]. Improved affordability of food over the course of several repeated episodes of migration undertaken by circular migrants may be one explanatory factor in the observed differences in stunting among migrant groups. Conversely, migrant children in our study were less likely to have received services from the community-based health system compared to children who were residing in their home villages. Growth monitoring and the detection, treatment and referral of acute malnutrition cases is carried out by Anganwadi workers, the ICDS front-line health workers; migrant children living on brick kilns and construction sites are not generally reached by this system, possibly contributing to prolonged acute malnutrition resulting in a higher prevalence of wasting among migrant children.

Our findings have important implications on policies pertaining to migration and social protection. As many have recommended (32, 33), revising ICDS and PDS guidelines to make state-led food security and nutrition programs accessible to women and children migrants is necessary. Further, it is crucial to recognize that with the diminishing of the pro-poor welfare state over previous decades, household wealth holds increasing importance in predicting child nutrition outcomes (34). Within the context of increasing agricultural instability in the state, migration for livelihood can enable nutrition security for households, and should thus be facilitated by enforcing labor policies that outline fair pay, safety standards and child care. Risks to nutrition brought about by migration should be prevented through programs targeted to migrant families while they are in their destinations. Households located in high outmigration regions that do not engage in migration are also important target groups for livelihood and maternal and child nutrition programs.

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