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Maternal Employment and Child Health in Nepal: The importance of job type and timing across the child's first five years

Sarah Brauner-Otto¹,

McGill University

Sarah Baird, and

George Washington University

Dirgha Ghimire

University of Michigan

Abstract

The increase in female labor force participation (FLFP) in the paid labor market since the mid-1900s is one of the most pronounced family transitions and is increasingly a global phenomenon. While this transition may improve income and bargaining power of the women, it may also increase stress and decrease time with children. Using the Chitwan Valley Family Study (CVFS) in Nepal, we explore the consequences of this transition for children's health by combining newly collected data on child health outcomes, quarterly data on women's employment, and data on households and neighborhoods. Regression models were used to estimate the relationship between FLFP and child health, exploring both the type (wage, salary, or own business) and timing of work across the child's first five years for 860 children born to 793 mothers. After adjusting for a robust set of individual, household, and community factors, FLFP is associated with worse child health. We find evidence that this is largely due to wage labor, the more common but "lower quality" and lower paying type of work women typically engage in. Measures of current work are generally inadequate at capturing this negative relationship. Breastfeeding may be an important piece of this story as mothers that worked during the first six months of a child's life were less likely to exclusively breastfeed during this period. Recognizing the challenges faced by working mothers in LMICs and paying attention to the quality of work will be critical as more women enter the workforce.

Keywords

maternal employment; child health; child nutrition; low and middle income countries; stunting; wasting; undernutrition; Nepal

¹**Corresponding Author:** Sarah R. Brauner-Otto, Department of Sociology, McGill University, Room 712, Leacock Building, 855 Sherbrooke Street West, Montreal, Quebec H3A 2T7, Canada. sarah.brauner-otto@mcgill.ca. Phone: 514-398-5682. Fax: 514-398-3404.

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1. Introduction

Women's employment and financial independence are central to global policy discussions on topics such as gender equality and women's empowerment (Kelkar 2016; UN 2010). Looking at the most recent data available, over 80 percent of countries have female labor force participation (FLFP) rates above 40%, although there is considerable variation across countries and even within geographic regions (Chaudhary and Verick 2014; Kapso, Silberman, and Bourmpoula 2016; Yeung, Desai, and Jones 2018). The nature of the work women are engaging in has also changed over time, with a general shift away agricultural labor, and varies across country (Bárcia de Mattos and Chaudhary 2016). This global phenomenon likely has profound implications for the health and well-being of household members.

There is particular interest in the relationship between FLFP and child health in part because existing theoretical frameworks and empirical evidence yield contrasting hypotheses and results (e.g., Ukwuani and Suchindran 2003). Increased household financial resources resulting from women's employment may enable families to purchase more or better food, use more preventative health services, and obtain treatment for sick children resulting in better nutrition and physical health (e.g., Duflo 2003). On the other hand, women's increased time out of the household when working may have negative effects on children's health outcomes if employed mothers have less time available for food preparation, home health care, or visits to health care providers (e.g., Morrill 2011).

Understanding the direction of this relationship is critical given that poor health in childhood is associated with a wide array of adverse outcomes across the life course (Aguayo and Menon 2016; Black et al. 2008; Martorell et al. 2010; Perkins et al. 2017). This is particularly the case in low- and middle-income countries (LMICs) where the vast majority of the global burden of child malnutrition lies. This study aims to contribute to the limited evidence base on this topic by focusing on the consequences of increased FLFP for children's health in rural Nepal.

We use multiple datasets from the Chitwan Valley Family Study (CVFS) in Nepal including comprehensive measures of children's health (anthropometric measures) measured in 2016, quarterly information on mother's labor force participation including occupational category from 2008 to 2016, and detailed data on factors known to influence FLFP such as maternal education, household structure, and community resources. As FLFP in Nepal is high and the nature of the labor market is changing, this study provides an exceptional opportunity to document variations in this global phenomenon.

Utilizing this unique dataset our analysis builds on the extant literature in a number of important ways. First, we focus on maternal paid employment in a LMIC where the limited existing research provides mixed results. Second, the CVFS allows for a more nuanced analysis of the relationship between FLFP and child health than is typical in the literature in LMICs. Specifically, we are able to explore how the type of work women are engaged in may condition the overall relationship between maternal employment and child health. We also employ a life course perspective to conceptualize a range of indicators of maternal work

over the child's first five years as opposed to the more commonly used measures of current employment status. Third, the CVFS also allows us to investigate some potential pathways through which maternal employment is related to child health, namely earnings and breastfeeding. Finally, we examine this overall relationship accounting for a host of individual, household, and community level factors that likely influence both mother's employment and child health. While this does not allow us to control for unobservables, the richness of the data allows us to control for a wide array of confounders that are often not available to the researcher.

2. Background

Women have and continue to perform unpaid labor in the household and on family farms. This paper focuses on the transformative shift of women working for pay, an activity that is often done in addition to their unpaid, domestic work. We use the phrases female labor force participation (FLFP), maternal/mother's work, and maternal/mother's employment interchangeably to include women's paid work, regardless of whether it occurs in or outside the home.

2.1 Theoretical Framework and Literature Review

We consider multiple competing, theoretically motivated hypotheses regarding the relationship between FLFP and child health outcomes. First, following from a rational choice framework, net of household assets and wealth, increasing FLFP leads to increases in household income (assuming the return to women's labor is greater outside the home than inside), which should lead to an increase in resources devoted to children and better child outcomes. These improved outcomes can come through two possible channels: (i) a direct income effect where purchasing more food and spending more money on medical expenses leads to better nutrition and health (Blumberg 1988; Gummerson and Schneider 2013; Quisumbing and Maluccio 2000; Tucker and Sanjur 1988) and (ii) an empowerment effect where improved bargaining power of mother in the household directs additional resources to children (Levin et al 2001; Singh et al. 2013; Richards et al. 2013). Mother's employment may also be important because participation in the labor force exposes women to new ideas including the importance of education, information on the benefits of health services, and childhood as a period of investment (Nobles and Frankenberg 2009; Sujarwoto and Tampubolon 2013; Thornton and Lin 1994). This theoretical perspective leads us to expect that *children whose mothers engage in paid labor will have better physical health*.

The second theoretical approach holds that mother's employment will be associated with poorer child outcomes (Glick and Sahn 1998; Kruger 2007; Morrill 2011). There are several potential mechanisms at work, again all with empirical support. First, because time is limited, when mothers spend more time in paid labor they may spend less time devoted to their children leading to worse child outcomes (Basu and Basu 1991; Miller and Urdinola 2010; Short et al. 2002; Sivakami 2010). This time shortage manifests itself in several ways. Most directly, we would expect less time to take care of important tasks, such as food preparation or seeking out medical care, and less parental supervision and monitoring (Alderman and Chishti 1991; Datar and Nicosia 2012; Hussain and Smith 1999; Na et al.

2015). When mothers are employed other caregivers, who may not have the necessary skills and knowledge, are often left to feed and care for young children. Research from several LMICs has found that nutritional intake and health status were better for children whose mothers were involved in their feeding (Pierre-Louis et al. 2007; Ukwuani and Suchindran 2003), in part due to increased breastfeeding, an important protective health behavior (Moss and Yeaton 2014; Kabir and Maitrot 2017; Walker et al. 2001). One study in Columbia found that mothers invested less time in important child-health promoting behaviors when the economic return to their work efforts was greater (Miller and Urdinola 2010).

Second, work is often stressful for the worker and that stress may have consequences for other family members (Conger et al. 1990; Gaunt and Benjamin 2007). This stress effect may also have a biological link to child health, particularly when we focus on work in the prenatal period (Aizer et al. 2017). Factors that contribute to stress are key predictors of low birth weight which itself predicts later poor health outcomes (Behrman and Rosenzweig 2006; Molina Lima et al. 2018). In sum, our competing hypothesis is: *children whose mothers engage in paid labor will have worse physical health.*

2.2. Measurement and Methodological Considerations

One potential explanation for the lack of consensus among existing research may be the measures of women's employment used. When measuring women's employment in low-income countries, most studies measure simple status (e.g., currently employed or unemployed) (for notable exceptions see Burroway 2017; Daniel et al. 2009; Reynolds, Fernald, and Behrman 2017). However, there is huge variation in the type of work women are engaging in, and the consequences of this work for their children likely varies by type. For example, hard physical labor clearly places greater demands on pregnant and lactating mothers—perhaps leading to worse child health outcomes—than working in a shop or a health clinic.

Although much of the increase in FLFP across the globe has been in unskilled labor, that is not the entire story. Dramatic increases in female education also mean that women are gaining access to skilled occupations in increasing rates (Heath and Jayachandran 2018). In particular, careers in education and health such as teachers, teaching assistants, and community health workers engage a large portion of women employees. The ability to balance work and domestic tasks such as watching small children or breastfeeding may also vary by job type, and not necessarily in ways that correspond with the skills those jobs require. For example, both community health workers and field workers may be able to bring infants with them while working, whereas this may not be possible working in an office nor a factory. This leads us to expect that *the relationship between mother's employment and child health may depend on the nature of that work.*

The timing of maternal work in relation to child age is another factor typically absent from the existing research. Likely due largely to data limitations, most research on this topic uses measures of current or any labor force participation (e.g. Leslie 1988; Meherali et al. 2001; Tucker and Sanjur 1988; van der Meulen Rodgers 2011). These are problematic for two reasons. First, the health outcomes in question, such as stunting or wasting, typically take some time to develop or may be more vulnerable during certain periods. For example, height

is more likely to be influenced in the first 1000 days, while wasting is more directly a measure of acute malnutrition (Black et al. 2013). Second, employment, particularly physically demanding labor, may be seasonal making measures of current employment problematic. This study expands the existing literature by operationalizing maternal employment at multiple points in the child's first five years.

Mixed findings may also stem from methodological problems related to selection or endogeneity (Leslie 1988; Meherali et al. 2011; van der Meulen Rodgers 2011). A major concern with observational research on FLFP is that it is not randomly assigned—women in some families choose to work while women in others do not and this choice is influenced by a range of interrelated factors at the individual, household, and macro-level. In wealthier households women are less likely to work, particularly in low-wage/low-skill jobs, and children are less likely to be sick (Maddah et al. 2007). Education is also a well-established correlate of both employment and child health, and education itself is likely a result of other macro-level changes that may also have direct effects on employment and child health (Grepin and Bharadwaj 2015; Yabiku and Schlabach 2009). Major society wide changes such as the spread of mass education, the shift to market-based economies from subsistence farming, and the spread of health services are all related to both increases in women's employment and changes in child outcomes. As a result, isolating the relationship between those two components is difficult.

In Nepal, rarely do mothers live alone (and none of those in our data do). This then means that their employment status is likely influenced by the presence and characteristics of other household members. For example, large households may have even greater domestic demands meaning women may be less likely to look outside the household for paid employment. There are also additional potential employees in these households lowering the likelihood of any one woman living in them working outside the home. Because of gendered norms regarding domestic labor, in Nepal this effect is likely to be particularly strong.

For all of these factors reverse causality is also a potential concern as women's employment raises household wealth by definition and previous research has demonstrated that more advantaged households are better able to advocate for better community resources (Caldwell 1986).

In order to at least partly account for these potential issues in an observational study it is imperative to have proper temporal ordering among all of these many factors, mother's employment, and children's health. We take advantage of a unique, multilevel data source from rural Nepal (the CVFS) that will allow us to estimate the strength of the association between mother's employment and child health, accounting for these major community and household-level changes, and family-level experiences. While randomized control trials (RCTs) are one way to causally identify the impact of FLFP on outcomes of interest, they are only feasible under very specific circumstances (Heath and Jayachandran (2018) provide a nice summary of some of the recent literature) and rarely provide information on mechanisms.

In this study we will first examine the overall relationship between mother's current employment and children's health. We will then disaggregate our measure of mother's employment to assess whether this overall relationship is different by job type (low-skill/low-wage agricultural work, salaried job, or having one's own business) and by when that work occurred in the child's first five years (ever, before birth, 1st 1000 days, recent work). Finally, we will explore the roles of mother's earnings and breastfeeding as potential pathways at work.

3. Methodology

3.1 Data

To test our hypotheses we use multiple data sets from the Chitwan Valley Family Study (CVFS) conducted in rural Nepal. The CVFS launched in 1995 by selecting a stratified, systematic sample of 151 "neighborhood" clusters of 5–15 households. All household members aged 15–59 and their spouses were interviewed in 1996. This sample has been continuously refreshed by adding households that moved into sample neighborhood, adding new individuals who moved into the households in sample neighborhoods, and following the sample households and individuals regardless of location. Since 1996 additional individual and household interviews, neighborhood-level data collection, and demographic event registries have been collected. The study has had an overall individual response rate of over 95% throughout the last 20 years of the data collection and mortality is the largest driver of attrition (Axinn, Ghimire, and Williams 2012). More detailed information on the study can be found in Axinn, Barber, and Ghimire (1997) and Barber et al. (1997). CVFS data are available for public use from ICPSR (<https://www.icpsr.umich.edu/icpsrweb/DSDR/studies/4538>).

We use multiple datasets from the CVFS. First, we use data from a 2016 supplement which gathered health data on the 961 children 3–60 months old living in sample households and their mothers (N=871). This dataset includes anthropometric measures for children as well as quarterly data on women's employment from 2008–2016 including information on occupation. Nineteen children were missing anthropometric data and are excluded from these analyses. We also use information from this dataset on mother's and father's education.

Second, we use information on household wealth from a household level survey conducted in 2016. Twenty-two children were excluded from the analysis sample because they lived in households that were not included in this data collection. Finally, we use data from the monthly Demographic Event Registry (DER) and the Neighborhood History Calendars (NHCs) (Axinn et al. 1997). The DER began in 1997 and continued throughout the 2016 data collection period. It gathers monthly information on household composition including the number, gender, age, and living location of all household members. NHCs are a mixed-method data collection tool used in the CVFS to capture detailed, time varying information on the location and types of community services available in each CVFS sample neighborhood.

Following addressing issues related to missing data, the final analysis sample was 860 children aged 3 to 60 months living with 793 mothers. In addition to the missing data on child health and wealth (discussed more below), 60 children have missing data on whether their father was currently living in the household and were excluded from the analysis sample.

3.2 Measures

Child Health—We explore six anthropometric measures of child health. Data was gathered by health clinicians trained on standard WHO protocols. All measurements were completed using UNICEF equipment (e.g., SECA Sensa 804 scales; flexible, transportable stadiometers) and procedures (e.g., measuring children <24 months or 87cm in supine position). Weight was measured to the nearest 0.1 kg with light clothing but without shoes. Middle-upper arm circumference was measured by a flexible tape measure. In all cases, measurements were taken twice and the average was recorded.

Using these anthropometric measurements we calculated gender-age continuous standardized z-scores for height/length-for-age (HAZ), weight-for-height/length (WHZ), and middle-upper arm circumference (MUAC) using median WHO international reference values as the standard (WHO 2012). We winsorize the data and recode the few values greater than 4 or less than -4 to be 4 and -4, respectively (this effects 22 (2.6%) children). Children were classified as being stunted, suffering from wasting, or having a small arm if their standardized z-scores was less than two standard deviations below the WHO mean (Fiorentino et al. 2016; Laillou et al. 2014). Descriptive statistics are presented in Table 1 and discussed more below.

Measures of FLFP—Our information on FLFP is time-varying (coming from women's work history calendars) and captures whether a woman worked for pay at all, in wage labor, in a salaried job, or had her own business in a given quarter from 2008–2016. Work that did not result in any earnings (e.g. labor on the family farm) is not captured by our measures. Most of the wage labor, 87%, in this setting was agriculture work on someone else's farm. Other common wage jobs include domestic work in someone else's house and working in a shop. Salaried jobs were office jobs in private (80%), government (19%), or NGO (5%) offices. Own businesses could have been operated in or outside the home with about half occurring in each setting.

For all types of work we created six measures of when it occurred over the child's first five years: currently (i.e. during the current quarter), ever, before the child's birth, in the child's first 6 months, during the child's first 1000 days, and in the twelve months prior to the survey. Children are coded as missing for a particular value if they are too young to have valid data for the entire period (e.g., less than 6 months old for work in the 1st 6 months).

Pathways—We also investigated two key pathways linking FLFP and child health identified in the theoretical literature: earnings and breastfeeding. For earnings, we created continuous measures of mother's earnings from current employment, employment during the child's first 1000 days, and employment during the previous 12 months (all earnings over the period are summed together for the latter two measures). Earnings are reported in

100 Rupees (about 90 US cents) and the logged value is used in regressions with 0 assigned to those with no earnings in that period. Unfortunately, we do not have a measure of total household income or earnings.

For breastfeeding, we created a measure equal to one if the child was exclusively breastfed for at least 6 months and zero otherwise. Children less than 6 months old were excluded from these analyses.

Controls—We control for a range of characteristics at multiple levels that previous research has found to influence child health and/or women’s employment. For all of these measures we attempt to establish clear temporal ordering whenever possible such that these measures would capture events or experiences that occurred *before* the birth of the child and the mother’s employment. Of principal importance is household wealth. In this rural, subsistence agriculture dominated setting cash savings are extremely rare and wealth is best ascertained through household resources such as home, land, and livestock ownership. We created a wealth index (ranging from 0–3) from three measures for whether the household owns the land their home is on, owns any farmland, and owns any livestock according to the 2016 household survey. We would have preferred a measure of wealth from before our measures of maternal employment and the birth of the children in question. Unfortunately, this was only possible for 65% of children. As a result, we used data from 2016 knowing that this may mean our estimates of the relationship between maternal employment and child health are underestimates (e.g., if maternal employment increases household wealth which then improves child health). In fact, findings are substantively identical regardless of the measures of wealth we used.

Other controls account for community resources (access to health services, employers, schools, markets, and/or bus stops); household composition (e.g., other potential caregivers and workers); household location; caste-ethnicity; maternal and paternal education; parental marriage formation; maternal age; child gender, birth order, and age in months. In models using anthropometric measures we also include terms for age in-months-squared and age-in-months-cubed. Descriptive statistics for all control variables are available in Table 2. Additional details are available in the Online Appendix.

3.4 Analytic strategy

We begin with models of child health using measures of whether the mother was currently working and then examine measures of mother’s work at different points in the child’s first five years. All work measures except for mother’s work during the child’s 1st 6 months (which is constructed exclusively for the breastfeeding analysis) are used in our analysis of child health. Then we investigate potential pathways linking work and child health by adding measures of earnings to our main models and estimating models of the relationship between mother’s employment and breastfeeding. When exploring earnings as a pathway we focus on employment in defined time periods (i.e., current, child’s 1st 1000 days, and last 12 months). We cannot calculate comparable earnings measures for all children to use in models with measures of whether the mother ever worked or worked before the child was born. For models of breastfeeding for at least six months we estimate models with measures

of ever work, work before the child's birth, and work in the child's 1st 6 months. Because of the timing of the measures we are not able to directly test whether earnings or breastfeeding are mechanisms. Rather, the models provide evidence about their potential role as mechanisms.

For both components of our analysis we first present descriptive statistics and then move on to multivariable regression analysis. We first estimate models with a measure of any work and then models with separate measures for wage labor, salaried employment, and owning one's own business. All models include all controls. For continuous dependent variables (standardized anthropometric z-scores) we estimate OLS regressions and for the dichotomous variables logistic regressions. Because children and women are nested within neighborhoods we estimate multilevel models with random neighborhood level effects. There are not enough siblings in the data to estimate three-level (child, mother, neighborhood) models.

4. Results

4.1 Descriptives

Table 1 presents descriptive statistics for the key dependent and independent variables. Children in our sample have below average z-scores for all three continuous health indicators. At 34% stunting was the most common health problem with 10% of children classified as wasted. These rates are similar to, but slightly higher, than those found for Province 3 (where Chitwan is) in the most recent DHS: 29% and 4%, respectively (Ministry of Health 2017). Malnourishment, measured by having a small MUAC, was relatively rare, occurring for only 5% of the sample.

Turning to mother's employment we see that paid employment is quite common: 24% of children had mothers who were currently working and 56% had mothers who ever worked for pay during the previous 5 years. Wage labor is the most common type of work mothers engaged in (25% had mothers who had ever done so). But, neither salaried jobs nor having a business were rare: 20% of children's mothers had ever held a salary position and 15% had their own business. Fewer than 2% of children had mothers who had worked more than one type of job.

Mother's work over the child's first five years follows a similar pattern to what is seen elsewhere (e.g. Drobic, Blossfeld, and Rohwer 1999). Employment rates are lower after having a child and increase as the child ages. This pattern is similar for both wage labor and salaried jobs. Owning a business is more stable over the life course.

Figure 1 shows the percent of women working by type of employment for each quarter from 2008–2016. Not surprisingly, given the dominance of agricultural labor in this largely rural setting, the wage labor is clearly seasonal. With the only about 1% of women engaged in wage labor in the winter season (4th quarter) but over 10% doing such work in the summer (2nd quarter). Salary jobs and owning businesses do not exhibit such seasonal variation, although they are becoming increasingly common. The increase in self-employment is

partially due to age as older mothers were more likely to be self-employed than younger mothers.

4.2 FLFP and child health, currently working

We now present the results of the estimated relationship between mother currently working in any job and children's health (Table 3). The measure of currently working is what is often used in the literature (e.g. Burroway 2017; Kabir and Maitrot 2017; Maddah et al. 2007; Nakahara et al. 2010; Pierre-Louis et al. 2007; Toyama et al. 2001). Panel A shows the results for the standardized z-scores measures of children's health. Considering whether mothers were currently working in any type of job (row I) we only see evidence of a relationship for MUAC (column 4). Children whose mothers were currently working had significantly smaller MUAC than those whose mothers were not currently working. However, when we disaggregate mother's employment by type we also see evidence of this negative relationship with height/length-for-age (HAZ) for wage labor (row II, column 1). This disaggregation is important because, as evidenced by the tests of equality between coefficients, it also allows us to see that working in one's own business, or in a salaried position for MUAC, does not have the same negative relationship with child health as wage labor does. Even when both estimates are negative that for wage labor is much larger (e.g. -0.499 for wage labor vs. -0.050 for own business on HAZ).

In Table 3, Panel B we look at the binary measures of stunted, wasted, and small arm circumference and find results consistent with those in Panel A. Note, for stunted, although the estimated effect of wage labor is not statistically significant, it is different from that for owning a business.

4.3 FLFP and child health, work across the child's first 5 years

In Table 4 we investigate whether the timing of mother's employment matters for its relationship with child health. Overall, it appears that the timing of work does matter and measures of maternal employment should account for this. Looking first at HAZ (Panel A, models 1–4), we see that whether a mother ever worked and if she worked before the child was born were both significantly associated with worse child health. Similarly, for stunting, we see that children whose mothers ever worked are significantly more likely to be stunted (Table 4, Panel B, model 13). Both sets of findings are in contrast to those in Table 3.

With these life course specific measures we also see more evidence of a negative relationship between maternal work and child's weight-for-height/length (WHZ). Children whose mothers worked in the previous 12 months had significantly lower WHZ (Table 4, Panel A, model 8).

We continue to find strong evidence of a negative relationship between mother's employment and malnutrition as measured by MUAC (Table 4, Panel A, Models 9–12 and Panel B, Model 24).

The different findings by child's life course stage and measures of child health may be because problems of reverse causality are driving the findings with current employment. Alternatively, the findings in Table 4 could be reflecting the biological processes involved in

producing stunting—a chronic condition that takes an extended period of exposure to unfold—vs wasting and small MUAC which are more acute problems influenced by recent experiences.

Consistent with what we found when looking at current work, the negative relationship between maternal employment and child health was generally driven by wage labor.

4.4 Pathways

The CVFS provides us with the unique opportunity to shed some light on potential pathways linking maternal employment and worse child health. Table 5 presents descriptive statistics for these measures. We see that earnings from wage labor are by far the lowest and owning a business is the most lucrative. Models including earnings are shown in Tables 6 and 7, which are comparable to Tables 3 and 4. There are two key points to take away from these tables. First, including the measures of earnings made more measures of maternal employment relative to the child's life course statistically significant. Here see evidence that work in the past 12 months is related to smaller HAZ (Table 7, Panel A, Model 2) and increased stunting (Table 7, Panel B, Model 8) and that maternal work is negatively related to WHZ (Table 7, Panel A, Models 3–4).

Second, while earnings were only significant in about half of our models, they were always positively related to child health outcomes: children whose mothers earned more in that period had better health. This does provide some evidence in support of an income effect because earnings was positively related to health, and closes the gap between the impact of different types of work (the p-values on the tests of equality have increased, and are now largely insignificant).

However, when comparing the estimated effects for holding a job and earnings our models provide evidence that it would be extremely difficult for women employed in wage labor to earn enough money to off-set the negative effect of having that job. For example, for HAZ, currently employed women would need to earn 3,714,000 rupees (\$32,797) in that quarter but the maximum earnings reported for current wage employment was 350,000 rupees (\$3,090) and the mean was only 5,000 (~\$44). Similar calculations for salary jobs and own businesses reveal that it is more reasonable to expect women to earn this necessary offset amount from those job types. We caution against over interpreting these findings because we do not have measures of earnings for other household members.

Another potential mechanism we investigate is breastfeeding behavior. Sixty-seven percent of children were exclusively breastfed for 6 months. Table 8 presents the results from models between mother's employment and breastfeeding and reveals that children whose mothers worked in the first 6 months of their lives were less likely to have been exclusively breastfed throughout that period. This is true for women working in wage labor or with salaried jobs.

5. Discussion

The global transition of women into the paid labor market has been dramatic, changing dynamics within households, with profound implications for families (Desai and Jain 1994; Gennetian et al. 2008; Rindfuss et al. 2003; Waldfogel et al. 2002). Global policy agendas focusing on increasing women's empowerment and financial independence and on the potential for women's labor contributions to improve economic growth and GDP make it imperative to understand how women's employment influences their children (Kelkar 2016; UN 2010). A growing body of literature is examining this relationship in LMICs, but most has been limited to global measures of maternal work that may obscure the relationship with child health. The focus of this paper was to examine the association between mother's employment and child health using a unique, rich data source that allows in-depth investigation into this relationship on a number of important dimensions.

Overall, we find that mother's employment is negatively related to child health. Across measures of health outcomes, we consistently find evidence that children whose mothers engaged in paid labor had worse health than those whose mothers did not, supporting hypotheses related to the time constraints working mothers face. We also find some evidence of a positive income effect, but particularly for wage labor, the amount of earnings necessary to offset the negative employment effect is far greater than women can reasonably expect to earn.

Second, we find that it is important to consider the nature of the work mothers are engaged in. Looking only at a global measure of current employment we miss seeing evidence of the strong, negative relationship between mother's wage labor employment and child health. Additionally, measures of any work obscure the strong negative relationship between maternal wage labor and child health. Our models with earnings further demonstrate the importance of considering the specific type of labor as the earnings potential for each job type shapes the possibility for the income effect to outweigh the negative effect of employment itself. In fact, it is entirely possible that the different effects of employment by job type we observe here are due to wages and earnings and not because the different types of work, such as agricultural labor, have additional negative impacts. Although some of our evidence is only suggestive, it is clear that these varied types of work influence child health differently and additional research should explore this area more thoroughly, perhaps by exploring other job characteristics beyond occupation type.

Third, our analyses suggest that the overall negative relationship with child health is robust but also that a global measure of maternal employment may mask important nuances related to the child's life course and to the seasonality of work. For example, we see that children are significantly more likely to have lower HAZ z-scores if their mothers worked before they were born but not if we use measures of current employment. While we do not find strong evidence of sensitive periods in terms of child development this may be because older children have recovered from previous health deficits or because of limitations in sample size. Longitudinal data on both child health and mother's employment are necessary to fully assess these relationships.

More life course inclusive measures of work are also critical because much work in LMICs is seasonal and therefore the measures of current work could be biased in substantively important ways. There may also be important interactions between season and developmental period. For example, child health outcomes may be worse for children born during times when seasonal work is more frequent. Future research examining work histories and trajectories including periods of unemployment and length of employed periods may be particularly useful for understanding how maternal work influences these health outcomes. Of course, resources for data are often limited prohibiting the collection of detailed life course specific measures. Our models looking at work in the past 12 months demonstrates that even this simple measure allows us to observe a relationship between maternal work and child WHZ that would not have been apparent with a measure of current work.

Finally, one major contribution of our work is that we find that breastfeeding may be an important piece of this puzzle. Children with working mothers were less likely to have been exclusively breastfed for at least 6 months. It may be that the negative health consequences are a result of nutritional deficiencies due to inadequate substitutes for breastmilk. Or, because the disruption in breastfeeding is likely accompanied by non-maternal care during work hours, it may be that overall care is low and that is what is responsible for the poor health outcomes (Kabir and Maitrot 2017; Pierre-Louis et al. 2007). Our analyses are not able to directly test breastfeeding as a mechanism, but demonstrating how FLFP is negatively related to it is an important first step.

Our study is not without its limitations. One concern is selection issues, particularly the possibility that mothers in poor families are more likely to be employed and their children have worse health outcomes because of the family wealth not because of the mother's employment. We have attempted to address this concern by including earnings in our models along with a host of controls for household wealth and location as well other factors that may influence mother's propensity to work such as education, the presence of other household members, and community resources. However, it may still be that we are missing key measures. Clearly poverty and earnings are one part of this puzzle. Future research on women's participation in the paid labor market is necessary to further understand this potential bias, as is research with more robust measures of wealth.

Reverse causality is also another concern—mothers may be working because their children have poor health outcomes. This issue is particularly likely in our models of current and ever worked given the temporal ordering. One could also expect this bias to be stronger for wage labor since that may be more flexible and easier to start and stop as needed. We have attempted to address this concern by measuring work that occurred before the health outcomes in question. Additional research using longitudinal data on both mothers' employment and child health could help further isolate any causal effects. Finally, the analyses here do not include information on work intensity, something other research has found to be important for influencing work-family conflict and stress (e.g., Reynolds et al. 2017).

Despite these weaknesses, this paper improves our understanding of child health and the consequences of maternal employment in LMICs. We demonstrate that mother's employment in wage labor is related to worse child health across a range of measures and that more prestigious and financially rewarding work may have a positive or neutral relationship, particularly once you account for earnings. Of course, regardless of negative effects on children's health, FLFP may have positive effects on the women themselves, other household members, and/or communities more broadly. For instance, women may feel happier or have a greater sense of personal accomplishment if they are working, or there may be a positive relationship with children's education or the health of other family members. It is therefore imperative that we identify structural factors that lead to the observed negative effects. Sub-standard childcare is one potential factor because even though there is increasing pressure and availability for mothers to work in LMICs there has not been a similar increase in childcare options. Without this, it is possible that young children will be left in the care of older children or other less qualified caregivers, which may be leading to poorer health outcomes (Lamontagne et al. 1998; Nakahara et al. 2010). Improving child health and nutrition continues to be a high priority across the globe as demonstrated in part by the UN Sustainable Development Goals (2015). The challenge is to improve the health of children within this context of increased female labor force participation, perhaps by improving childcare options or by creating more rewarding work opportunities for women.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1. Mother's employment: percent of mothers with children aged 0–5 employed in each quarter, by type of employment. 2008–2016. Chitwan Valley Family Study, Chitwan, Nepal.

Table 1.

Descriptive statistics. Key child health and maternal work variables.

	MEAN	STD	MIN	MAX
Child health				
Standardized z-scores				
Length/height for age (HAZ)	-1.31	1.46	-4	4
Weight for length/height (WHZ)	-0.37	1.23	-4	2.89
Middle-Upper Arm Circumference (MUAC)	-0.45	0.95	-4	2.87
Dichotomous health indicators (at least 2SD below age-sex WHO mean)				
Stunted	0.34		0	1
Wasted	0.10		0	1
Small arm	0.05		0	1
Maternal employment				
Any job				
Current	0.24		0	1
Ever	0.56		0	1
Before child was born	0.42		0	1
During child's 1st 6 months	0.17		0	1
During child's 1st 1000 days	0.37		0	1
During last 12 months before interview	0.40		0	1
Wage labor				
Current	0.07		0	1
Ever	0.25		0	1
Before child was born	0.17		0	1
During child's 1st 6 months	0.04		0	1
During child's 1st 1000 days	0.16		0	1
During last 12 months before interview	0.17		0	1
Salaried job				
Current	0.08		0	1
Ever	0.20		0	1
Before child was born	0.15		0	1
During child's 1st 6 months	0.06		0	1
During child's 1st 1000 days	0.12		0	1
During last 12 months before interview	0.11		0	1
Own business				
Current	0.10		0	1
Ever	0.15		0	1
Before child was born	0.09		0	1
During child's 1st 6 months	0.08		0	1
During child's 1st 1000 days	0.10		0	1
During last 12 months before interview	0.12		0	1

Notes: N=860 children except for measures of work during the child's 1st 6 months (N=843), work during the child's first 1000 days (N=547), and work during the last 12 months (N=714).

Table 2.

Descriptive statistics. Control variables included in all models.

	MEAN	STD	MIN	MAX
Neighborhood-level factor				
Number of community organizations within a 5 min walk in 2007 (school, health service, employer, market, bus stop)	2.6	1.6	0	5
Household-level factors				
Number of women in hh	2.1	1.1	0	9
Number of men in hh	1.4	1.0	0	6
Living with husband	0.6		0	1
Wealth index (sum of owns land home is on, owns any farm land, owns any livestock)	2.5	0.9	0	3
Distance to Naryanghat (km, as the crow flies)	8.5	4.0	0.02	18
Ethnicity (reference group: Brahmin-Chhetri)				
Brahmin-Chhetri	0.4		0	1
Mother-level factors (as of 2016)				
Mother's age	25.8	4.7	15	43
Mother's education (has SLC)	0.4		0	1
Father/husband's education (has SLC)	0.5		0	1
Degree of spouse choice (5=self, 1=parents)	2.9	1.8	1	5
Child is female	0.4		0	1
Birth order	1.6	1.0	1	8
Child age (months)	32.1	16.7	3	60

Notes: N=860 children.

Table 3.

Models of the relationship between mother currently working and child health, by type of employment.

Panel A. Continuous, standardized z-scores measures.				
		Length/height for age (HAZ)	Weight for length/height (WHZ)	Middle-Upper Arm Circumference (MUAC)
		1	2	3
I	Any work	−0.198 (0.10)	−0.034 (0.10)	−0.248 ** (0.08)
	N	860	860	860
	Wage labor	−0.499 ** (0.18)	−0.277 (0.17)	−0.571 *** (0.13)
II	Salary job	−0.150 (0.16)	−0.003 (0.15)	−0.135 (0.12)
	Own business	−0.050 (0.14)	0.072 (0.14)	−0.146 (0.11)
	Tests of equality (p values)			
	Wage = Salary	0.151	0.232	0.015
	Wage = Business	0.040	0.091	0.009
	Salary= Business	0.623	0.694	0.941
	N	860	860	860
Panel B. Dichotomous measures (at least 2SD below age-sex WHO mean)				
		Stunted	Wasting	Small arm
		4	5	6
III	Any work	0.232 (0.19)	−0.104 (0.33)	1.019 ** (0.36)
	N	860	860	860
	Wage labor	0.632 (0.33)	0.604 (0.51)	2.270 *** (0.49)
IV	Salary job	0.361 (0.30)	−1.076 (0.77)	−0.365 (0.77)
	Own business	−0.083 (0.28)	0.021 (0.46)	1.076 * (0.51)
	Tests of equality (p values)			
	Wage = Salary	0.544	0.079	0.004
	Wage = Business	0.083	0.376	0.058

Salary= Business	0.241	0.209	0.095
N	860	860	860

Notes: Table 3 shows effect estimates with standard errors in parentheses. Panel A shows results from multilevel mixed-effects linear models with random neighborhood effects. Panel B shows results from multilevel mixed-effects logistic regression models with random neighborhood effects. All models also contain a constant and all controls shown in Table 2.

*
p < .05

**
p < .01

p < .001 two tailed tests

Table 4.

Models of the relationship between mother’s employment and child health, by type of employment. Employment measured over the child’s first five years.

Panel A. Continuous, standardized z-scores measures												
Length/height for age (HAZ)			Weight for length/height (WHZ)					Middle-Upper Arm Circumference (MUAC)				
	Ever	Before Child Born	1st 1000 Days	Last 12 Months	Ever	Before Child Born	1st 1000 Days	Last 12 Months	Ever	Before Child Born	1st 1000 Days	Last 12 Months
I	1	2	3	4	5	6	7	8	9	10	11	12
Any work	-0.224 ** (0.09)	-0.182 * (0.09)	0.006 (0.10)	-0.144 (0.09)	-0.115 (0.08)	-0.051 (0.08)	-0.119 (0.10)	-0.188 * (0.09)	-0.236 *** (0.06)	-0.157 * (0.06)	-0.154 * (0.08)	-0.239 *** (0.07)
	860	860	547	714	860	860	547	714	860	860	547	714
Wage labor	-0.279 * (0.11)	-0.232 (0.12)	-0.031 (0.14)	-0.267 * (0.13)	-0.289 ** (0.10)	-0.189 (0.11)	-0.255 (0.14)	-0.307 * (0.12)	-0.356 *** (0.08)	-0.243 ** (0.09)	-0.284 * (0.11)	-0.391 *** (0.10)
	-0.128 (0.11)	-0.176 (0.13)	-0.111 (0.16)	-0.166 (0.15)	0.061 (0.11)	0.116 (0.12)	-0.031 (0.15)	-0.069 (0.14)	-0.054 (0.08)	-0.009 (0.10)	-0.079 (0.12)	-0.126 (0.11)
	-0.054 (0.12)	-0.094 (0.15)	0.109 (0.16)	0.129 (0.14)	-0.033 (0.11)	-0.074 (0.14)	0.039 (0.15)	-0.127 (0.13)	-0.111 (0.09)	-0.182 (0.11)	-0.015 (0.12)	-0.125 (0.11)
II	Tests of equality (p values)											
Wage = Salary	0.327	0.747	0.701	0.604	0.016	0.061	0.270	0.188	0.008	0.069	0.208	0.070
	0.151	0.461	0.490	0.027	0.083	0.512	0.141	0.283	0.035	0.661	0.093	0.050
	0.637	0.653	0.288	0.114	0.522	0.271	0.732	0.742	0.624	0.202	0.698	0.991
N	860	860	547	714	860	860	547	714	860	860	547	714
Panel B. Dichotomous measures (at least 2SD below age-sex WHO mean)												
Stunted			Wasting					Small arm				
	Ever	Before Child Born	1st 1000 Days	Last 12 Months	Ever	Before Child Born	1st 1000 Days	Last 12 Months	Ever	Before Child Born	1st 1000 Days	Last 12 Months
Any work	0.375 * (0.17)	0.315 (0.17)	0.086 (0.20)	0.290 (0.18)	0.261 (0.26)	0.218 (0.26)	-0.418 (0.44)	0.139 (0.31)	0.706 (0.37)	0.080 (0.35)	0.519 (0.41)	0.946 * (0.39)
	860	860	547	714	860	860	547	714	860	860	547	714
III												

Wage labor	0.443 *	0.477 *	0.354	0.585 *	0.265	0.255	0.033	0.238	1.283 **	0.332	1.117 *	1.462 **
	(0.21)	(0.24)	(0.29)	(0.25)	(0.32)	(0.34)	(0.52)	(0.39)	(0.44)	(0.45)	(0.56)	(0.49)
Salary job	0.174	0.236	-0.071	0.285	0.316	0.323	-1.169	-0.927	-0.271	-0.859	-0.075	-0.083
	(0.22)	(0.26)	(0.31)	(0.27)	(0.36)	(0.39)	(1.06)	(0.77)	(0.50)	(0.65)	(0.68)	(0.66)
Own business	-0.011	0.291	-0.046	-0.232	0.155	0.158	-1.165	0.362	0.684	0.599	-0.099	1.190 *
	(0.24)	(0.30)	(0.31)	(0.27)	(0.38)	(0.47)	(1.06)	(0.47)	(0.47)	(0.54)	(0.80)	(0.54)
IV												
Tests of equality (p values)												
Wage = Salary	0.370	0.486	0.306	0.406	0.914	0.892	0.312	0.176	0.014	0.126	0.165	0.051
Wage = Business	0.138	0.615	0.332	0.017	0.815	0.859	0.311	0.828	0.308	0.685	0.194	0.666
Salary= Business	0.543	0.879	0.952	0.144	0.741	0.765	0.998	0.132	0.134	0.063	0.981	0.101
N	860	860	547	714	860	860	547	714	860	860	547	714

Notes: Table 4 shows effect estimates with standard errors in parentheses. Panel A shows results from multilevel mixed-effects linear models with random neighborhood effects. Panel B shows results from multilevel mixed-effects logistic regression models with random neighborhood effects. All models also contain a constant and all controls shown in Table 2.

* p< .05
** p< .01
*** p < .001 two tailed tests.

Table 5.

Descriptive statistics. Measures of pathways linking maternal employment and child health.

	N	MEAN	STD	MIN	MAX
Quarterly earnings (in 100 Rupees), of those who worked					
Any job					
Current	207	295	883	0	8000
During child's 1st 1000 days	201	3002	7088	0	67000
During past 12 months before interview	309	1496	3541	0	31016
Wage labor					
Current	56	50	70	4	350
During child's 1st 1000 days	85	264	726	2	4620
During past 12 months before interview	132	113	257	2	1700
Salaried job					
Current	65	188	227	0	1000
During child's 1st 1000 days	63	2604	3054	17	15000
During past 12 months before interview	85	1649	2799	24	16000
Own business					
Current	86	654	1080	0	6000
During child's 1st 1000 days	57	7312	11763	0	67000
During past 12 months before interview	100	3068	5233	0	31016
Exclusively breastfed for 6 months	860	0.67		0	1

Table 6.

Models of the relationship between mother currently working and child health, by type of employment, including earnings.

Panel A. Continuous, standardized z-scores measures			
	Length/height for age (HAZ)	Weight for length/height (WHZ)	Middle-Upper Arm Circumference (MUAC)
	1	2	3
I			
	Any work	−0.761 **	−0.383
		(0.251)	(0.186)
	All earnings	0.131 *	0.118 **
		(0.054)	(0.040)
N	860	860	860
II	Wage labor	−0.748 **	−0.437 *
		(0.23)	(0.17)
	Salary job	−0.540	−0.489 *
		(0.28)	(0.21)
	Own business	−0.477	−0.532 *
		(0.29)	(0.21)
	All earnings	0.091	0.082 *
		(0.05)	(0.04)
	Tests of equality (p values)		
	Wage = Salary	0.417	0.107
	Wage = Business	0.262	0.143
	Salary = Business	0.756	0.775
N	860	860	860
Panel B. Dichotomous measures (at least 2SD below age-sex WHO mean)			
	Stunted	Wasting	Small arm
	4	5	6
III			
	Any work	0.981 *	2.265 **
		(0.472)	(0.713)
	All earnings	−0.174	−0.329
		(0.101)	(0.173)
N	860	860	860
IV	Wage labor	1.064 *	3.017 ***
		(0.44)	(0.66)
	Salary job	1.016	0.643

	(0.53)	(0.98)	(0.94)
Own business	0.628	0.894	2.317 **
	(0.55)	(0.82)	(0.81)
All earnings	-0.151	-0.208	-0.293
	(0.10)	(0.17)	(0.17)
<hr/>			
Tests of equality (p values)			
Wage = Salary	0.919	0.144	0.015
Wage = Business	0.333	0.722	0.301
Salary= Business	0.307	0.180	0.064
<hr/>			
N	860	860	860
<hr/>			

Notes: Table 6 shows effect estimates with standard errors in parentheses. Panel A shows results from multilevel mixed-effects linear models with random neighborhood effects. Panel B shows results from multilevel mixed-effects logistic regression models with random neighborhood effects. All models also contain a constant and all controls shown in Table 2.

*
p < .05

**
p < .01

p < .001 two tailed tests.

Table 7.

Models of the relationship between mother's employment and child health by type of employment, including earnings. Employment measured across the child's first five years.

Panel A. Continuous, standardized z-scores measures							
	Length/height for age (HAZ)		Weight for length/height (WHZ)		Middle-Upper Arm Circumference (MUAC)		
	1st 1000 Days	Last 12 Months	1st 1000 Days	Last 12 Months	1st 1000 Days	Last 12 Months	
	1	2	3	4	5	6	
I	Any work	−0.073 (0.236)	−0.585 ** (0.214)	−0.524 * (0.231)	−0.459 * (0.201)	−0.527 ** (0.185)	−0.586 *** (0.162)
	All earnings	0.013 (0.035)	0.080 * (0.035)	0.066 (0.035)	0.049 (0.033)	0.061 * (0.028)	0.063 * (0.026)
	N	547	714	547	714	547	714
	Wage labor	−0.152 (0.22)	−0.35 (0.19)	−0.373 (0.21)	−0.402 * (0.18)	−0.427 * (0.17)	−0.500 *** (0.15)
II	Salary job	−0.309 (0.31)	−0.321 (0.30)	−0.225 (0.30)	−0.245 (0.29)	−0.315 (0.24)	−0.327 (0.23)
	Own business	−0.111 (0.34)	−0.045 (0.33)	−0.179 (0.33)	−0.325 (0.31)	−0.278 (0.26)	−0.351 (0.25)
	All earnings	0.030 (0.04)	0.026 (0.04)	0.030 (0.04)	0.029 (0.04)	0.036 (0.03)	0.033 (0.03)
	Tests of equality (p values)						
	Wage = Salary	0.50	0.89	0.52	0.46	0.54	0.32
	Wage = Business	0.86	0.20	0.41	0.73	0.43	0.41
	Salary= Business	0.34	0.15	0.82	0.65	0.83	0.87
	N	547	714	547	714	547	714
	Panel B. Dichotomous measures (at least 2SD below age-sex WHO mean)						
	Stunted		Wasting		Small arm		
	1st 1000 Days	Last 12 Months	1st 1000 Days	Last 12 Months	1st 1000 Days	Last 12 Months	
	7	8	9	10	11	12	
III	Any work	0.485 (0.477)	1.113 ** (0.408)	1.102 (0.964)	0.505 (0.639)	−0.073 (0.236)	1.576 * (0.748)
	All earnings	−0.065 (0.071)	−0.147 * (0.066)	−0.296 (0.183)	−0.076 (0.118)	0.013 (0.035)	−0.122 (0.127)
	N	547	714	547	714	547	714

IV	Wage labor	0.530	0.696	0.707	0.307	0.707	1.728 *
		(0.44)	(0.37)	(0.99)	(0.64)	(0.99)	(0.68)
	Salary job	0.215	0.486	-0.072	-0.803	-0.072	0.388
		(0.62)	(0.56)	(1.71)	(1.20)	(1.71)	(1.06)
	Own business	0.277	-0.003	0.096	0.511	0.096	1.759
		(0.68)	(0.62)	(1.88)	(1.20)	(1.88)	(1.15)
	All earnings	-0.044	-0.033	-0.180	-0.022	-0.180	-0.087
		(0.08)	(0.08)	(0.23)	(0.16)	(0.23)	(0.16)
	Tests of equality (p values)						
	Wage = Salary	0.497	0.619	0.550	0.244	0.487	0.123
N	Wage = Business	0.610	0.119	0.660	0.804	0.677	0.970
	Salary= Business	0.881	0.175	0.912	0.134	0.845	0.090
N		547	714	547	714	547	714

Notes: Table 7 shows effect estimates with standard errors in parentheses. Panel A shows results from multilevel mixed-effects linear models with random neighborhood effects. Panel B shows results from multilevel mixed-effects logistic regression models with random neighborhood effects. All models also contain a constant and all controls shown in Table 2.

*
p < .05

**
p < .01

p < .001 two tailed tests.

Table 8.

Potential mechanism: Models of relationship between mother's employment and breastfeeding (exclusively breastfed for at least 6 months), by type of employment.

Mother worked:		Ever	Before Child Born	1st 6 months of child's life
I	Any work	−0.057 (0.17)	−0.214 (0.17)	−0.723 *** (0.22)
	N	843	843	843
	Wage labor	0.001 (0.22)	−0.102 (0.24)	−1.335 ** (0.43)
II	Salary job	−0.501 * (0.22)	−0.678 ** (0.25)	−0.927 ** (0.35)
	Own business	−0.160 (0.25)	0.059 (0.32)	−0.271 (0.32)
	Tests of equality (p values)			
	Wage = Salary	0.101	0.091	0.463
	Wage = Business	0.612	0.675	0.042
	Salary = Business	0.266	0.047	0.144
	N	843	843	843

Notes: Table 8 shows effect estimates with standard errors in parentheses from multilevel mixed-effects logistic regression models with random neighborhood effects. All models also contain a constant and all controls shown in Table 2.

*
p < .05

**
p < .01

p < .001 two tailed tests.