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Childbirth and women's labour market transitions in India (revised)

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Abstract: The impact of childbirth on women’s employment has been discussed extensively in the context of developed countries. Constraints on mothers’ labour market participation and consequent fall in earnings are characterised as the ‘motherhood penalty’. This phenomenon is relatively less explored in developing countries primarily because of the lack of suitable data. In this paper, we use primary data from India, collected via a life history calendar administered to men and women separately. Using an event study method, we estimate the impact of the first childbirth on women’s labour market participation. Our main finding is that the birth of the first child does not impose a penalty, in the traditional understanding, on a mother’s labour supply. While overall employment does not show any association with childbirth, women’s paid work registers a significant increase two to three years post childbirth. This impact is largely due to an increase in informal paid work and driven by women with lower levels of education and from relatively poorer households. Our results suggest that in a developing country like India, characterised by informal labour markets, and early age of childbirth, the impact of motherhood on employment may need an alternate framing rather than one based on developed countries.

Key words: motherhood penalty, childbirth, event study, life history calendar, India

JEL classification: J01, J12, J13, J16

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1 Introduction

The low levels of female labour force participation in India have generated quite some attention in recent literature (Afridi et al. 2018; Klasen and Pieters 2015; Sarkar et al. 2019; Sorsa et al. 2015). In the Indian context, in addition to the traditional supply and demand considerations, social norms restricting women's autonomy and mobility also come into play (Anukriti et al. 2020; Jayachandran 2020). Norms offer a perspective on why even a favourable ecosystem of rising education and decreasing fertility have not had a positive impact on women's labour supply.

Social roles that impinge on women's employment are usually related to major life events, such as marriage and motherhood, that are almost universally experienced by Indian women. In this paper, we focus on women's labour market transitions as related to childbirth, specifically the birth of the first child. Motherhood is a watershed event for most Indian women that is not only anticipated, but also exalted. Gendered norms assign a prescriptive definition of mothers' roles and responsibilities that are generally in conflict with their ability to engage with the labour market. This is referred to as the motherhood penalty and has been well researched in developed countries where long-term individual-level panel data are available. However, such studies are relatively few in India mainly due to the lack of longitudinal data.

This paper addresses this gap using unique retrospective data collected in 2020 from two states, Karnataka and Rajasthan, located in southern and northern India, respectively. Using the life history calendar (LHC) method we obtain retrospective information on labour market participation and other important life events from our respondents from when they were 15 years of age. We employ an event study framework (Kleven, Landais, and Sogaard 2019) to estimate the impact of childbirth on women's labour force participation. To the best of our knowledge, this is the first study in the Indian context to use long-term retrospective data to explore women's labour market trajectories and how these may be impacted by childbirth.

Our main findings from the event study suggest that the birth of the first child does not impose a penalty on the mother's labour supply. While overall employment does not show any association with childbirth, women's paid work actually registers a significant increase two to three years post childbirth. This increase is driven primarily by an increase in informal work—casual wage work and self-employment—among less educated women from poorer households.

2 Background literature and life history calendar method

In this section, we discuss the literature on motherhood penalty and provide a context for why the penalty experienced in developed and developing countries might be different. Further, we describe the life history calendar method that we have used in our study.

Kleven, Landais, Posch, et al. (2019) provide compelling evidence for the motherhood penalty across a set of developed countries that are diverse with respect to both, women's labour force participation and family policies supporting working mothers. After the birth of the first child, women's earnings are negatively impacted and do not recover to pre-childbirth levels even after ten years. What is striking is their finding that institutional support such as parental leave and childcare policies do not make a difference in the long term. The authors speculate that sticky gender norms with prescriptive roles for mothers may be responsible for motherhood penalty

across countries as traditional views regarding mothers' responsibilities are correlated with a larger earnings penalty for women.

The evidence from developing countries broadly corroborates these results. Agüero et al. (2020) use the Demographic and Health Survey (DHS) data from 21 developing countries and confirm a motherhood penalty on women's earnings with the effect being larger in middle-income countries relative to low-income countries. The authors suggest the mechanisms operate largely through differences in the labour market. In low-income countries, there is a greater concentration of women in agricultural activities or in the informal sector, which may allow them to combine childcare responsibilities with employment. However, as labour markets become formal without accompanying changes in supporting infrastructure such as childcare facilities, such flexible arrangements may not be an option. The importance of flexible labour market arrangement is also emphasized by Berniell et al. (2021) who estimate the impact of motherhood for Chilean women. Chile has a large informal sector, which allows mothers to continue in the labour market while reducing their hours of work. They find that the women's employment rate declines significantly after motherhood, largely due to a decline in formal employment. Informal employment declines in the year immediately after childbirth, with no significant change in participation in subsequent years. The penalty for women, therefore, is in terms of their participation in formal jobs. After childbirth, there is an increase in informal employment including temporary/non-registered jobs among women and a reduction in earnings.

There are few studies that examine the motherhood penalty in the Indian context.¹ Based on cross sectional data, Das and Zumbyte (2017) examine how the presence of a young child affects the labour supply of urban married women. Consistent with expectations, they find that younger children in the household show a negative association with women's labour supply, but this is offset to a certain extent when there are older women in the household. This is presumably due to sharing of care-giving responsibilities among women. These findings are indirectly reinforced by Khanna and Pandey (2021) using panel data from India Human Development Survey (IHDS) collected in 2004-05 and 2011-12. Their results show that the death of a co-resident mother-in-law negatively impacts women's labour supply, particularly for women with four or more children. Using the same data, Sarkhel and Mukherjee (2020) find a negative association between young children and women's labour market wages and working hours. In addition to a traditional variable that captures the presence of a young child, the authors use the difference between current number of children and desired number of children as a motherhood proxy. The authors argue that the 'extra children' is a closer estimate of motherhood burden as the desired number of children could be endogenous to women's labour market outcomes, i.e. women internalize their ideal family size when making labour supply choices. To the best of our knowledge, ours is the first paper that estimates the impact of the first childbirth on women's labour market participation in the Indian context.² The LHC approach used here provides an alternative to panel data in understanding how life cycle events impact labour market outcomes.

We adopt a life history calendar (LHC) technique to collect retrospective data from our respondents (Freedman et al. 1988). LHC is a method where respondents provide autobiographical information across various domains, and for a specified time as determined by the research question (Morselli et al. 2019). Typically, a chronological time frame is presented graphically to the

¹ There are many studies that find a negative association of the presence of a young child in the household on mother's employment (Klasen and Pieters 2015; Sarkar et al. 2019; Sorsa et al. 2015). But few consider the impact of first childbirth on women's labour market outcomes.

² There have been some correspondence studies to understand discrimination against mothers in the formal sector (Bedi et al. 2018), but no studies documenting the actual impact of motherhood on the labour force participation.

respondent or information is collected around specific personal events such as childbirth, death, and marriage or around major public events (Glasner and Van Der Vaart 2009). A key advantage of the LHC is the visual and temporal cues that aid recall of events more accurately than conventional surveys aiming to collect retrospective data (Freedman et al. 1988). Inconsistencies in information can be easily detected and corrected immediately (Glasner and Van Der Vaart 2009).

The LHC approach has been applied extensively in social science research including community stress (Ensel et al. 1996), intimate partner violence (Yoshihama et al. 2005), vulnerability (Morselli et al. 2016), employment transitions (Manzoni 2012), and occupational mobility (Solga 2001). Many studies have compared the LHC approach with the traditional survey approach and found that data quality is often superior in the former method (see Morselli et al. 2016 for a brief overview). The LHC aids recall of specific events and the interactive nature of the calendar that makes it easy to spot discrepancies in responses. Manzoni (2012) compares determinants of labour market transitions in Germany using two different survey designs: retrospective data (German Life History Study) and panel survey data (German Socio-Economic Panel). At a broad level, there are few differences across these survey approaches. The author notes that retrospective data underestimate the level of employment transitions but shows similar results to panel data in terms of determinants of labour market events.

3 Data and descriptive results

The LHC data used in this paper are part of a larger study, the Indian Working Survey (IWS 2020–21) conducted in two states in India, Karnataka and Rajasthan, that aims to understand if and how social identity interacts with the labour market.³ IWS collected detailed survey data on various aspects of labour market engagement including individual work status, role of social networks, and experience of discrimination in the labour market. There was also emphasis on accurate measurement of women’s productive activities and factors that constrain or enable their labour market interaction.

The two states, Karnataka and Rajasthan, are located in Southern and Western India, respectively, and thus provide a measure of regional diversity. The state choices were determined by the presence of adequate representation of marginalized populations (religion and caste in this case), intra-state variation in women’s labour force participation rates, and economic structure spanning formal and informal labour markets. A stratified multistage sampling design was followed to arrive at a state-representative sample. Approximately, 4,000 households were to be surveyed in each state, but the field work was discontinued in March 2020 due to COVID-19. Within each household, we interviewed two randomly selected adults, a man and a woman between the ages of 15 and 65, depending on household structure and availability of members. The final sample comprises of 3,646 households and 5,951 individuals (3,371 women and 2,580 men) across the two states.

The LHC was one module of the IWS and collected long-term, retrospective data on men’s and women’s life histories from the time they were 15 years of age. Thus, the time span of information obtained is determined by the current age of the respondent. It was administered only to respondents below 47 years of age, thus giving us information for a maximum of 32 years (from

³ The India Working Survey (IWS) is a collaborative project between researchers at Azim Premji University, the Indian Institute of Management Bangalore (IIMB), and the University of Western Australia.

the age of 15 to 46 years) of an individual’s life. Information was collected on labour force activity and other events that could potentially impact labour outcomes—such as migration, marriage, childbirth, household structure, spouse’s occupation and income, and health shocks. This is a yearly calendar, that is the year in which the event occurred is noted.

The life history calendar was administered to 3,078 individuals in 2,065 households.⁴ Of these, 1,766 were women (1,010 from Karnataka and 756 from Rajasthan) and 1,312 were men (608 in Karnataka and 614 in Rajasthan). The sample is predominantly rural, with more than 80 per cent of respondents in both states from rural areas.

Standard cross-sectional data provide insight into an individual’s status at a point in time (for example, marital status, employment), or at best, a cumulative understanding of a particular event or aspect of an individual’s adult life (for example, years of education, number of children). In contrast, the LHC is able to provide a life-cycle perspective on various events around an individual’s adult life including their first occurrence, the relative position of that occurrence vis-a-vis current time, as well as the duration and re-occurrences (where applicable) of that event. In this section, we present initial findings on the occurrence (and re-occurrence, where applicable) of a couple of key events that could potentially impact women’s labour market outcomes, namely marriage, childbirth, and locational shifts.

We categorize our respondents into age cohorts based on their age at the time of the interview, (Table 1). The average age of our respondents was 32 years with a marginally larger share of men belonging to the older age categories compared to women (greater than 35 years of age). Around 59 percent of female respondents were below the age of 34, compared to 55 per cent of men.

Table 1: Distribution of respondents across age groups

Age group	Male	Female
18–20	10.5	9.2
21–24	13.3	11.8
25–29	15.3	17.8
30–34	16.0	20.9
35–39	21.9	19.5
40–44	17.1	14.6
45–47	5.9	6.3
Total	100	100

Source: authors’ calculations based on India Working Survey (IWS) data.

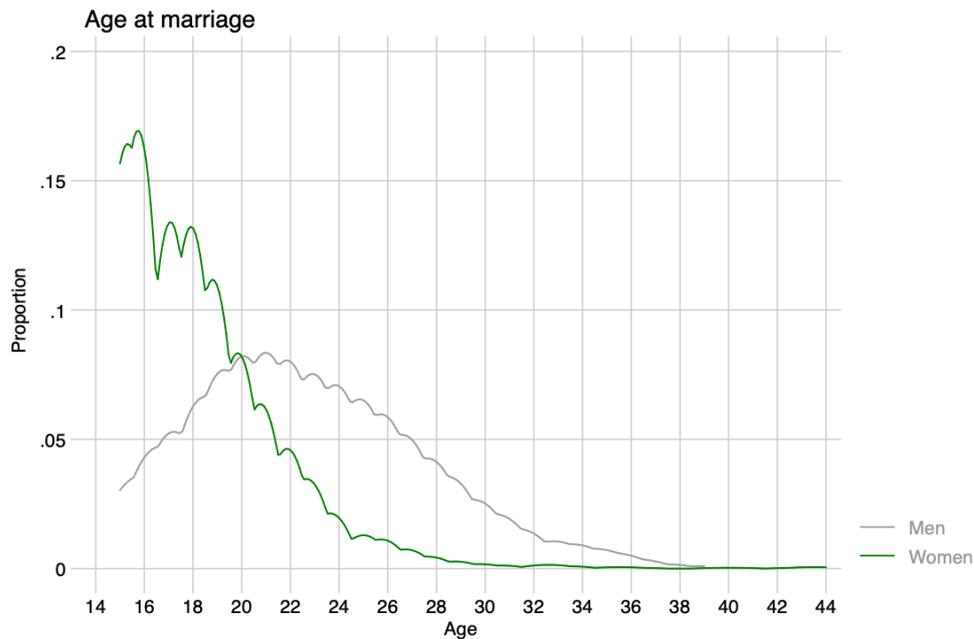
About 38 per cent of our female respondents and 15 per cent of male respondents were not literate. About 50 per cent and 60 per cent of women and men, respectively, had up to secondary education. The corresponding figures for education beyond the secondary level was 12 per cent and 9 per cent for men and women, respectively.

⁴ Any individual between the age of 15 and 65 years could be selected as a respondent in IWS. Within this group, only those who were below 47 years of age were administered the LHC. Consequently, the LHC sample is a sub-sample of the IWS respondents.

3.1 Marriage

Marriage was a near universal event, particularly for women in our sample. About 74 per cent of men and 92 per cent of women in our sample were married.⁵ The average age of marriage for men was 23 years compared to 18 years for women. By the age of 19, about 72 per cent of women were married, compared to only 25 per cent of men (Figure 1).

Figure 1: Age at marriage, kernel density estimates



Source: authors' calculations based on IWS data.

It is likely that age at marriage, particularly for women, is in fact lower, as respondents may not reveal the true age of marriage given that the legal age at marriage is 18 years. When we compare across cohorts (for those cohort groups where at least 90 per cent are married), we do not find any significant change in the age of marriage for women over the years (Table 2). However, for men in our sample, we note a steady advancement in the year of marriage.

⁵ If we consider only those who are married currently (and exclude those who were divorced/widowed/separated/abandoned), then the share of men who are married remains unchanged. On the other hand, the share of currently married women falls to 86 per cent.

Table 2: Age at marriage by cohorts

Age group	Share married (%)		Age at marriage (years)	
	Men	Women	Men	Women
18–20	10.9	46.3	17.6	17.5
21–24	32.8	82.2	19.9	18.4
25–29	68.0	96.5	21.0	18.2
30–34	91.0	99.7	22.3	18.0
35–39	97.6	99.4	23.3	18.0
40–44	100.0	99.6	23.7	18.0
45–47	97.4	100.0	24.0	19.3

Source: authors' calculations based on IWS data.

The average age of marriage for men, in Karnataka, was higher than that of men in Rajasthan. In Karnataka, most men married between the ages of 20 and 24, compared to 15 and 20 in Rajasthan. Among women, we do not see substantial state-wise differences with 18 years being the average age of marriage reported by women in both Karnataka and Rajasthan. There were no significant differences in the average age of marriage across social groups. However, we find that the average age of marriage increased with education level, with illiterate women having an average age of marriage of 17 years compared to 20 years for women with education level of higher secondary or above.

3.2 Shifts in residence

In the LHC, we collected the place of residence of the respondent every year from age 15 up to the time of the interview in 2019. The place of residence was identified vis-a-vis the current location. Further, we collected four kinds of location data with relation to current location—same district but different location, same state but different district, different state, and finally, outside India. For men, about 83 per cent stayed in their current location throughout their lifetime. Women, on the other hand, experience more locational shifts. If we restrict the sample to unmarried women, then the share of women having at least one locational shift reduces and is close to that of the men. This suggests that women's migration is mainly linked to marriage. For the overall sample, 37 per cent of women have shifted residence once, and 9 per cent have moved twice (Table 3).

Table 3: Number of shifts in place of residence

Number of shifts in residence since age 15	Men	Women
0	83.2	47.6
1	9.8	37.0
2	5.8	9.0
3	0.8	3.3
4	0.3	2.3
5	0.1	0.7
6	0.0	0.1
7	0.1	0.1
Total	100	100

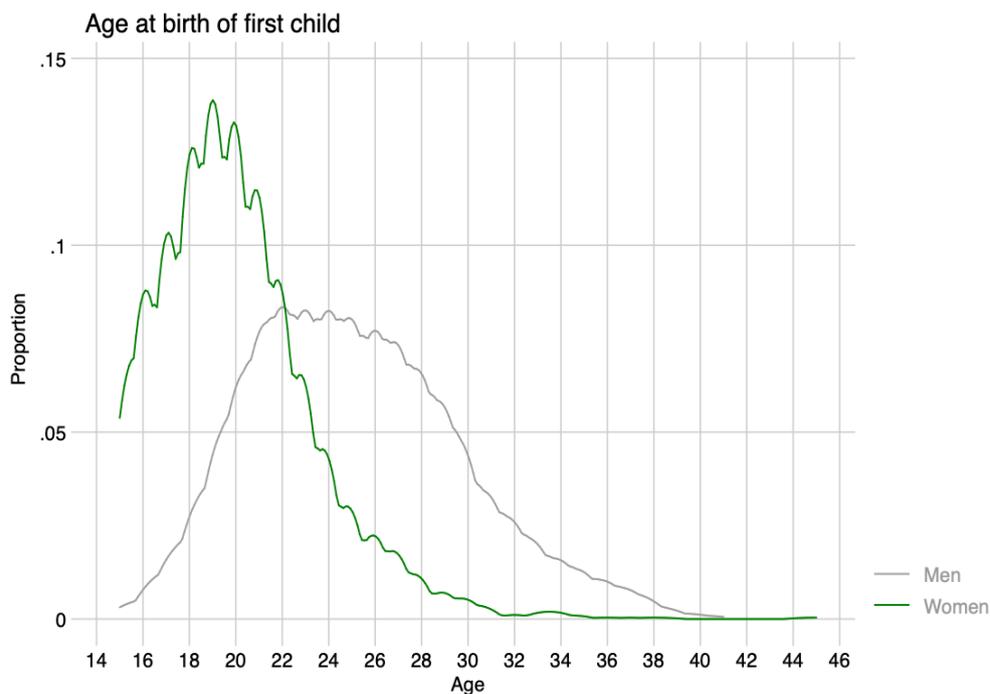
Source: authors' calculations based on IWS data.

For women, the majority of these shifts in residence (72 per cent) are within the same district. For men, although there are fewer who do move residence, an equal share of men (42 per cent) move either intra-state to a different district, or within the same district. Only 16 per cent of men in our sample move across states.

3.3 Childbirth

Most ever-married individuals we interviewed (88 per cent) had at least one child. On average, most men have their first child at the age of 25 years, whereas the average age of first childbirth for women is much earlier, at 19 years. By the age of 22 years, 81 per cent of women have had their first child. This was only 22 per cent for men at the same age (Figure 2).

Figure 2: Age at birth of first child, kernel density estimates



Source: authors' calculations based on IWS data.

Women with higher education had, on an average, children a year later compared to women with education below higher secondary education. We do not find any significant difference in the age of childbirth for men across educational groups, or for men and women across social groups.

Table 4: Average age at time of first birth, by education level

Education level	Average age at childbirth (years)	
	Men	Women
Illiterate	24.9	19.2
Primary and below	24.8	19.7
Middle	24.8	20.3
Secondary	25.9	20.8
Higher secondary	25.6	21.3
Diploma/graduate	25.7	23

Source: authors' calculations based on IWS data.

3.4 Labour market engagement

In the LHC, we categorized an individual's employment status as one of the following: regular salaried, agricultural self-employed (farming/fishing), farm labour, non-agricultural self-employed, non-agricultural casual labour, or unpaid family helper. For any given year, the primary activity of the individual in that year is recorded for every individual from the age of 15 to the age at the time of interview. An individual not in any of the employment categories (i.e student, involved in domestic duties, unemployed) would be categorized into a single category representing those out of the workforce. We use two definitions of workforce—one including all wage and self-employed workers and unpaid family helpers (employment), the other including only wage and self-employed workers (paid employment).

About 11 per cent of men and 39 per cent of women had never entered the workforce. Among men who had never worked, 57 per cent were in education or had just finished education. Only 8 per cent of women who had never worked, in comparison, were in education or just completed their education. In fact, if we restrict the sample to those above the age of 25 years, the share of men who have never been employed falls to 2 per cent, while the share of women remains at around 32 per cent. Therefore, while the non-entry of men into the workforce can be explained to a large extent by their age and educational activities, the same is not true for women. A large share of women remain out of the workforce even after accounting for their age and educational commitments. There are state-wise differences as well. In Karnataka, 6 per cent of men had never been employed, compared to 16 per cent in Rajasthan. We see a similar divergence in women's participation in employment with 32 per cent of women in Karnataka never being employed, compared to 49 per cent in Rajasthan.

If we consider only paid employment, i.e. exclude unpaid family workers, the share who have never entered the workforce increases, especially for women. Now 15 per cent and 55 per cent of the male and female respondents have never participated in paid work. If we restrict the sample to those above the age of 25 (to account for education), the share of men falls substantially to 5 per cent, while the share of women falls only slightly to 49 per cent.

There are significant differences between states with respect to paid work as well. In Karnataka, 9 per cent and 45 per cent of men and women, respectively, had never engaged in paid work, while

the corresponding numbers in Rajasthan were 21 per cent and 69 per cent. Restricting the sample to those who were above the age of 25 years, the share of men and women who had never engaged in paid work in Karnataka falls to 2 per cent and 38 per cent. In Rajasthan, the share falls to 6 per cent and 63 per cent for men and women, respectively.

Typically, and not surprisingly, men entered the labour market earlier compared to women, with the average age of entry for men in Karnataka being 18 years compared to 20 years for women. In Rajasthan, men entered at the age of 20 years while women entered a year later. (Figure 3).

Figure 3: Age at first entry into labour market



Source: authors' calculations based on IWS data.

Table 5 summarizes some of the key findings from the descriptive statistics. Broadly, women marry earlier than men. Parenthood occurs earlier for women compared to men. Men start working earlier, whether in paid or unpaid employment. We also find (not shown in table) that women experience more flux in terms of their place of residence.

Table 5: Average age at the time of major events

	Men	Women
Average age at marriage	22.7	18.1
Average age at childbirth	25.1	19.9
Average age at entry into any employment	17.9	19.7
Average age at entry into paid employment	18.9	20.5
Average age at first exit from employment	26	25

Source: authors' calculations based on IWS data.

4 Event study and methodology

We are interested in understanding the impact of the birth of the first child on labour force participation by women. Therefore, we use an event study approach based on changes around the birth of the first child for mothers. The event study approach lets us observe the entire dynamics of change in labour force participation and controls for most individual-level time invariant factors such as religion, social group, and so on. We also control for several important time-varying factors giving the model a high degree of precision in estimating the impact of first childbirth. Before discussing the event study results, we examine some initial descriptive results around the event of interest—childbirth—and its relation to labour market participation.

Our outcome of interest is binary indicating participation in paid work (1 if they participate, 0 otherwise). Paid work includes casual (agricultural and non-agricultural) employment, salaried work, and self-employment (agricultural and non-agricultural). In later analysis, motivated by the approach of Berniell et al. (2021), we further disaggregate paid work into formal and informal employment. Informal employment is defined as employment in casual wage work or self-employment. Salaried employment constitutes formal employment.

For the sample of all married individuals with at least one child, we look at the distribution of men and women across different employment–childbirth interactions. A large share of married women (35 per cent) has never worked, compared to 2 per cent of men. For men, the majority experience is that of entering work before fatherhood and continuing as a worker for the rest of their life. Only 32 per cent of women have the same experience, i.e. entry into the workforce before birth and remaining employed post childbirth. About 3.2 per cent of women experience a break in employment in the same year or prior to childbirth. For 20 per cent of women, entry into the labour market occurs three years or more after the year of birth of their child (Table 6).

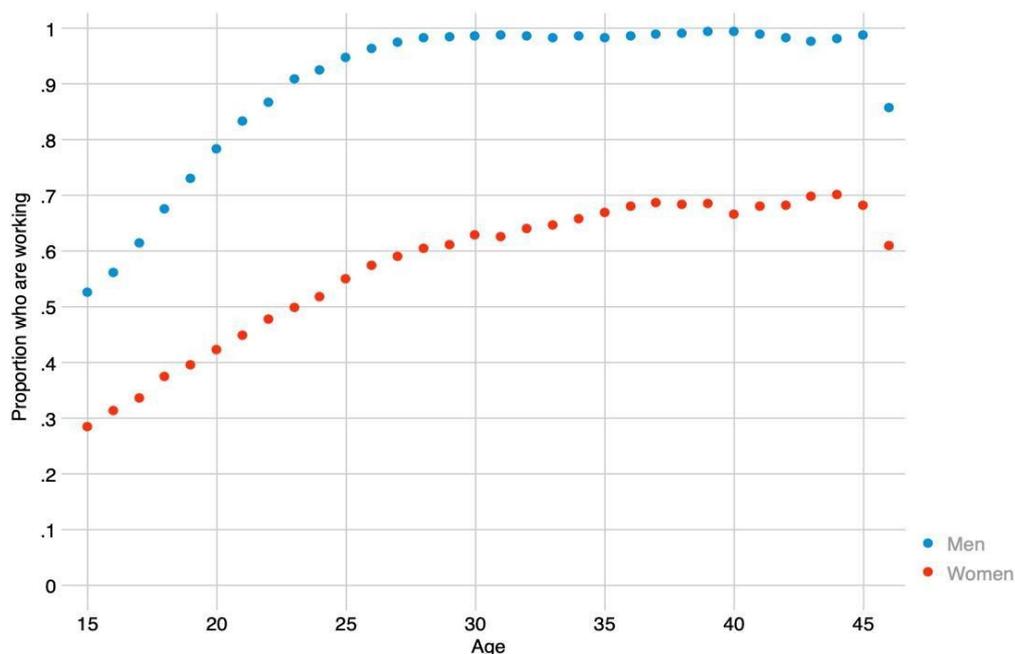
Table 6: Childbirth and labour market participation

	Men	Women
Never worked	2.2%	35.0%
Entered/re-entered before childbirth and did not exit	85.0%	32.0%
Entered before childbirth, exit before or same year as childbirth, no re-entry	1.9%	4.6%
First entry after birth and continuing	8.0%	19.0%
Stopped before birth and re-entered after	0.5%	4.2%
Stopped same year as birth	0.5%	2.0%
Started before and stopped after birth	2.0%	3.2%

Source: authors' calculations based on IWS data.

Therefore, broadly, for both men and women, the year of childbirth per se does not seem to be affecting labour market attachment. Rather for women, we find that in the years subsequent to childbirth, one can expect a marginal increase in women's labour force participation rate (LFPR). For men, there is a steady increase in labour force participation rate even prior to their fatherhood (Figure 4). The increase continues after childbirth, and for both rural and urban men, the levels of labour force participation are relatively high. For instance, men after 15 years from childbirth are all employed, as shown by the 100 per cent LFPR at that point. For women, the levels of labour force participation are comparatively lower, and we do not see the steady and unhindered increase in participation that we see for men.

Figure 4: Labour force participation rate by age, men and women



Source: authors' calculations based on IWS data.

In the rest of this section, we use the event study method to examine the robustness of these results after controlling for various factors.

For the event study analysis, we include data for five years before childbirth to five years after the event. We investigate the dynamics of probability of being employed as a function of event time.

$$Y_{ist}^g = \sum_{j \neq -1} \alpha_j^g * \mathbf{I}[j = t] + \sum_k \beta_k^g * \mathbf{I}[k = age_{is}] + \sum_y \gamma_y^g * \mathbf{I}[y = s] + v_{ist}^g \quad (1)$$

We denote Y_{it} the outcome of interest for a woman i in year s and at event time t . We include a full set of event time dummies, age dummies and calendar year dummies. We omit the event time dummy at $t=-1$, implying the event time dummies measure the impact on women’s probability of being employed relative to the year just before the first childbirth. The age dummies control non-parametrically for underlying life cycle trends in women’s employment. The calendar year dummies control non-parametrically for time trends such as droughts and business cycles. We capture the effect of event time when controlling for age and year because there is variation in the age at which women have their first child. The baseline model that we use is a simple linear probability estimation on the panel data with individual fixed effects with controls for event time, calendar year, and age.

However, we also estimate several other models as a robustness check. In the individual fixed effects model, it is not necessary to control for time invariant aspects such as education, social group, or place of residence. However, the LHC does contain information on time-variant aspects besides employment. This includes information on the household structure (who the individual is residing with—alone, with spouse, with parents, with in-laws, etc.) in every year. We therefore also estimate a fixed effects model with the basic controls (age, year, and event time dummies) *and* controls for household structure in each year.

We also estimate a random effects model, with the basic controls. Since the random effects model allows us to introduce time-invariant controls, we model for these as well. These include education level, caste category, state, place of residence, and number of children. We also include region and state controls in the models. For all random effect models, standard errors are clustered at the individual level.

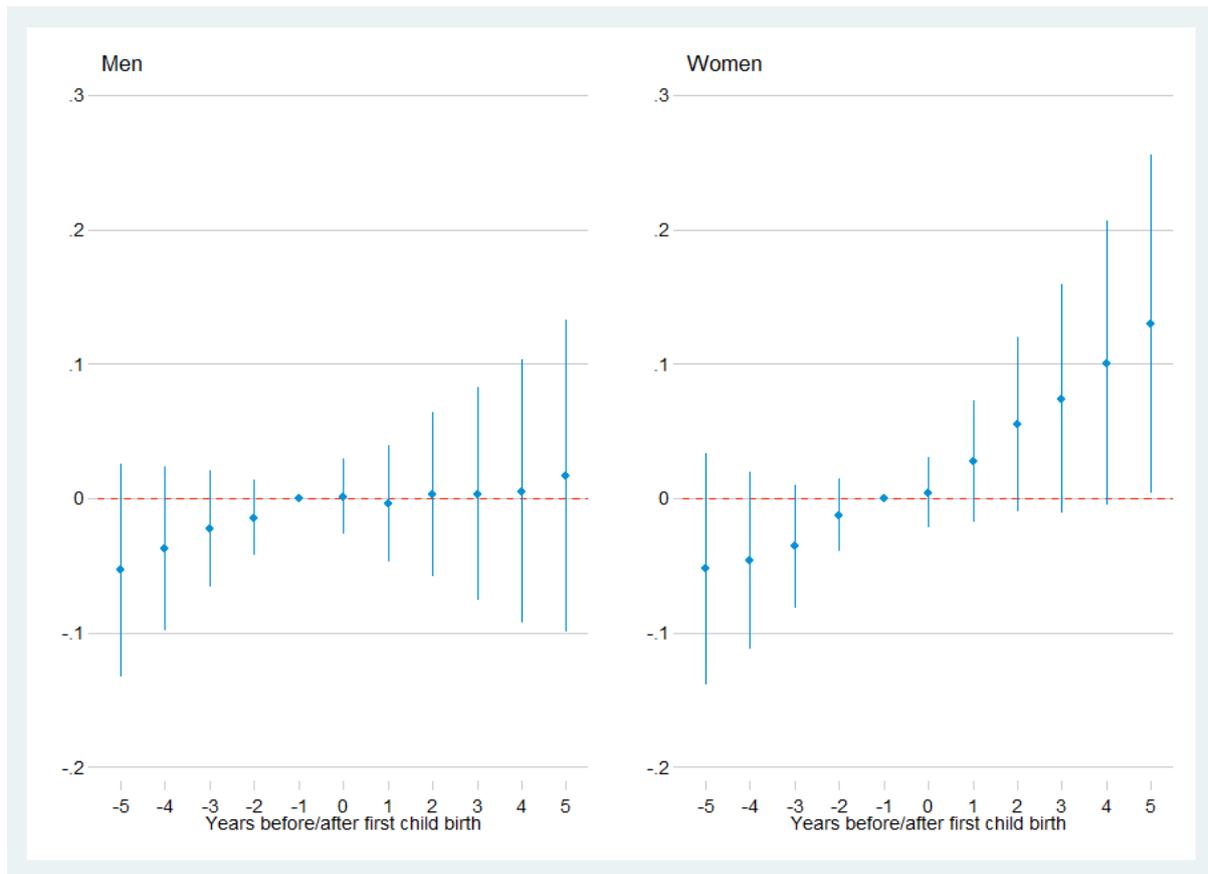
Similar event study models have been used to investigate childbirth penalties in developed countries (Kleven, Landais, Posch, et al. 2019) and in Chile (Berniell et. al. 2021). The outcomes we consider are labour market status of women in any work, paid or unpaid work. Since most of our sample is rural (80 per cent), all results in the sample pertain to the rural population only.

4.1 Impact of first childbirth

We first estimate the probability of participation of all rural men and women in paid work using the event study framework described in Equation 1. Figure 5 plots the impact of first childbirth on labour market participation for all rural women and men separately. The impacts are relative to the year before childbirth, controlling for age and calendar year and a range of other individual and household characteristics. The figure includes 95 per cent confidence interval bands around the event year coefficients.

For men, there are no significant changes in the probability of labour market participation after childbirth, suggesting that men’s participation in paid work is largely unaffected by this event. For women, on the other hand, we see that probability of paid labour force participation gradually increases after childbirth. Although these effects are positive, they are not significant till four years after childbirth. In the fifth year, the coefficient is significant, indicating that five years after childbirth, women’s labour force participation rate is likely to increase by about 10 per cent compared to participation in the year immediately prior to childbirth.

Figure 5: Change in probability of employment after childbirth, men and women

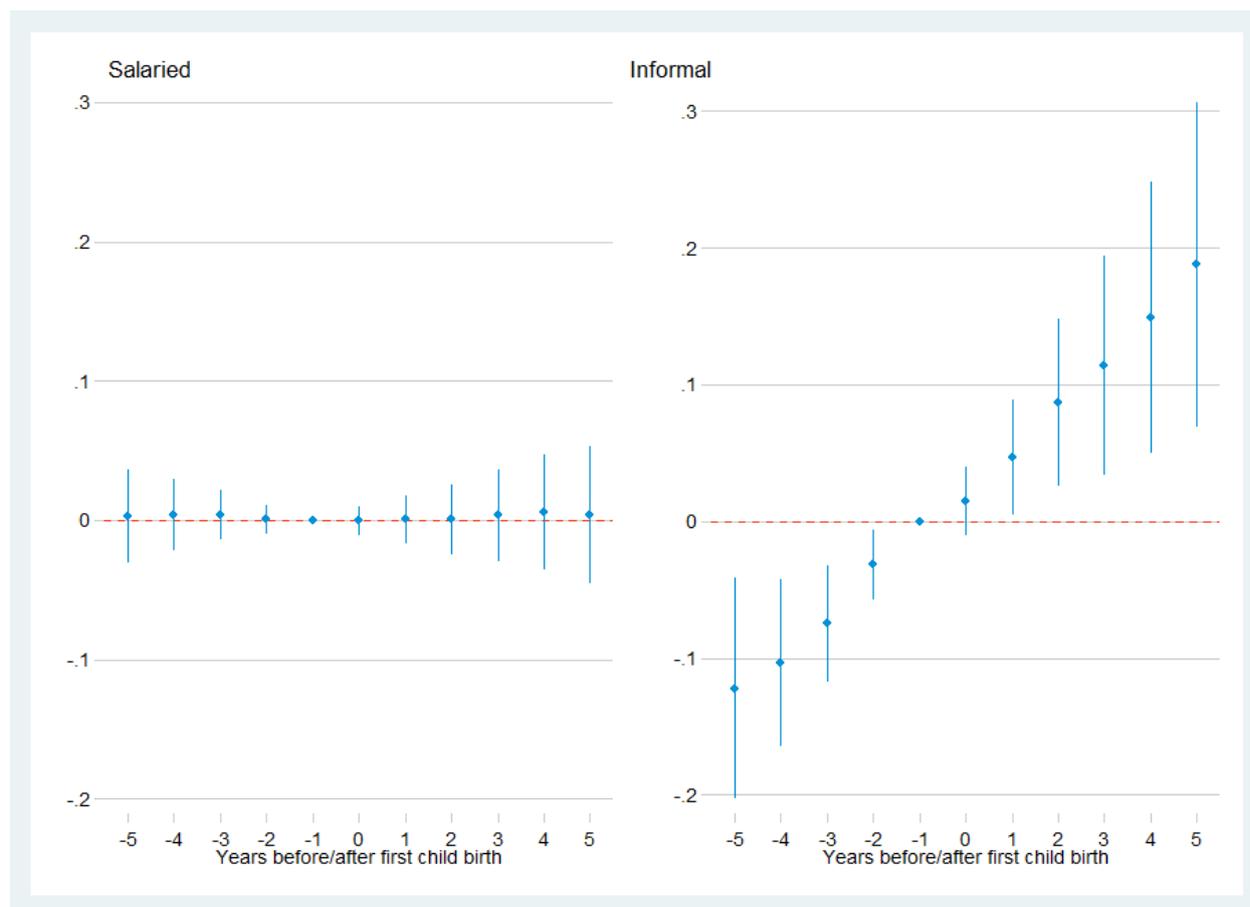


Note: dependent variable is a binary variable indicating whether the individual participated in the labour market in that year. Independent variables include dummies for years before/after childbirth, age, and calendar year fixed effects. The y-axis plots proportional change in LFPR from year prior to childbirth. Standard errors are clustered at the individual level.

Source: authors' calculations based on IWS data.

Therefore, unlike what literature suggests, rural women do not experience a significant fall in employment after childbirth. Rather, their employment increases in the years afterwards. As in Berniell et al. (2021), we explore whether this increase in employment is consistent across all types of employment. We broadly divide employment into formal and informal as specified earlier and for women alone, and we examine what is the change in the participation in each type of work.

Figure 6: Change in probability of employment after childbirth for women, formal and informal work



Note: dependent variable is a binary variable indicating whether the individual participated in the labour market in that year. Independent variables include dummies for years before/after childbirth, age, and calendar year fixed effects. The y-axis plots proportional change in LFPR from year prior to childbirth. Standard errors are clustered at the individual level.

Source: authors' calculations based on IWS data.

The left panel in Figure 6 plots the event study coefficients for formal employment (salaried work), while the right panel is for informal employment (casual and self-employed) for rural women. There are clear differences in the labour market participation in each of these employment types after childbirth. Informal employment witnesses a significant increase one year after childbirth. This is unlike what we saw earlier in the case of all paid work among women. From the first year after childbirth, the probability of women's participation in informal work increases by about 2.5 per cent. In the second year, it increases by 5 per cent compared to the year prior to childbirth. There is a steady increase and by five years after childbirth, probability of being in informal work for women has increased by nearly 10 per cent compared to pre-childbirth. In contrast, there is no significant increase in formal employment in the years immediately after childbirth or even later. Therefore, the increase in women's labour force participation rate seen after childbirth is entirely driven by an increase in their participation in informal work. And any lack of increase in aggregate paid employment is a result of the salaried component muting the increase in informal work.

We estimate the results for other model specifications—fixed effects with additional controls, random effects with basic and additional controls, and a simple linear probability estimation. These findings are broadly consistent as seen in Table 7. These results are also consistent if we extend the horizon to ten years after childbirth.

Table 7: Robustness tests

	Men, paid work	Women, paid work	Women, formal	Women, informal
xtreg, basic controls, fe	Insignificant	+ from Y5	Insignificant	+ from Y1
xtreg, basic controls + hhstructure, fe	Insignificant	+ from Y5	Insignificant	+ from Y1
xtreg, basic controls, cluster	Insignificant	+ from Y1	Insignificant	+ from Y1
xtreg, all controls, cluster re	Insignificant	+ from Y1	Insignificant	+ from Y2
OLS estimates, clustered	Insignificant	+ from Y1	Insignificant	+ from Y2

Source: authors' calculations based on IWS data.

4.2 Heterogeneity analysis

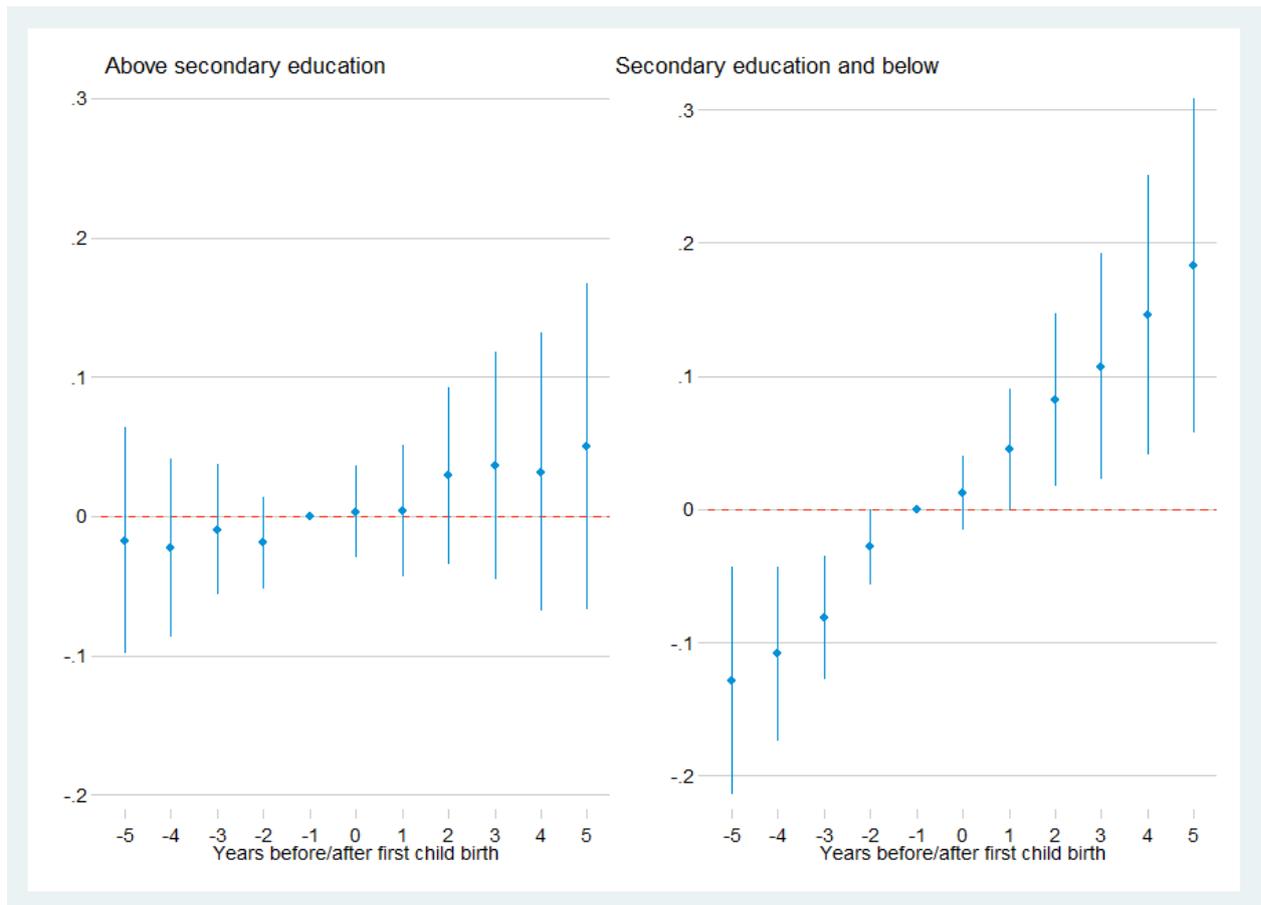
Next, we look at whether the observed increase in informal employment is seen among all groups of women. Using various indicators, we stratify the sample of women into different groups.

Education levels

We broadly classify our sample of women into less educated (secondary education and below) and higher educated (above secondary education). We estimate the event study equations for the two samples separately.

Figure 7 plots the marginal effects on probability of paid informal work in the years after and prior to childbirth for the two groups of women. The increase in informal work is entirely among women with below secondary education. Among the higher educated women, there is no significant change in the likelihood of work participation.

Figure 7: Change in probability of informal employment after childbirth for women, by education



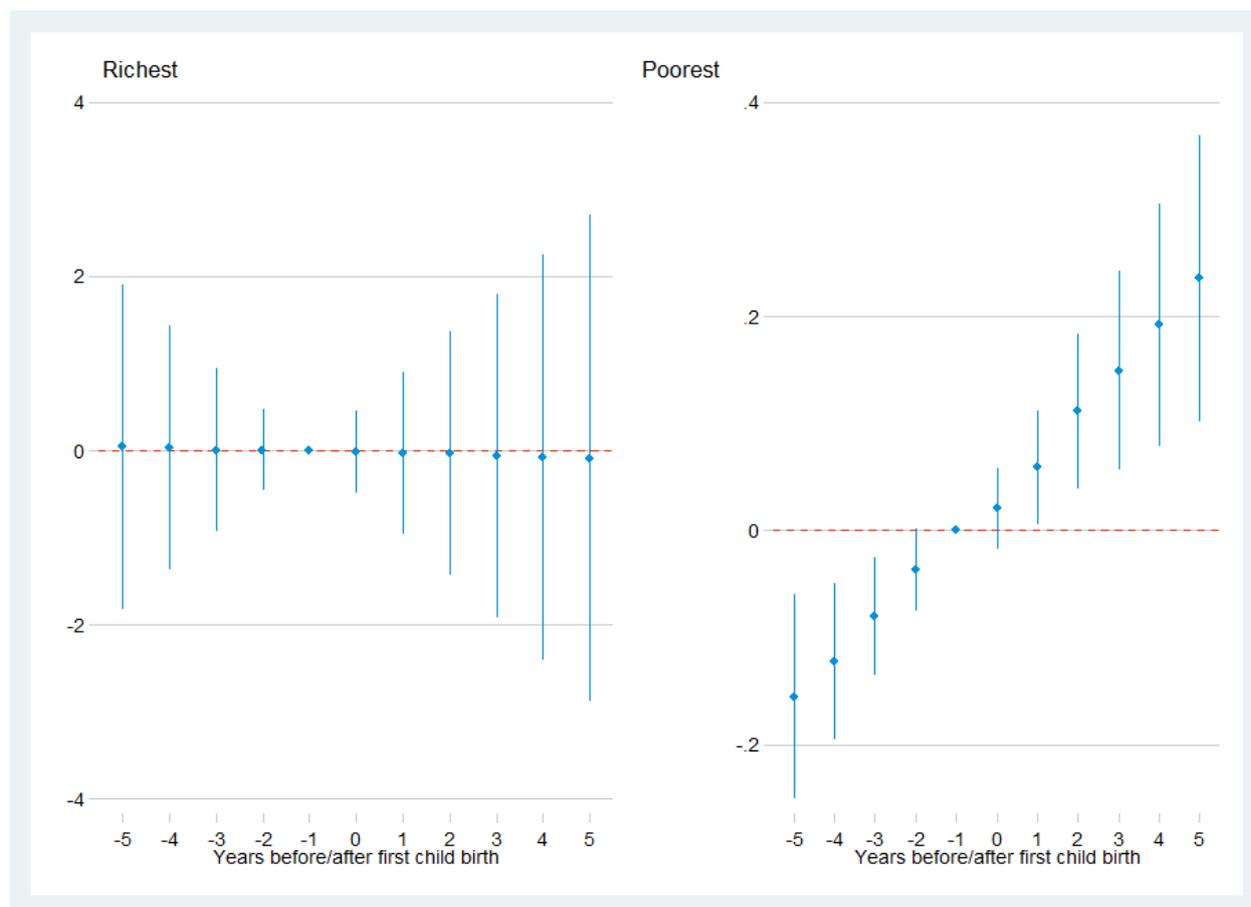
Note: dependent variable is a binary variable indicating whether the individual participated in the labour market in that year. Independent variables include dummies for years before/after childbirth, age, and calendar year fixed effects. The y-axis plots proportional change in LFPR from year prior to childbirth. Standard errors are clustered at the individual level.

Source: authors' calculations based on IWS data.

Asset ownership

The IWS main survey also collected information on the household structure (type of building, number of rooms, latrine type) as well as on assets owned—gas cylinder, fridge, television, mobile, etc. We use this information to create an asset index. Individuals are broadly categorized into four quantiles based on their asset index value. We look at the lowest (poorest) quartile and the highest (richest quartile) to see whether post-childbirth labour market participation differs for women in different strata. As Figure 8 shows, for women in the poorest households, from the first year after childbirth onwards there is a positive and significant increase in the likelihood of participation in informal paid work in the years after childbirth. On the other hand, for women in the richest households we do not see any such significant change in informal paid work.

Figure 8: Change in probability of informal employment after childbirth for women, by asset group



Note: dependent variable is a binary variable indicating whether the individual participated in the labour market in that year. Independent variables include dummies for years before/after childbirth, age, and calendar year fixed effects. The y-axis plots proportional change in LFPR from year prior to childbirth. Standard errors are clustered at the individual level.

Source: authors' calculations based on IWS data.

5 Discussion and way forward

Based on unique retrospective data from two states in India, Karnataka and Rajasthan, we explore major events around men and women's working age for up to a period of 32 years.

Specifically, using event study analysis, we explore the impact of first childbirth on labour supply, an experience that is near universal and extremely important for Indian women.

Our descriptive results support existing evidence of marriage and childbirth being near universal events for men and women. However, women marry and have children earlier compared to men. In terms of employment, the average age of women's first entry into paid work (at age 23) is after marriage and childbirth which happen at age 18 and 20, respectively. For men, on the other hand, employment comes first, at the age of 18. Marriage and childbirth happen about three to four years later.

The event study results show that for men and women, there is no significant impact of childbirth on their labour market participation. Overall, we find that women's paid employment is not impacted by motherhood. However, their participation in paid informal work shows a significant

increase from the second or third year after the first childbirth. Further, a heterogeneity analysis reveals that this increase in informal work is limited largely to less educated women and those from poorer households.

The findings from the event study run counter to what is seen in other studies (Berniell et al. 2021; Kleven 2019). Post childbirth, there is a significant increase in the likelihood of participation, driven largely by an increase in informal work. We discuss below what are the possible mechanisms behind this increase.

For many households in a country like India, engaging in the labour market is a necessity rather than a choice. High levels of poverty and low wages mandate that most women have to engage in paid work to contribute to their family's needs. The presence of a large informal labour market facilitates the (re-)entry of women into different kinds of paid work. For instance, Bhan et al. (2020) find that informal workers are more likely to return to work soon after childbirth, as informal sector employment does not come with entitlements such as paid leave or other maternity benefits. Further, the ease of entry into informal work (because of low entry barriers as well as availability of such work) ensures that even after childbirth, women continue to be in some kind of paid employment. This is nowhere more apparent than in the case of construction worksites where it is not unusual to see women working with their children present at the site.

In this context, it is important to revisit the notion of motherhood penalty post childbirth that has been developed largely in the context of high-income economies. Implicit in this concept is the idea that employment is intrinsically good and welfare enhancing and a withdrawal from the labour force penalizes women. Notwithstanding the debates of whether work is beneficial or exploitative for informal women workers in developing countries, for mothers the return to work immediately after childbirth may come with additional costs to maternal and child health. For instance, Chowdhury et al. (2021) find evidence of early weaning among mothers in informal work that could impact the health of the child. Therefore, in the context of a developing country, the apparent lack of a child 'penalty' is itself not indicative of a favourable outcome for women.

There may be other reasons as well for the observed increase in employment post childbirth. Among women in our sample, marriage and childbirth occur very early in the working age. The average age at marriage is 18 years, while the average age of first childbirth is 19 years. By the age of 22 years, 81 per cent of women have had their first child. Prior to these events, there is only a very small interval of time during which women *can* work. Therefore, it is only natural, one may argue, that after childbirth there is an increase in paid work. It is also likely that norms that otherwise constrain women's mobility and participation in the labour market are relaxed after marriage and childbirth. Moreover, household needs and priorities may also change after childbirth, forcing women into employment to supplement household budgets.

While our results are counter to the evidence of the negative impact of motherhood on labour market outcomes, we argue that experiences from other countries are not directly transferable to the Indian context. Our results are largely driven by rural women where agriculture or some form of employment in the informal sector is likely to dominate women's employment. This may be more conducive to being undertaken along with childcare responsibilities than, perhaps, in an urban setting or in more formalized work settings. Unlike Berniell et al. (2021) who find that motherhood causes a shift from formal to informal sector for women in Chile, in India, there is a monotonic increase in informal work with no change in formal employment. Having a child does not necessarily worsen outcomes in terms of moving away from formal sector employment.

There are limitations to our current analysis. First, our labour market outcomes also do not capture differences in the intensive margin (hours of work, full time vs. part time status, salaried vs. casual) which may reflect a negative association with childbirth. Unfortunately, we did not collect earnings data (due to concerns of recall errors) that could have provided another measure of labour market outcome and which would have picked up reduced intensity of employment. Second, there is a possibility that our current estimates suffer from omitted variable bias. We do not control for time-invariant unobservables that are almost certainly correlated with our observed variables. Examples of these include social norms constraining women's employment, attitudes towards paid work in natal and marital families, and other community-specific effects. Finally, given that marriage and childbirth occur very close together, it is likely that the effects of these two events are intertwined in determining the labour market impact. Thus, more analysis and robustness checks are necessary to validate our early findings and to explore the mechanisms of how childbirth impacts mothers' employment.

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