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# Urbanization and Women Empowerment: Evidence from India<sup>\*</sup>

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## Abstract

The paper examines the short-term implications of urbanization on women empowerment in India. In theory, urbanization can affect women either positively or negatively. Women in urban areas, compared to their rural counterparts, are thought to enjoy greater social, economic, and political opportunities and freedoms. At the same time, research shows barriers to women's empowerment remain widespread in urban environments. We measure urbanization using satellite-based nighttime light intensity data. Fixed effects estimation results show that urbanization positively affects women's labor market participation, agency within households, mobility, access to information, and attitudes toward domestic violence (thereby making them more likely to report incidences of violence). However, the effect of urbanization on women's financial autonomy is negative, and on health is mixed. These results, we show, are robust to unmeasured confounders to a large extent. In light of the rapid urbanization that India is currently experiencing, the importance of these findings cannot be overemphasized. They suggest that while urbanization could go a long way toward economically empowering women in India, the government also needs to devise complementary policies and interventions that could tackle the adverse consequences of urban expansion.

**JEL:** J16, O12

**Keywords:** Gender, India, Nighttime Lights, Urbanization, Women Empowerment

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<sup>\*</sup>All remaining errors are our own.

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# 1 Introduction

India is experiencing rapid urbanization. The 2011 census reveals 475 urban agglomerations, up from 384 in 2001, and 7,935 towns, as opposed to 2,774 towns in 2001. It is estimated that by 2030, more than 400 million people will be living in cities in India.<sup>[1]</sup> According to the *World Urbanization Prospects Report 2018*, between 2018 and 2050, urban areas are expected to grow by 416 million people in India.<sup>[2]</sup> The report also projects, by 2050, 53 percent of India’s population will be urban (currently, 34 percent of India’s population is urban). Interestingly, India’s urbanization is not a result of rural-urban migration; in fact, the rate of migration into cities in India has remained essentially stagnant since the 1970s — even after liberalization unleashed a wave of economic growth. Rather, India’s urbanization is driven by the conversion of villages into towns through natural population growth and local shifts in employment, i.e., the creation of census towns (Randolph and Gandhi (2019)).<sup>[3]</sup>

In this paper, we investigate the implications of urbanization and urban expansion in India on women’s empowerment. Gender inequality and discrimination against women are pervasive in India. While boys and girls start secondary school at the same rate, only 0.80 girls enroll in tertiary schooling for every boy (World-Bank (2011)). Early marriage and childbearing are extremely common, and many women face highly unequal gender norms and have limited agency both within and outside their houses (Klasen and Pieters (2015); Calvi (2020); Afridi et al. (2022a)). They also spend a disproportionately higher amount of time in domestic activities and unpaid health care for family members which leaves little time for participation in paid employment (Charmes et al. (2019); Ratheesh and Anitha (2022)).<sup>[4]</sup> As per the Indian Census 2011, India’s sex ratio among children aged 0 to 6 years

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<sup>1</sup><https://india.un.org/en/171267-poverty-and-urbanisation>

<sup>2</sup><https://population.un.org/wup/Publications/Files/WUP2018-Highlights.pdf>

<sup>3</sup>In all fairness it should be noted that urbanization not being driven by rural-urban migration is not unique to India. Menashe-Oren and Bocquier (2021) empirically show that over urban transition, the role of migration was negligible in low- and middle-income countries between 1985 and 2015.

<sup>4</sup>India is one of the fastest growing economies of the world yet its female labor force participation rate (FLFP) has remained one of the lowest. According to the Periodic Labor Force Survey 2021-22, only around 29 percent of women in the age group 15 to 59 were a part of the labor force.

is 1.09 boys per girl, reflective of the widespread practice of sex-selective abortion. Finally, the situation of gender violence is very concerning in India with about 1 out of 4 women reporting to have been exposed to physical intimate partner violence (IPV).<sup>5</sup> Against this backdrop, it is important to understand whether the process of rapid urbanization that India is currently experiencing is actually benefiting women or affecting them adversely.

In theory, urbanization can affect women positively as well as negatively. Women in urban areas, unlike their rural counterparts, are thought to enjoy greater social, economic, and political opportunities and freedoms. In an editorial, [Tacoli and Satterthwaite \(2013\)](#) note that “urban women are able to engage in paid employment outside the family, better access to services, lower fertility rates, and some relaxation of the rigid social values and norms that define women as subordinated to their husbands and fathers and to men generally” (p. 3). Even so, these women are likely to continue experiencing forms of gender discrimination. As noted in the UN-Habitat’s *State of Women in Cities 2012-13* report, in urban environments “notable gender gaps [exist] in labour and employment, ‘decent work’, pay, tenure rights, access to and accumulation of assets, personal security and safety, and representation in formal structures of urban governance” (p. viii). This clearly suggests that barriers to women empowerment are widespread in urban environments and that women are often the last to benefit from the prosperity of cities. In fact, [Chant \(2013\)](#) remarks, “women make significant contributions to urban prosperity through a wide range of paid and unpaid labour,...[yet they] often reap limited rewards in terms of equitable access to ‘decent’ work, human capital acquisition, physical and financial assets, intra-urban mobility, personal safety and security, and representation in formal structures of urban governance” (p. 9-10).

Women’s empowerment is not a single-dimensional phenomenon ([Moghadam \(1996\)](#); [Kabeer \(1999\)](#); [Janssens \(2010\)](#)). Rather it is a multidimensional and multi-scalar process and is experienced at the individual as well as the household levels. As noted in [Kabeer et al. \(2011\)](#) and [Golla et al. \(2011\)](#), it is imperative to understand that women’s economic

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<sup>5</sup>National Family Health Survey 2019-21

empowerment extends beyond women’s economic position in terms of work, income, education, and assets to encompass other social and political dimensions. More specifically, this requires skills and resources to compete in markets, fair and equal access to economic institutions, and the ability to make and act on decisions and control resources and profits in terms of exercising power and agency. As such, in this paper, we use several economic outcomes to capture women’s empowerment. These include indicators for women’s participation in the labor market and employment, mobility, financial autonomy, agency within the household, access to information, exposure to and attitudes towards IPV, and health. We obtain data on these measures from two recent repeated cross-sections, the 2015-16 and 2019-21 waves of the National Family Health Survey (NFHS). These are widely used nationwide surveys of India and are a part of the global Demographic Health Survey (DHS) program. They provide detailed information on women’s socioeconomic characteristics, decision-making power within households, financial independence, physical health, employment, IPV, etc. The two waves of the NFHS provide us with access to data on more than 1.2 million Indian women.

We measure urbanization using satellite nighttime lights data. Specifically, geo-referenced NFHS data are merged with nighttime light intensity data for the survey clusters in which the NFHS sample households reside. Based on the notion that light intensity per unit area corresponds to a reasonable measure of the degree of urbanization, nighttime lights is argued to be a valid marker of urbanization and urban settlements (Elvidge et al. (1997); Imhoff et al. (1997); Sutton (1997); Henderson et al. (2003); Storeygard (2016); Amare et al. (2020); Chen et al. (2022) Abay et al. (2023)). As such, nighttime lights intensity of an area is likely to be indicative of its level of urbanization (with higher values of nighttime lights intensity indicating higher level of urbanization). There are two major benefits of using nighttime lights to measure urbanization. First, it is measured with consistent quality. Second, it introduces a gradient of urbanization permitting the investigation of the implications of urbanization on women outcomes along an urbanization continuum.<sup>6</sup>

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<sup>6</sup>Using nighttime lights to measure urbanization in developed countries could be a little problematic since the two main driving forces for the changes in nighttime lights in these countries are urbanization (or de-

Alternatively, to measure urbanization, one could construct measures of urbanization using data on districts' urban population or use the census-based binary indicator of urbanization (indicating whether or not respondents live in urban areas) available in the NFHS. Each of these measures, however, has a major drawback. Construction of population-based measures of urbanization requires information on districts' urban population which is at best obtained at 10-year intervals in India. In fact, the last year for which district population data is available for India is 2011. This clearly means it is impossible to construct accurate population-based measures of urbanization that correspond to the 2016 and 2021 waves of the NFHS. The typical binary measure of urbanization is also problematic. As noted above, the binary indicators of urbanization available in the NFHS are also census-based. Since after 2011 no census was conducted in India, the indicator of urban and rural areas in the 2016 and 2021 waves of the NFHS reflects whether in 2011 the areas were considered as urban or rural. However, as noted at the very outset, India has undergone rapid urbanization in the last decade or so. Thus, an area that was classified as rural in the 2011 census may actually have become urban in 2015 or 2019 (i.e., if the census was administered in 2015 or 2019, that area's classification would have changed from rural to urban). This implies that using the census-based indicator of urbanization available in the NFHS likely would cause our covariate of interest to suffer from misclassification error (or non-classical measurement error).<sup>7</sup> Additionally, some recent studies have claimed that the definition of 'urban' used in India, based on which the binary indicator of urbanization is constructed, is particularly restrictive.<sup>8</sup>

Controlling for time-invariant unobserved heterogeneity across districts as well as for secularization) and energy saving policies. However, as noted in Stathakis et al. (2015), when using nighttime lights to measure urbanization in developing countries, the interpretation of nighttime light changes is much easier because the latter driving force is typically absent.

<sup>7</sup>In general, binary measures of urbanization are not preferred since they fail to capture the heterogeneity of urban areas. As noted by Cali and Menon (2013), Christiaensen and Todo (2014) and Abay et al. (2023), rather than a binary phenomenon, urbanization is a continuum reflecting a rural-to-urban transformation process.

<sup>8</sup>[https://wri-india.org/blog/measuring-urbanization-why-india-needs-re-think-its-methodology?trk=feed\\_maintain-feed-card-feed-article-content](https://wri-india.org/blog/measuring-urbanization-why-india-needs-re-think-its-methodology?trk=feed_maintain-feed-card-feed-article-content)

ular changes in the economic environment that have the same effect on all individuals within states in addition to individual heterogeneity, and exploiting intertemporal and interspatial variation in nighttime light intensity, we find that urbanization improves women’s labor market participation, agency within households, mobility, access to information, and attitudes towards IPV (which makes them more likely to report incidences of violence). However, the effects of urbanization on women’s financial autonomy is negative, and on health is mixed. We show that the results are similar when we restrict our sample to only those women who have not recently migrated to their current area of residence suggesting that much of the effects are not driven by endogenous selection and migration of some women and their families. Further, we assess the sensitivity of our results to omitted confounders using the method proposed by [Oster \(2019\)](#). We find that they are robust to modest degrees of omitted variable bias. We also document some interesting heterogeneity. For example, we find that the effect of urbanization on women’s mobility is lower for women from other religions as compared to Hindu women, and for women from disadvantaged castes as compared to forward caste women. Overall, our results suggest that urbanization could go a long way toward economically empowering women in India. However, since we document some adverse consequences of urban expansion, the government also needs to devise complementary policies and interventions that would be effective in tackling these.

## 1.1 Literature

Our study is one of the first to empirically analyze the link between urbanization and women empowerment in a developing country using data from a large-scale survey. In the last two decades, a large empirical literature in economics has come into being that looks at the determinants of women empowerment and gender inequality in developing countries. Gender inequality manifests itself in various forms including, but not limited to disparities in health, education, labor market participation, freedom of choice, and bargaining power within marriage. This literature has attributed these disparities to several factors such as

the dependence of developing countries on activities that men have a comparative advantage in (Qian (2008); Carranza (2014)), difference in property rights between men and women (Goldstein and Udry (2008); Anderson and Genicot (2015); Bhalotra et al. (2019)), lack of technological progress in home production (Dinkelman (2011); Devoto et al. (2012)), dowry system (Bloch and Rao (2002); Alfano (2017); Bhalotra et al. (2020); Sekhri and Storeygard (2014)), difference in job opportunities (Bhalotra et al. (2021)), patriarchal norms and attitudes (Jayachandran (2017); Jayachandran (2015); Afridi et al. (2022a); Dhar et al. (2022)), child marriage and early marriage (Field and Ambrus (2008); Roychowdhury and Dhamija (2021)), historical factors (Alesina et al. (2013); Guarneri and Rainer (2021)), etc.<sup>9</sup> This literature, however, has not focused much on the relationship between urbanization and women empowerment despite theoretical and descriptive works in economics (e.g., Boserup (1970), Goldin (1995)) and other related disciplines (see Chant (2013) for an excellent review) suggesting that the effects of economic development and urbanization are likely to be gendered.

The dearth of studies examining the effect of urbanization on women empowerment in developing countries perhaps is because, as summarized by Chauvin et al. (2017), most of the empirical literature on urbanization and agglomeration effects focuses on developed countries (especially on the US), and little is known about the impact of urbanization in developing countries despite the global importance of the phenomenon in these countries. Similar observation has also been made by Vakulabharanam and Motiram (2023). They note, “Global urbanization has been driven by cities in developing countries, but literature in economics has disproportionately focused on cities in the Global North.” (p. 64) Chauvin et al. (2017) argue that only *some* of the stylized facts documented about cities in the US apply to cities of the developing world, and they call for more research on cities in the developing world. Some studies that do look at the effect of urbanization in developing countries in recent times include Hering and Poncet (2010), Banks (2013), Cali and Menon

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<sup>9</sup>Jayachandran (2015) provides an excellent review of this literature.



(2013), Combes et al. (2015), Hasan et al. (2017), Mitra (2019), Combes et al. (2020), Amare et al. (2020), Chen et al. (2022), Abay et al. (2023) and Vakulabharanam and Motiram (2023) among a few others. Of these only Banks (2013), Mitra (2019), and Vakulabharanam and Motiram (2023) focus on women. However, these studies are interested in only looking at the relationship between urbanization and female employment which is only one of the several measures of women empowerment. Further, often these focus on only one state (e.g., Mitra (2019)) or a couple of cities (e.g., Vakulabharanam and Motiram (2023)).

The rest of the paper unfolds as follows. Section 2 presents the background. Section 3 discusses the data and outlines the empirical model. Results are discussed in Section 4. The last section concludes.

## 2 Background

Urbanization is a socioeconomic process by which cities (or urban areas) grow. According to Tisdale (1941),

urbanization is a process of population concentration. It proceeds in two ways: the multiplication of points of concentration and the increase in size of individual concentrations....consistent with the definition of urbanization, cities may be defined as points of concentration (p. 311).

It is often presumed that urbanization is associated with the generation of wealth and urban women enjoy greater social, economic, and political opportunities and freedoms than their rural counterparts. However, just as prosperity is not an inevitable outcome of urbanization—there is considerable evidence that suggests urbanization has created widespread poverty, inequality, poor living conditions, insecurity, and violence for many people in cities (Chen and Ravallion (2007); Ravallion et al. (2007); Jones and Corbridge (2008); Mathur (2013)) —, urban expansion and growth may not always result in gender equality and improve the lives of women. The barriers to women’s ‘empowerment’ remain widespread in urban

environments.

For women, as well as men, the city's main attraction is the possibility of economic opportunities which are unavailable to them in rural areas. In particular, expanded independence, the possibility for social mobility, and greater employment opportunities associated with city life are often viewed as a potential path to a better standard of living for women and their families (Deshingkar and Grimm (2005); IOM (2009)). Additionally, a common perception is that cities allow women to escape from the miseries of gender violence, gender discrimination, and disinheritance (IOM (2009); Tacoli and Mabala (2010); IATF (2012)). However, existing research often shows that women are disadvantaged compared with men in cities in terms of equal access to employment and shelter, health and education, transport, asset ownership, experiences of urban violence, and the ability to exercise their rights. These disadvantages are especially marked for poor urban women residing in informal settlements (slums).

Urban centers can provide access to economic resources and institutional support to help women cope with violence. Yet, women in urban areas are exposed to high levels of violence perpetrated by a partner as well as by someone who is not a partner (McIlwaine (2013); Jungari et al. (2022)). Research suggests a number of urban-specific factors can be responsible for this. These include more fragmented social relations which erode support for the most vulnerable (Walker et al. (2013)), engagement in certain specific types of occupation (McIlwaine (2013)), poor infrastructure and, limited sanitary facilities (International (2010)). For a very large number of women in urban areas, the constant threats, from verbal harassment to outright violence whenever they leave the home, thus, are an unwelcome reality. This, as noted by McIlwaine (2013), can significantly affect women's health, mobility, and their ability to work. Indeed, the use of space among women is also cross-cut by time in cities. In particular, women have much more restricted mobility (especially at night) linked with their safety and fear of violence. Issues of access to and provision of quality and affordable public transport are also crucial in determining women's movement within cities (Khosla (2009);

Borker (2021)).

Life in urban areas is more expensive than in rural areas and, in many cases, is more expensive for the residents of low-income settlements since they have to pay higher prices for inadequate accommodation, water provided by private vendors, and for access to latrines, where these exist. The cost of poor health, exacerbated by lack of sanitation and living in locations with high concentrations of environmental hazards, is also high when missing a day's work means a considerable reduction in income. Poor housing conditions, distance from health services and schools, unsafe neighborhoods – both because of environmental hazards and high rates of violence and crime – and limited access to water and sanitation place an additional burden on those who undertake unpaid care work and social reproductive activities such as child care, food preparation, cleaning and washing (Tacoli (2012); Chant (2013)). These are typically women's responsibilities, to which they often have to add paid work. The resulting time poverty<sup>10</sup> and emotional stress are important non-income elements of urban poverty, which are made much worse at times of economic crises when prices rise, incomes decline and public services provision is cut (Chant (2013)).

In sum, therefore, whether urbanization and urban growth really make women better off than their rural counterparts is not very clear.

## 3 Data and Methodology

### 3.1 Data

This study makes use of data from the fourth and fifth rounds of NFHS of India (NFHS 2015-16, NFHS 2019-20), and from Indian Census 2011. The NFHS is a nationally representative household demographic and health survey for India. It provides information on various topics such as population demographics, health, and nutrition for India. It is conducted by the International Institute for Population Sciences (IIPS) in Mumbai, administered under

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<sup>10</sup>See Gammage (2010) for a discussion on time poverty

the Ministry of Health and Family Welfare (MoHFW), Government of India, and is a part of the global Demographic Health Survey (DHS) program. The NFHS 2015-16 survey was conducted between January 2015 and December 2016, and covered 601,509 households located throughout India. The NFHS 2019-21 was conducted between June 2019 and April 2021, and covered 636,669 households located throughout India. In every round, the sample was drawn using stratified random sampling (for more details on the survey methodology see IIPS and ICF, 2017, 2022). All rounds of the NFHS survey are publicly available at the DHS website.<sup>[11]</sup> Both the NFHS rounds administered a separate woman’s questionnaire to collect information on all women aged 15-49 in the sampled households. The questionnaire included questions on background characteristics, family planning, nutrition, marriage, sexual activity, employment status, domestic violence, women’s mobility and autonomy, etc.<sup>[12]</sup> Using the two rounds of NFHS data, we constructed panel data at the district level. In India, districts refer to third-level administrative divisions, below the level of country and state/union territories. As per the Census of India 2011, there were 640 districts.

### 3.1.1 Outcomes

We focus on a range of groups of outcomes as discussed below:

1. **Labor force participation:** These include four binary employment indicators: currently employed in paid work (i.e., whether or not a woman was employed in paid work when the survey was being conducted), employed in paid work in the last twelve months (i.e., whether or not a woman was employed in paid work during the twelve months preceding the survey), currently employed in unpaid work (i.e., whether or not a woman is employed in unpaid work when the survey was being conducted), and employed in unpaid work in the last twelve months (i.e., whether or not a woman was employed in unpaid work during the twelve

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<sup>11</sup><https://dhsprogram.com/Countries/Country-Main.cfm?ctry>

<sup>12</sup>However, questions on certain topics like domestic violence and menstrual hygiene were restricted to a subset of the eligible women randomly selected from each household belonging to the state module. The state module consists a subsample of 15% of the surveyed households.

months preceding the survey).<sup>13</sup> If a woman is currently employed in paid (unpaid) work, the first (third) variable takes a value one, and zero otherwise. If a woman was employed in paid (unpaid) work anytime during the twelve months preceding the survey, the second (fourth) variable takes a value one, and zero otherwise.

2. **Mobility:** This set comprises variables reflecting the ability of women to travel alone to the following places: a) market, b) health facility, and c) places outside their village/town. For all three places, there is a separate binary variable that takes a value one if a woman is allowed to travel alone and zero otherwise. Additionally, we create a mobility index that takes a value one if a woman is allowed to travel alone to at least one of the three places and zero otherwise.

3. **Intra-household decision-making power:** This set comprises variables based on the women's subjective evaluations of their decision-making power within the household on the following decisions: a) their health care, b) large purchases of the household, c) their visits to friends or relatives and d) the use of husband's income. For all four decisions, there is a separate binary variable which takes a value one if the response is that the woman alone or woman and husband jointly take the decision, and zero otherwise. Additionally, we create an index of intra-household decision-making power that takes a value one if the response is woman alone or woman and husband jointly take the decision for at least one of the four decisions, and zero otherwise.

4. **Access to Information:** This set comprises variables capturing the women's access to various modes of information and media such as newspapers, radio, and television. For all three modes, there is a separate binary variable that takes a value one if a woman accesses that mode (reads a newspaper, listens to the radio, or watches television) in a week and zero otherwise. Additionally, we create an index of access to media that takes a value one if a woman accesses at least one of the three modes and zero otherwise. Moreover, we create another variable, access to mobile phones, which takes a value one if a woman has a mobile

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<sup>13</sup>Paid work indicates work for which women get payment in the form of cash or kind.

phone and zero otherwise.

5. **Attitudes towards IPV:** This set comprises variables reflecting the women’s acceptability of IPV due to the following acts: a) travels without informing husband, b) neglects the house or the children, c) argues with the husband, d) refuses to have sex with the husband, e) does not cook food properly, f) husband suspects her of being unfaithful and g) shows disrespect for in-laws. For all the seven acts, there is a separate binary variable that takes a value one if a woman justifies the violence and zero otherwise. Additionally, we create an index of attitudes towards IPV that takes a value one if a woman justifies violence for either of the seven acts and zero otherwise.

6. **IPV:** This set comprises four broad categories of IPV: less severe physical violence, severe physical violence, sexual violence, and emotional violence. Less severe physical violence includes acts of pushing, shaking, throwing something, twisting arm, pulling hair, slapping, punching with a partner’s fist, or something else. Severe physical violence includes acts of kicking, beating, choking, burning, threatening, or attacking with any kind of weapon. Sexual violence includes forced sexual acts, forced sexual relations resulting from the fear of what the partner would do otherwise, and humiliating sexual acts. Finally, emotional violence includes activities that cause women to face humiliation, insult, and various kinds of threats from their partners to hurt the women or their close ones. For each of the four categories of IPV, there is a binary variable that takes a value one for a woman if she reports to have faced at least any one kind of the underlying acts of violence in the last twelve months and zero otherwise. We also create an additional indicator, *any violence*, which takes a value one for a woman if she reports having at least one of the four kinds of domestic violence and zero otherwise. Moreover, we create another variable, marital stress, capturing the stress in the marital relationship. It takes a value one for a woman if she reports that she is scared of her husband and zero otherwise.

7. **Health outcomes:** These include anthropometric indices for nutrition surveillance: height-for-age z-score (HAZ), weight-for-height z-score (WHZ). We also use body mass index

(BMI) to create a binary variable that takes a value one if the BMI falls in the range of normal weight (18.5-24.9) and zero otherwise. In addition to this, we construct a binary indicator for anemia that takes a value one if a woman is anemic and zero otherwise. Moreover, we create an index of major morbidity for women based on the following five diseases: a) diabetes, b) asthma, c) thyroid, d) heart disease, and e) cancer. The index of major morbidity takes a value one if a woman is suffering from any one or more of the five diseases, and zero otherwise.

**8. Ownership of Assets and Financial Access:** This set comprises variables capturing the ownership of a house, land, and access to money or a bank account. The variable ownership of house (land) takes a value one if a woman owns a house (land) and zero otherwise. Access to money or a bank account is a binary variable that takes a value one if a woman has access to her own money that she can decide how to use or if she has a bank or savings account that she operates herself, and zero otherwise.

**9. Husband’s Education:** This set comprises two variables capturing the husband’s literacy and years of education gap between wife and husband. Literacy is a binary variable that takes a value one if the woman’s husband is literate and zero otherwise. The education gap measures the difference in the years of education between the wife and husband.

**10. Miscellaneous:** This set consists of two variables capturing the woman’s preference for son over daughter and access to health insurance. Son preference is a binary variable that takes a value one if a woman’s ideal number of sons is higher than an ideal number of daughters and zero otherwise. Access to health insurance is a binary variable that takes a value one if a woman is covered by health insurance and zero otherwise.

### **3.1.2 Covariate of Interest**

Our covariate of interest is urbanization. As discussed previously, we measure urbanization using nighttime lights. The NFHS 2015-16 and NFHS 2019-20 provide nightlight composite data capturing the average nighttime luminosity of the area within the 10 km (2 km)

buffer<sup>14</sup> surrounding the DHS rural (urban) cluster location (Mayala et al. (2018); Mayala and Donohue (2022)). It is publicly available for download from the Spatial Data Repository of the DHS.<sup>15</sup> It is based on nighttime light intensity data coming from the Visible Infrared Imaging Radiometer Suite (VIIRS) Day/Night Band (DNB), flown jointly by NASA and NOAA (Elvidge et al. (2017)). It is measured in average cloud-free radiance values (Mayala et al. (2018); Mayala and Donohue (2022)).

### 3.1.3 Demographics

We include women’s years of education completed, current marital status (whether the woman has never been in a union, is currently married, or others), religion (Hindu, Muslim, or others), caste (Scheduled Caste [SC], Scheduled Tribe [ST], Other Backward Caste [OBC], or Other Caste [OC]), sex of the household head (male or female), household size, household wealth status (five quintiles indicating the poorest, poor, middle, rich, or richest group). In addition to these, we also include birth year dummies of women.

### 3.1.4 District Characteristics

We include a range of district-level characteristics from the 2011 Indian Census. This set comprises the following variables: a) number of government pre-primary schools, b) number of rural government primary schools, c) number of rural government middle schools, d) number of rural government secondary schools, e) number of government senior secondary schools, f) number of government arts and science degree colleges, g) number of government engineering colleges, h) number of government medicine colleges, i) number of government management institutes, j) number of government polytechnic institutions, k) number of government vocational training schools, l) number of government non-formal training center m) total strength of primary health center doctors, n) total strength of maternity and child welfare center doctors, o) total strength of mobile health clinic doctors, p) power supply

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<sup>14</sup>Buffer zone is created in such a way that the administration area doesn’t change.

<sup>15</sup><https://spatialdata.dhsprogram.com/covariates/>



per day (in hours) for all users in summer (April-September), q) power supply per day (in hours) for all users in winter (October-March), r) percentage of SC/ST population, and s) percentage of the literate population. The Socioeconomic High-resolution Rural-Urban Geographic Dataset on India (SHRUG) version 2.0 provides the aggregated data at the district level.<sup>16,17</sup> Non-missing and valid information on all the district characteristics is available for 610 districts. The NFHS 2015-16 and NFHS 2019-20 data are matched with these district-level characteristics.

### 3.1.5 Analytical Sample

The nightlight composite data from NFHS 2015-16 and NFHS 2019-20 are matched with the respective women’s data files at the cluster level. Next, we match the district-level characteristics with both the NFHS rounds. We further pooled the two rounds of NFHS data to construct our analytical sample. The unit of analysis is women aged 15 to 49 years. Specifically, our analytical sample includes 649,142 women from NFHS 2015-16 and 613,641 women from NFHS 2019-20, making a total of 1,262,783 observations. The analytical sample consists of women who are usual residents of the household and have non-missing information for all the demographics and district characteristics included in the analysis. However, our analytical sample for the regression analysis varies by the outcome variables based on the non-missing data on the specific outcome variable. For example, our mobility outcomes have 205,655 observations, while IPV outcomes have 116,168 observations.

### 3.1.6 Summary Statistics and Descriptive Analysis

The summary statistics for outcome variables, nightlights along with the demographics and district characteristics, are presented in Tables 1A, 1B, and 1C, respectively. Table 1A shows that the average proportion of women in the pooled sample report to be employed in paid (unpaid) jobs at the time of the survey is 20.5% (4.2%), and the proportion of women

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<sup>16</sup>For detailed documentation of SHRUG 2.0, see Asher et al. (2021)

<sup>17</sup>The SHRUG dataset is available at <http://devdatalab.org/shrug>

reported to be employed in paid (unpaid) jobs in the last 12 months preceding the survey is 25.3% (5.9%). In the pooled sample, around 61.8% of the women report that they have the mobility to travel alone, 88.6% report that they have some say in one or more kinds of household decision-making, 77.4% have access to some source of media (newspaper, radio, or television), 48.9% have mobile phone, 46.7% think IPV is justifiable, 25.5% have been exposed to one or more types of IPV in the last 12 months, 77.4% report that they are afraid of their partner, women’s average HAZ is -1.907, average WHZ is -0.837, 59.2% have normal weight as per BMI, 53.7% are anemic, 5.6% are suffering from major morbidity, 42% own a house alone or jointly, around 32.9% own land alone or jointly, 73.9% have financial access to money or bank account, 80.7% report that their husband is literate, average difference in the years of schooling between wife and husband is around 1.6 years, 18.7 report their preference for son over daughter, and 23.7% have access to health insurance.

As discussed previously, the nightlights are reported in average cloud-free radiance. We further take the natural log of the nightlights after adding one to the raw data. Table 1B shows that the average values of nightlights and log of (nightlights + 1) in the pooled sample are 2.77 and 0.752, respectively.<sup>18</sup> Figure 1 shows the distribution of log(nightlights + 1) for the pooled sample (upper panel) as well as across the two rounds (lower panel). The district-level distribution of nightlights across the two rounds is mapped in Figure 2. The map indicates a significant variation in nightlights across the districts and the two rounds of survey. The demographic variables further show that the average age of women is 30.2 years, the average years of completed education is around 7 years, 70.9% are currently married, the average household size to which women belong is 5.6, 75.4% are Hindus, 19.6% are from upper castes, 85.6% of women belong to households headed by a male member, and around 42% of women belong poorest or poor wealth quintile.

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<sup>18</sup>It is worth mentioning here that the average value of nightlights computed based on NFHS 5 is lower than that computed based on NFHS 4. This, however, is not surprising and is unlikely to be a reflection of measurement error because a major part of NFHS 5 was conducted during the COVID period when economic activities—a proxy of which is nightlights—had temporarily stalled across most parts of the country (Beyer et al. (2023)).

Table 1C shows the average number of a) government pre-primary schools (around 340), b) rural government primary schools (around 1152), c) rural government middle schools (around 475), d) rural government secondary schools (around 159), e) government senior secondary schools (around 59), f) government arts and science degree colleges (around 6), g) government engineering colleges (around 0.6), h) government medicine colleges (around 0.5), i) government management institutes (around 0.7), j) government polytechnic institutions (around 1), k) government vocational training schools (around 4), l) government non formal training centre (around 35) m) total strength of primary health centre doctors (around 62), n) total strength of maternity and child welfare centre doctors (around 53), o) total strength of mobile health clinic doctors (around 10), p) power supply per day for all users in summer (around 2.4 hours), q) power supply per day for all users in winter (around 2.5 hours), r) percentage of SC/ST population (32.3%), and s) percentage of literate population (62%).

### 3.2 Methodology

Our main regression model is given by

$$y_{icdst} = \beta \log(\text{nightlights}_{cdst} + 1) + \gamma x_{icdst} + \lambda v_{dst}^{2011} \times t + \mu_d + \eta_{st} + \epsilon_{icdst}$$

where  $y_{icdst}$  represents outcomes of women  $i$  residing in the cluster (village/neighborhood)  $c$  of district  $d$  within state  $s$  from survey round  $t$ ;  $\text{nightlights}_{cdst}$  represents total nighttime lights of cluster  $c$ ,  $x_{icdst}$  includes individual/household level controls,  $v_{dst}^{2011} \times t$  denotes district characteristics (including public goods) as per the 2011 census interacted with survey year,  $\mu_d$  indicates district fixed effects,  $\eta_{st}$  denotes the state-survey round fixed effects, and  $\epsilon_{icdst}$  is the idiosyncratic error term. We cluster the standard errors at the district level<sup>19</sup>

Our coefficient of interest is  $\beta$  which captures the impact of urbanization (as proxied by nighttime lights) on different women's outcomes. In general, obtaining a consistent estimate

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<sup>19</sup>As noted previously, the two rounds of NFHS allowed us to create panel data at the district level. Hence we could include district fixed effects and not cluster fixed effects.

of the effect of urbanization on women’s outcomes is very challenging due to the usual problem of omitted variables, i.e., there could be unobservables that could be impacting women’s outcomes and also be correlated with urbanization. Our specification, however, reduces this concern substantially. The inclusion of state-survey round fixed effects helps us account for time-varying state-level policies, and infrastructural and social developments. These could be correlated with both urbanization and women empowerment. District fixed effects account for all district-level time-invariant characteristics. These include economic structure that have been constant over our sample period, geographic features like soil type, proximity to rivers, latitude, longitude, altitude, and ruggedness, and historical factors like year of exposure to railways, location of colonial institutions and missionaries, historical political conditions of the district, etc. Districts’ economic structure, geographical conditions and history could simultaneously be determining women’s outcomes and urbanization. In fact, district-fixed effects are also likely to account for unobserved local social/gender norms since they are known to be very sticky at least in the short term (Afridi et al. (2022b)). Local social/gender norms are very important determinants of women’s outcomes; they could potentially be correlated with urbanization as well. Finally, the inclusion of the interaction between district characteristics and survey year allows us to partial out the impact that initial economic conditions of districts can have on women’s outcomes over time.

One concern for married women is that their natal home might not be in the same village or urban locality as their current place of residence (which is their husbands’ home). If that is the case, state-time fixed effects, district fixed effects, and interactions between district characteristics and survey year will account for omitted factors discussed above that are relevant for women’s current residence, but not that are relevant for women’s natal home. This could, in theory, be problematic since omitted variables corresponding to women’s natal home could be determining women’s current (post-marriage) outcome (e.g., local gender norms prevailing at the place where the women grew up could be affecting her current outcomes). We recognize this concern but feel this does not hamper our identification. This

is because, while patrilocal village exogamy (where the woman moves out of her village to join her husband’s family) is very common in India, as noted in [Beauchamp et al. \(2023\)](#), most women stay within the same district. As such, the included fixed effects and interaction between district characteristics and survey round are likely to account for unobserved attributes corresponding to women’s natal home (in addition to women’s husbands’ home).

In addition to omitted variables, endogenous sorting of women into villages/neighborhoods—more specifically rural-urban migration—could be driving our results. Women could be migrating from rural to urban areas for various reasons: when they get married, for economic reasons, or after marriage with their husbands. In theory, rural-urban migration could be determining urbanization. Moreover, those women migrating from rural to urban areas could have different attributes compared to those who are not and these attributes could be correlated with women’s outcomes. This is a genuine point of concern. But, as noted at the very outset, the rapid urbanization that India is witnessing, like most other developing countries, is *not* driven by rural-urban migration. In fact, several studies find that overall rural-urban migration is exceptionally low in India ([Munshi and Rosenzweig \(2016\)](#); [Randolph and Gandhi \(2019\)](#); [Dutta et al. \(2022\)](#)). Most migration in India is from rural to rural.<sup>20</sup> As noted by [Randolph and Gandhi \(2019\)](#), “contrary to the popular imagination of migrants flooding into megacities like Mumbai and Delhi, India’s urbanization is increasingly driven by the conversion of villages into towns through natural population growth and local shifts in employment — i.e. the creation of census towns — and the majority of these settlements are not on the fringes of the country’s big cities.” However, even if there is a small degree of sorting into villages/neighborhoods (or migration from rural to urban areas), this is unlikely to be very problematic for us given our model specification. In particular, our model includes a host of time-varying and time-invariant individual and household-level controls (e.g., caste, religion, education, wealth, etc.). Many of these controls are also likely

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<sup>20</sup>[Munshi and Rosenzweig \(2016\)](#)’s explanation for India’s low mobility is based on a combination of well-functioning rural insurance networks and the absence of formal insurance, which includes government safety nets and private credit.

to act as proxies for unobserved attributes tastes, preferences, attitudes, etc. These controls should be able to account for the sorting of women or families into villages/neighborhoods (if any) to a large extent. Nevertheless, to assuage this concern, in addition to estimating our regression model for the full sample, following [van Maarseveen \(2021\)](#) and [Abay et al. \(2023\)](#), we estimate it by restricting our sample to those women who have lived in the area for a relatively long time.<sup>21</sup> As argued by [Glaeser \(1996\)](#), “presumably location choice would be less of an issue for long-term residents” (p. 62). Thus, if the data showed that the degree of urbanization of the cluster is very important for long-term residents, this should lead us to believe that it is urbanization that drives outcomes.

Additionally, we check the sensitivity of our results to unobservable confounders using a method proposed by [Oster \(2019\)](#). This method is based on the idea that selection on observables can provide a useful guide to assess the selection based on unobservables. It enables researchers to derive bounds on the coefficient of interest ( $\beta$ ) under assumptions regarding  $\delta$ , the proportional degree of selection between unobservables and observables, and  $R_{max}$ , the maximum R-squared under the full model where all (observed and unobserved) variables are included. Both  $\delta$  and  $R_{max}$  are unknown parameters to be chosen given the particular context of the problem and econometric model. In our case, we assume that the upper bound of  $\delta$  is 1 suggesting that the strength of the effect of unobservables is not more than the strength of observables (in other words, selection on unobservables is not stronger than selection on observables). The range 0 to 1 for  $\delta$  seems reasonable in our context, as we observe most of the key control variables that have been identified in the literature on determinants of women empowerment. Further, we also include fixed effects that account for heterogeneity across space and time. In choosing  $R_{max}$ , we follow [Oster \(2019\)](#)’s suggestion and set it as 1.3 times the R-square of the main regression. Using a sample of randomized

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<sup>21</sup>Following [Angel and Bittschi \(2019\)](#), we also re-estimated our main regression model by restricting the sample to ‘never movers’. Most of the estimated coefficients are in line with those estimated using the full sample. However, some of the coefficients that were statistically significant when estimated using the full sample fail to show statistical significance when the restricted sample is used. This is not surprising, however, since the sample size of women who are ‘never-movers’ is (naturally) very small. These results are available upon request.

papers (from top journals), Oster (2019) shows that the value of  $R_{max}$  which allows at least 90 of randomized results to survive randomized papers is 1.3 R-square.<sup>22</sup>

## 4 Results

### 4.1 Main Results

The estimates of the effect of urbanization on different measures of women’s empowerment are reported in Tables 2-11. Each table consists of 3 horizontal panels. In panel A, we present the regression results for the full analytical sample; in panel B, we present the regression results for a sample of women who have lived in the area for at least ten years preceding the survey; and in panel C, we present the Oster bounds for the estimates of parameters based on the full analytical sample. We compute four sets of Oster bounds by varying  $\delta$  from 0.1 to 1 and using 1.3 times the R-square of the main regression as the value of  $R_{max}$ .

#### 4.1.1 Labor Force Participation

The results for women’s labor force participation based on the full sample are reported in Table 2, vertical Panel A. The coefficients of  $\log(1+\text{nighttime lights})$  (referred to as LNL hereafter) from the regression that uses ‘currently employed in paid work’ as the dependent variable (column 1) is 0.009, and that from the regression that uses ‘employed in paid work in the last twelve months’ as the dependent variable (column 2) is 0.003. The coefficient from the first regression is statistically significant at 1% level of significance. In terms of standard deviations (sd), it implies that the likelihood of currently employed in paid work increases by 0.019 sd due to one sd increase in LNL.<sup>23</sup> Alternatively, it implies that the likelihood of

<sup>22</sup>Alternatively, one could look at R-squares obtained in other studies in the same context that control reasonably well for the omitted variables, and set  $R_{max}$  as the average of R-squares of those studies. However, given the paucity of such studies that control reasonably well for omitted variable bias in context of India, we could not adopt this approach.

<sup>23</sup>The effect of a one sd increase in nighttime lights is equal to  $\frac{(Coefficient)*(StandardDeviationofnightlights)}{(StandardDeviationofoutcomevariable)}$ . The standard deviation of LNL (SD LNL) for every regression is provided in the tables. The standard deviation of the outcome variables are available in Table 1A.

currently employed in paid work increases by 0.009 due to a 100-percent increase in nighttime lights.<sup>24</sup> In terms of magnitude, it is equivalent to 4.4 percent of the average likelihood of paid employment in the pooled sample (i.e. 0.205, see Table 1A).

The coefficients of LNL from the regressions that use ‘currently employed in unpaid work’ (column 3) and ‘employed in unpaid work in the last twelve months’ (column 4) as the dependent variables in the separate regressions are -0.014 and -0.020, respectively. The coefficient from the first regression is statistically significant at 1% level of significance. Both these coefficients are statistically significant at a 1% level of significance. It implies that one sd increase in LNL reduces the likelihood of currently employed in unpaid work and employed in unpaid work in the last twelve months by 0.06 and 0.073 sd, respectively.

The analysis that uses the sample of women who have lived in the area for at least ten years preceding the survey (Panel B) produces the results in the same direction as reported based on the full sample (Panel A). In fact, we notice that the magnitude of the coefficients of urbanization from the regressions with outcomes related to paid work is higher compared to coefficients of urbanization from the baseline regressions with identical outcomes. Moreover, the coefficient of LNL from the regression that uses ‘employed in paid work in the last twelve months’ as the dependent variable (column 2) also seems to be statistically significant now. Specifically, for the sample of women who have lived in the area for at least ten years preceding the survey, we find a higher effect of LNL on ‘currently employed in paid work’ (from 0.009 to 0.014), and ‘employed in paid work in the last twelve months’ (from 0.003 to 0.007). These findings are reassuring as they suggest that endogenous sorting is unlikely to be driving our results.

The estimated Oster bounds on the “true” effect of LNL on employment in paid and unpaid work are reported in Panel C. These show that if the degree of selection on unobservables

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<sup>24</sup>It is important to note that the average of the nighttime lights in our sample is very low i.e. 2.77 units. Therefore, a 100-percent increase in nighttime lights indicates a movement from 2.77 to 5.53 units. That a 100-percent increase in nighttime lights does not represent a huge increase, can also be understood by noting that a movement from the first quartile of the nighttime lights distribution to the second quartile require approximately 153 percent increase in nighttime lights.



is 100% (or less) of the degree of selection on observables (i.e., selection on unobservables is not stronger than selection on observables), the effect of LNL on both the outcomes related to paid (unpaid) work is positive (negative). This provides clear evidence that our findings on labor force participation are robust to sufficiently high degrees of selection on unobservables.

### **4.1.2 Mobility**

The estimated effects of urbanization on the ability of women to travel alone to various places are reported in Table 3. The results based on the full sample indicate a positive effect of LNL on women’s ability to travel alone (Panel A). Specifically, the results show that one sd increase in LNL increases the likelihood of traveling alone to market, health facility, places outside their village/town, and at least one of three places by 0.062, 0.057, 0.029, and 0.049 sd, respectively. The estimates based on the sample of women who have lived in the area for at least ten years preceding the survey (Panel B) are in line with the estimates from the full sample (Panel A). The estimated Oster bounds (Panel C) further confirm that the effects of urbanization across all the mobility outcomes continue to remain positive irrespective of the degree of selection on unobservables considered.

### **4.1.3 Intra-Household Decision-Making Power**

Women’s intra-household decision-making power is captured through their ability to make decisions on their health care, large household purchases, their visits to friends or relatives, the usage of their husband’s income, and overall decision-making index. The results based on the full sample (Panel A) and sub-sample (Panel B) are reported in Table 4. Results in both panels indicate a positive effect of urbanization on intra-household decision-making power although the coefficients are statistically significant for two outcomes. Specifically, the results show that an additional sd of LNL increases the likelihood of women making a decision on large household purchases (their visits to friends or relatives) by 0.022 (0.016)

sd. The Oster bounds estimation (Panel C) reinforces the robustness of these coefficients with respect to the varying degrees of selection of unobservables.

#### **4.1.4 Access to Information**

In Table 5, we examine whether urbanization has any effect on women’s access to various modes of information and media, such as newspapers, radio, and television. The results based on the full sample (Panel A) and sub-sample (Panel B) show a positive effect of LNL on all the measures of women’s access to various modes of information and media. All the coefficients are statistically significant at 1% except for access to radio, which is significant at 10%. Specifically, increasing the LNL by one sd increases the likelihood of access to the newspaper by 0.038 sd, access to radio by 0.007 sd, access to television by 0.027 sd, access to at least one of the three modes of media by 0.027 sd, and access to the mobile phone by 0.05 sd. The Oster bounds (Panel C) indicate that the estimated effects of LNL are robust to selection on unobservables for the regression equations with outcomes that indicate whether the woman listens to radio (Column 2) and whether the woman has access to mobile phones (Column 5) as long as  $\delta$  is not more than 0.50. For other regressions, however, the estimated effect of LNL is robust for smaller values of  $\delta$ .

#### **4.1.5 Attitudes Towards IPV**

Next, we try to understand whether urbanization changes women’s attitudes toward IPV. Across the two panels (A and B) in Table 6, we find that women are less likely to justify IPV for one or more reasons due to an increase in LNL. Specifically, the likelihood of justifying IPV for at least one reason (Column 8) goes down by 0.026 sd with an additional sd of LNL. The Oster bounds estimates (Panel C) indicate that 7 out of the 8 coefficients are definitely negative as long as the extent of selection related to unobservable factors amounts to 50% (or less) of the extent of selection related to observable factors. These findings show that urbanization reduces women’s acceptability towards IPV.

#### 4.1.6 IPV

We examine how urbanization affects women’s exposure to IPV in Table 7. Results based on the full sample (Panel A) show that an extra sd of LNL increases the likelihood of women’s exposure to less severe physical violence (emotional violence) by 0.01 (0.011) sd. However, the effect of LNL on less severe physical violence is statistically insignificant for the sample of women living in the area for at least ten years preceding the survey. The Oster bounds estimates (Panel C) affirm the robustness of the effect of LNL on emotional violence regardless of the degrees of selection of unobservables.

While these results appear to suggest that urbanization increases women’s exposure to (some categories of) IPV, an alternative interpretation of the results is that urbanization does not actually increase women’s exposure to IPV; it simply makes them more likely to report incidences of IPV. The second interpretation, in fact, seems to be more credible in our case because we do find that urbanization improves women’s access to information and reduces their likelihood of justifying IPV. If women become more aware of the evils of IPV and become less tolerant of IPV, it is extremely likely that their likelihood to understand and report IPV will increase. This interpretation also seems plausible given that we find urbanization reduces marital stress (Table 7, Column 6). A reduction in marital stress due to higher urbanization is consistent with urbanization lowering actual IPV and increasing reporting of IPV.

#### 4.1.7 Health Outcomes

The estimated effects of urbanization on health outcomes are reported in Table 8. The results based on the full sample indicate that the effect of LNL on the health of women is somewhat mixed (Panel A). Specifically, the results show that a 100-percent increase in nighttime lights increases the WHZ by 0.061 sd, reduces the likelihood of suffering from anemia by 0.3 percentage points, reduces the HAZ by 0.043 sd, reduces the likelihood of having normal weight by 0.8 percentage points, and increases the likelihood of suffering from

major morbidity by 0.4 percentage points. The estimates based on the sample of women who have lived in the area for at least ten years preceding the survey (Panel B) are in line with the estimates from the full sample (Panel A). The estimated Oster bounds (Panel C) further confirm that the effects of urbanization across all the health outcomes are robust to sufficiently high degrees of selection on unobservables as a proportion of selection on observables.

#### **4.1.8 Ownership of Assets and Financial Access**

Table 9 reports the results of the effects of urbanization on three outcomes - women's ownership of a house, land, and access to money or a bank account. Estimates across the two panels show that the women's ownership of land and house goes down with the increasing units of LNL. Specifically, an additional sd of LNL reduces the likelihood of owning land (house) by 0.023 (0.066) sd. The effect of LNL on access to money or a bank account is statistically insignificant. The Oster bounds for land and house ownership as outcome variables do not include zero for all values of  $\delta$  suggesting that the estimated effects of LNL are robust to high degrees of selection on unobservables. The Oster bounds for access to money/bank account as the outcome variable also suggest that the estimated impact of LNL is robust provided that the degree of selection on unobservables is 25% of the degree of selection on observables.

#### **4.1.9 Husband's Education**

In Table 10, we examine the effects of urbanization on spousal education and the gap between women's own and spousal education. Results based on the full sample (Panel A) show that an additional sd of LNL reduces the likelihood of the husband being literate and increases the gap between the own and spousal education by 0.028 and 0.041 sd, respectively. These results are robust to the subsample of women living in the area for at least ten years preceding the survey (Panel B) and Oster bounds analysis (Panel C), irrespective of the degree of selection

of unobservables considered.

#### 4.1.10 Miscellaneous

In Table 11, we focus on women’s preference for sons over daughters as an indicator of their gender attitudes. Moreover, we also examine the effect of urbanization on access to health insurance. The results in panel A show that women are 0.011 sd less likely to report that, for them, their ideal number of sons is more than the ideal number of daughters with an additional sd of LNL. Finally, turning to women’s access to health insurance, we find that the likelihood of being covered by health insurance goes down by 0.026 sd with an extra sd of LNL. Results of both the outcome variables are robust to the subsample of women living in the area for at least ten years preceding the survey (Panel B) and Oster bounds analysis (Panel C) as long as the degree of selection on unobservables is 25% of the degree of selection on observables.

## 4.2 Heterogeneity

We examine the differential impact of urbanization on different measures of women’s empowerment by wealth (poor and non-poor), religion (Hindu and other religions), caste (disadvantaged/backward and forward), and region (Northern Indian states including the BIMARU<sup>25</sup> states and other states). The results are reported in Tables A1-A10 in the Appendix. For every case of heterogeneity analysis, we construct a separate binary variable that takes a value one if a woman belongs to the specific group and zero otherwise: Poor takes value one if a woman belongs to the poor or poorest wealth quintile and zero otherwise; Minority takes a value one if a woman belongs to a religion other than Hindu and zero otherwise; Disadvantaged Class takes a value one if a woman belongs to the Scheduled Caste (SC), Scheduled Tribes (ST), or Other Backward Classes (OBC) and zero otherwise; and NBIMARU takes a value one if a woman belongs to Bihar, Chandigarh, Chhattisgarh, Delhi, Haryana, Himachal

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<sup>25</sup>It is an acronym indicating a group of four states - Bihar, Madhya Pradesh, Rajasthan, Uttar Pradesh.

Pradesh, Jammu and Kashmir, Jharkhand, Madhya Pradesh, Punjab, Rajasthan, Uttarakhand, or Uttar Pradesh and zero otherwise. Each table consists of four panels. In panels A, B, C, and D, we present the regression results of the interactions between LNL and the binary variables - Poor, Minority, Disadvantaged Caste, and NBIMARU, respectively. The coefficient of the interaction between LNL and the binary variable for the specific subgroup shows the differential effect of urbanization by that subgroup.

We find evidence of some interesting differential effects by wealth, religion, caste, and region. The effect of LNL on labor market outcomes is higher among the poor as compared to the non-poor (Table A1, Panel A). The coefficients of the interaction between LNL and ‘Poor’ from the regression that uses ‘currently employed in paid work’ as the dependent variable (column 1) is 0.018, and that from the regression that uses ‘employed in paid work in the last twelve months’ as the dependent variable (column 2) is 0.017. It shows that a 100-percent increase in nighttime lights increases the likelihood of current employment in paid work (employed in paid work in the last twelve months) of women in the poor group by an extra 1.8 (1.7) percentage points relative to women in the non-poor group. We also find that the likelihood of current employment in unpaid work (employed in unpaid work in the last twelve months) of women in the poor group reduces by an extra 0.9 (1.2) percentage points relative to women in the non-poor group for a 100-percent increase in nighttime lights.

In Table A2, we find that the effect of urbanization on mobility outcomes is lower among women from other religions as compared to Hindu religion (Panel B) and disadvantaged caste as compared to forward caste (Panel C). In Table A4, we find that the positive effect of urbanization on the likelihood of access to at least one of the three modes of media is higher among women from poor wealth group as compared to non-poor wealth group caste (Panel A), other religions as compared to Hindu religion (Panel B), disadvantaged caste as compared to forward caste (Panel C), and Northern states as compared to other states (Panel D). In the same table, we also note the effect on the likelihood of access to the mobile phone is lower among women from other religions as compared to Hindu religion (Panel B) and

disadvantaged caste as compared to forward caste (Panel C). We also note a higher effect of urbanization on IPV among women from poor wealth group as compared to non-poor wealth group caste (Panel A) and disadvantaged caste as compared to forward caste (Table A6, Panel C).

In line with the main results, we continue to get mixed effects for health outcomes among different sub-groups as well (Table A7). For instance, the positive effect of urbanization on WHZ is lower among women from the poor wealth group as compared to the non-poor wealth group caste (Panel A) and disadvantaged caste as compared to the forward caste (Panel C). The negative effect of urbanization on the likelihood of having normal weight is higher among women from the poor wealth group as compared to the non-poor wealth group caste (Panel A) and other religions as compared to Hindu religion (Panel B). The effect of urbanization on the likelihood of suffering from major morbidity is lower among women from the poor wealth group as compared to the non-poor wealth group caste (Panel A) and disadvantaged caste as compared to the forward caste (Panel C). In the case of anemia as the outcome variable, the direction of the effect of urbanization changes with the social group. The likelihood of suffering from anemia increases (decreases) among the poor (non-poor) with the increasing degree of urbanization. Urbanization reduces the likelihood of suffering from anemia among the women from the forward caste, whereas it has no effect on the women from the disadvantaged caste.

We also find evidence of differential effect of urbanization on the ownership of the house (lower among women from poor wealth groups (Panel A, Table A8) and other religions (Panel B, Table A8) while higher among non-poor and Hindu religion), access to money or a bank account (higher among women from poor wealth groups while lower among non-poor (Panel A, Table A8)), the likelihood of husband being literate (lower among women from poor wealth groups (Panel A, Table A9) and forward caste (Panel C, Table A9) while higher among non-poor and disadvantaged caste), the gap between women's own and spousal education (higher among women from other religions (Panel B, Table A9) and disadvantaged caste (Panel C,

Table A9) while lower among Hindu religion and forward caste), and coverage by health insurance (lower among women from disadvantaged caste while higher among forward caste (Panel C, Table A10)).

## 5 Conclusion

We examined the short-term effects of urbanization on women empowerment in India. In theory, urbanization can affect women either positively or negatively. Women in urban areas, compared to their rural counterparts, are thought to enjoy greater social, economic, and political opportunities and freedoms. Further, gender norms prevailing in urban areas are also likely to be less regressive. At the same time, research shows barriers to women’s empowerment remain widespread in urban environments. We measured urbanization using satellite-based nighttime light intensity data. Fixed effects estimation results showed that urbanization positively affects women’s labor market participation, agency within households, mobility, access to information, and attitudes toward domestic violence (thereby making them more likely to report incidences of violence). However, the effect of urbanization on women’s financial autonomy is negative, and on health is mixed. We also documented some interesting heterogeneity in the relationship between urbanization and women’s empowerment.

The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a blueprint for peace and prosperity for people and the planet, now and into the future. At its core are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries in a global partnership.<sup>26</sup> SDG 5 aims to achieve gender equality and empower all women and girls. In India, achieving this goal has been a longstanding challenge due to deeply ingrained patriarchal attitudes, gender-based violence, and socioeconomic disparities. Our research suggests that policies and programs that seek to boost urbanization (e.g., Atal Mission for Rejuvenation and Urban Transformation (AM-

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<sup>26</sup><https://sdgs.un.org/goals>



RUT); Smart Cities Mission (SCM); Pradhan Mantri Awas Yojana – Urban (PMAY-U), etc.) can go a long way towards helping India achieve this goal. However, since we document some negative impacts of urbanization on women (especially on women’s health), the government—perhaps in collaboration with civil society organizations, and private sectors—also needs to devise complementary interventions that could mitigate these. This would ensure that urban centers become beacons of women empowerment, where women’s agency is celebrated, and their rights are upheld.

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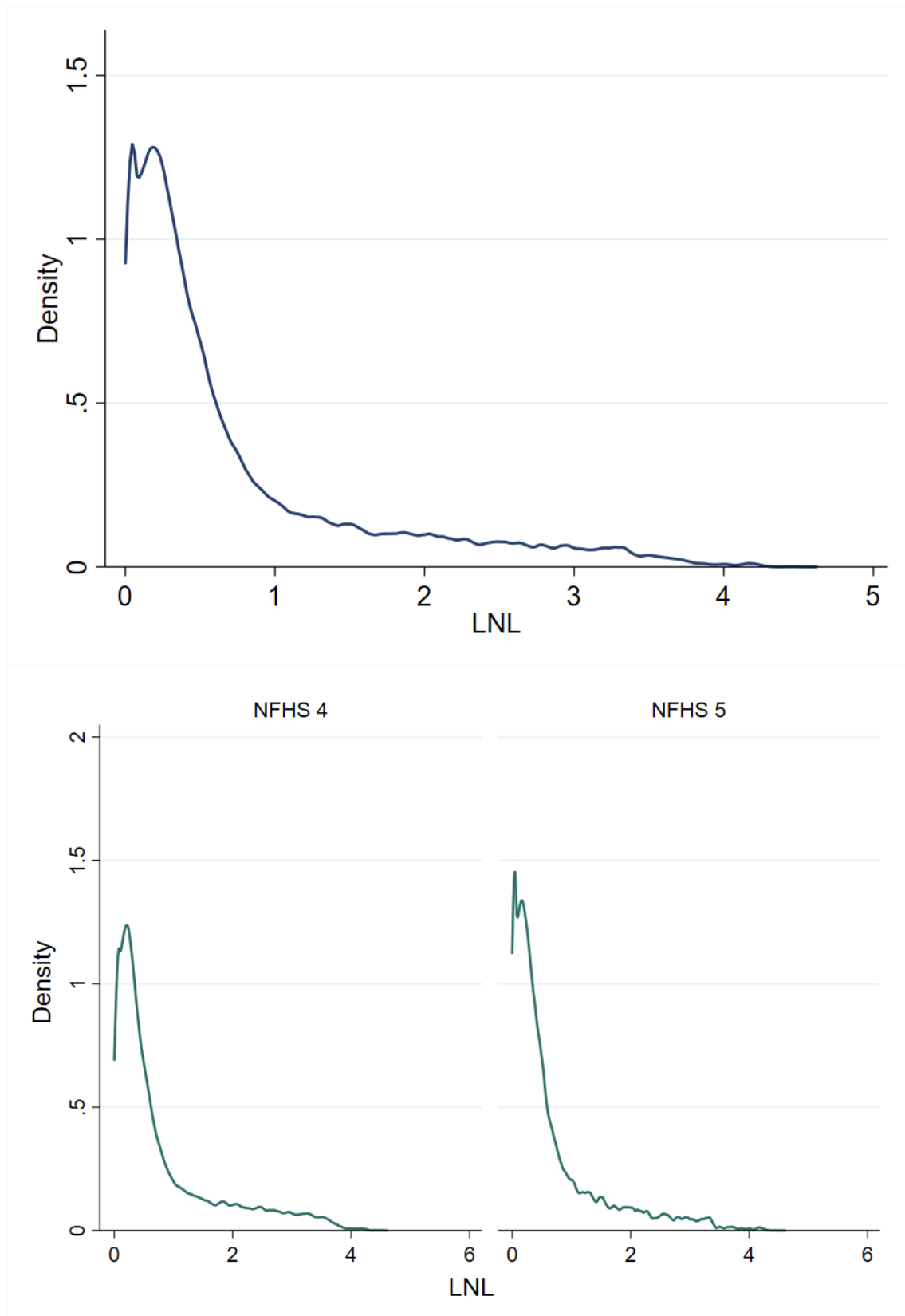
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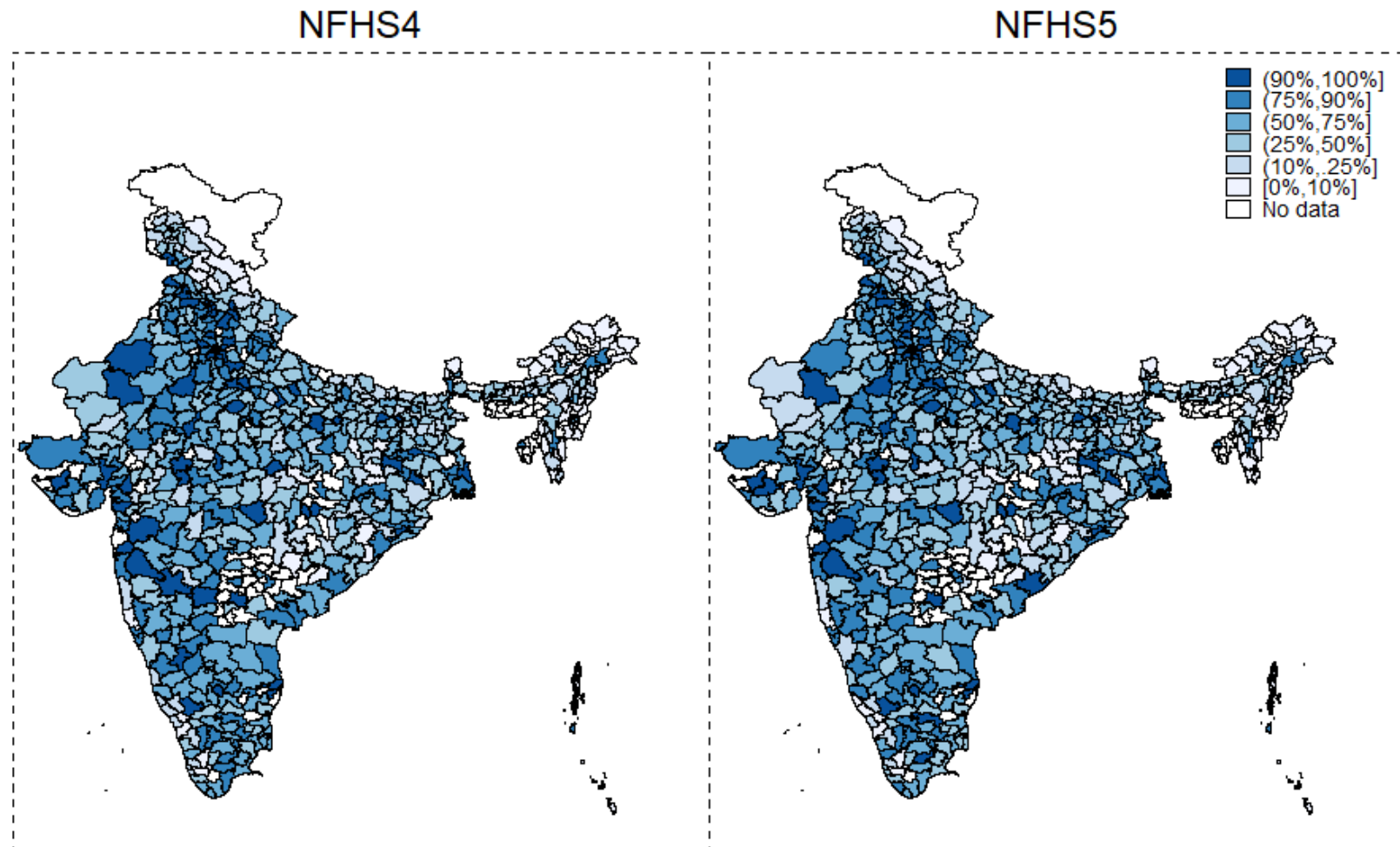
Fig 1: Kernel Density plot of explanatory variable for pooled sample (upper panel) and for two rounds of NFHS (lower panel)



Source: By authors using data from NFHS composite nighttime lights.



Fig 2: District level Map of Nighttime lights.



Source: District Coordinates from Survey of India (<https://onlinemaps.surveyofindia.gov.in/>) and Nighttime light from NFHS 4 and NFHS5 respectively.

Table 1A: Summary Statistics of Outcome Variables

Variable	Pooled			NFHS 4		NFHS 5	
	Obs	Mean	Std. Dev.	Obs	Mean	Obs	Mean
Labor Force Participations							
Currently employed in paid work	205655	0.205	0.404	113611	0.196	92044	0.216
Employed in paid work in the last twelve months	205655	0.253	0.435	113611	0.247	92044	0.26
Currently employed in unpaid work	205655	0.042	0.2	113611	0.041	92044	0.043
Employed in unpaid work in the last twelve months	205655	0.059	0.235	113611	0.06	92044	0.057
Mobility							
Traveling alone to market	205655	0.553	0.497	113611	0.543	92044	0.565
Traveling alone to health facility	205655	0.496	0.5	113611	0.487	92044	0.508
Traveling alone to places outside their village/town	205655	0.489	0.5	113611	0.479	92044	0.502
Mobility: At least one of three places	205655	0.618	0.486	113611	0.608	92044	0.63
Intra Household Decision Making Power							
Decisions regarding own health care	145218	0.783	0.412	80433	0.757	64785	0.816
Decisions regarding large household purchases	145218	0.766	0.424	80433	0.741	64785	0.795
Decisions regarding visits to family/relatives	145218	0.781	0.413	80433	0.753	64785	0.816
Decisions regarding what to do with husband's earning	141870	0.75	0.433	78622	0.726	63248	0.78
Intra Household Decision Making Power	144233	0.886	0.318	79764	0.87	64469	0.905
Access to Information							
Newspaper/Magazine	1262783	0.349	0.477	649142	0.382	613641	0.315
Radio	1262783	0.151	0.358	649142	0.161	613641	0.142
Television	1262783	0.734	0.442	649142	0.75	613641	0.717
Access to any of the information sources	1262783	0.774	0.418	649142	0.791	613641	0.756
Access to Mobile Phones	205655	0.489	0.5	113611	0.45	92044	0.538
Attitudes towards Intimate Partner Violence (IPV)							
Justifies IPV in the following cases:							
Goes out without informing husband	203222	0.214	0.41	111841	0.242	91381	0.18
Neglects the house or the children	205082	0.322	0.754	113611	0.384	91471	0.244
Argues with the husband	203347	0.241	0.428	111982	0.271	91365	0.204
Refuses to have sex with the husband	201920	0.12	0.325	111053	0.132	90867	0.105
Doesn't cook food properly	203833	0.161	0.367	112367	0.183	91466	0.134
Suspicion of being unfaithful	203112	0.211	0.408	111894	0.232	91218	0.184
Shows disrespect for in-laws	203468	0.331	0.471	112109	0.358	91359	0.298
Justifies IPV for any of the above reason	202622	0.467	0.499	111678	0.499	90944	0.428

Table 1A (Cont.): Summary Statistics of Outcome Variables

Variable	Pooled			NFHS 4		NFHS 5	
	Obs	Mean	Std. Dev.	Obs	Mean	Obs	Mean
Intimate Partner Violence							
Less Severe Physical Violence	116168	0.213	0.41	61981	0.211	54187	0.216
Severe Physical Violence	116168	0.063	0.243	61981	0.062	54187	0.064
Sexual Violence	116168	0.051	0.22	61981	0.054	54187	0.048
Emotional Violence	116168	0.107	0.309	61981	0.105	54187	0.109
Any Violence	116168	0.255	0.436	61981	0.253	54187	0.257
Marital Stress	116168	0.774	0.418	61981	0.785	54187	0.762
Health Status							
Height-for-Age Z-Score (HAZ)	1231514	-1.907	1.003	638416	-1.915	593098	-1.9
Weight-for-Age Z-Score (WHZ)	1220737	-0.837	1.175	633125	-0.918	587612	-0.75
Normal weight based on BMI	1232140	0.592	0.491	638621	0.591	593519	0.593
Anemia	1222554	0.537	0.499	636830	0.514	585724	0.561
Major Morbidity	1241929	0.056	0.229	637113	0.057	604816	0.054
Financial Autonomy							
Ownership of House	205655	0.42	0.494	113611	0.389	92044	0.457
Ownership of Land	205655	0.329	0.47	113611	0.303	92044	0.36
Access to money or a bank account	205655	0.739	0.439	113611	0.647	92044	0.853
Spouse Education							
Husband is literate	153870	0.807	0.394	85262	0.799	68608	0.818
Education gap between wife and husband	153870	-1.565	4.311	85262	-1.693	68608	-1.406
Miscellaneous							
Child preference toward son	1262783	0.187	0.39	649142	0.204	613641	0.169
Covered by health insurance	1262783	0.237	0.425	649142	0.174	613641	0.303

Table 1B: Summary Statistics of Main Explanatory Variables and Individuals/Households Controls

Variable	Pooled			NFHS 4		NFHS 5	
	Obs	Mean	Std. Dev.	Obs	Mean	Obs	Mean
<b>Nighttime Light</b>	1262783	2.766	6.686	649142	3.243	613641	2.261
<b>LNL - [log(1+Nighttime Lights)]</b>	1262783	0.752	0.862	649142	0.825	613641	0.675
<b>Age</b>	1262783	30.22	9.868	649142	29.973	613641	30.481
<b>Education</b>	1262783	7.013	5.19	649142	6.632	613641	7.415
<b>Current Marital Status</b>							
Never in union	1262783	0.25	0.433	649142	0.247	613641	0.253
Currently married	1262783	0.709	0.454	649142	0.713	613641	0.706
Others	1262783	0.041	0.197	649142	0.04	613641	0.041
<b>Religion</b>							
Hindu	1262783	0.754	0.431	649142	0.749	613641	0.759
Muslim	1262783	0.133	0.339	649142	0.136	613641	0.129
Others	1262783	0.113	0.317	649142	0.115	613641	0.112
<b>Caste</b>							
SC	1262783	0.189	0.391	649142	0.18	613641	0.198
ST	1262783	0.174	0.379	649142	0.174	613641	0.173
OBC	1262783	0.392	0.488	649142	0.396	613641	0.387
Others	1262783	0.196	0.397	649142	0.203	613641	0.189
Don't know/Missing	1262783	0.049	0.217	649142	0.047	613641	0.052
<b>Household Head Sex</b>							
Male	1262783	0.856	0.351	649142	0.868	613641	0.844
Female	1262783	0.144	0.351	649142	0.132	613641	0.156
<b>Household Size</b>	1262783	5.588	2.528	649142	5.748	613641	5.419
<b>Wealth</b>							
Poorest	1262783	0.202	0.401	649142	0.195	613641	0.209
Poorer	1262783	0.217	0.412	649142	0.214	613641	0.221
Middle	1262783	0.21	0.407	649142	0.21	613641	0.21
Richer	1262783	0.196	0.397	649142	0.197	613641	0.195
Richest	1262783	0.175	0.38	649142	0.184	613641	0.165

Table 1C: Summary Statistics of District level controls

Variable	Obs	Mean	Std. Dev.
Pre-Primary Government Schools	610	340.041	861.473
Primary Government Schools	610	1152.423	856.729
Middle Government Schools	610	474.643	332.737
Secondary Government Schools	610	158.911	152.42
Senior Secondary Government Schools	610	58.756	60.005
Arts and Science Government Colleges	610	6.369	10.463
Engineering Government Colleges	610	0.592	1.873
Medical Government Colleges	610	0.503	2.089
Management Government Institutions	610	0.741	3.835
Government Polytechnics	610	1.38	4.921
Vocational Government Training Institutes	610	4.144	8.714
Non-Formal Training Government Institute	610	35.29	134.637
Primary Health Centre Doctor	610	62.159	53.108
Maternity and child welfare Centre doctors	610	52.941	100.863
Mobile Health clinics Doctors	610	10.066	27.213
Hours of Power Supply in Summer	610	2.409	2.726
Hours of Power Supply in Winter	610	2.465	2.508
SC/ST Population (in percentage)	610	32	0.219
Literate Population (in percentage)	610	62	0.103

Table 2. Effect of Urbanization on Labor Market Outcomes

	[1]	[2]	[3]	[4]
	Currently employed in paid work	Employed in paid work in the last twelve months	Currently employed in unpaid work	Employed in unpaid work in the last twelve months
Panel A: Full Sample				
LNL	0.009*** (0.002)	0.003 (0.003)	-0.014*** (0.001)	-0.020*** (0.001)
Observations	205,655	205,655	205,655	205,655
R-squared	0.103	0.127	0.045	0.056
SD LNL	0.857	0.857	0.857	0.857
Panel B: Restricted Sample (Respondent living at the same place for at least 10 years)				
LNL	0.014*** (0.003)	0.007** (0.003)	-0.015*** (0.001)	-0.021*** (0.002)
Observations	140,999	140,999	140,999	140,999
R-squared	0.106	0.132	0.049	0.060
Panel C: Robustness to omitted variables for full sample: Oster bounds ( $R_{max} = 1.3R_{squared}$ )				
$\delta = 0.10$	[0.00909,0.00991]	[0.00330,0.00451]	[-0.01400,-0.01361]	[-0.01963,-0.01905]
$\delta = 0.25$	[0.00909,0.01124]	[0.00330,0.00648]	[-0.01400,-0.01297]	[-0.01963,-0.01812]
$\delta = 0.50$	[0.00909,0.01377]	[0.00330,0.01020]	[-0.01400,-0.01173]	[-0.01963,-0.01631]
$\delta = 1$	[0.00909,0.02040]	[0.00330,0.01997]	[-0.01400,-0.00832]	[-0.01963,-0.01127]

Notes: All specifications include controls for individual/household characteristics, district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard deviation of the log of nighttime light+1 has been reported in Panel A. The reported Oster bounds are obtained from the full sample with the main specification in Panel C. Standard errors in parentheses are clustered at district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table 3. Effect of Urbanization on Women's Mobility

	[1]	[2]	[3]	[4]
	<b>Traveling alone to market</b>	<b>Traveling alone to health facility</b>	<b>Traveling alone to places outside their village/town</b>	<b>Mobility: At least one of three places</b>
<b>Panel A: Full Sample</b>				
LNL	0.036*** (0.003)	0.033*** (0.003)	0.017*** (0.003)	0.028*** (0.003)
Observations	205,655	205,655	205,655	205,655
R-squared	0.150	0.152	0.135	0.137
SD LNL	0.857	0.857	0.857	0.857
<b>Panel B: Restricted Sample (Respondent living at the same place for at least 10 years)</b>				
LNL	0.037*** (0.003)	0.036*** (0.003)	0.017*** (0.003)	0.028*** (0.003)
Observations	140,999	140,999	140,999	140,999
R-squared	0.140	0.149	0.128	0.125
<b>Panel C: Robustness to omitted variables for full sample: Oster bounds (<math>R_{max} = 1.3R_{squared}</math>)</b>				
$\delta = 0.10$	[0.03547,0.03559]	[0.03299,0.03345]	[0.01719,0.01732]	[0.02789,0.02808]
$\delta = 0.25$	[0.03526,0.03559]	[0.03226,0.03345]	[0.01698,0.01732]	[0.02789,0.02838]
$\delta = 0.50$	[0.03487,0.03559]	[0.03085,0.03345]	[0.01658,0.01732]	[0.02789,0.02896]
$\delta = 1$	[0.03384,0.03559]	[0.02708,0.03345]	[0.01553,0.01732]	[0.02789,0.03050]

Notes: All specifications include controls for individual/household characteristics, district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard deviation of the log of nighttime light+1 has been reported in Panel A. The reported Oster bounds are obtained from the full sample with the main specification in Panel C. Standard errors in parentheses are clustered at district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table 4. Effect of Urbanization on Women's Intra-Households Decision Making

	[1]	[2]	[3]	[4]	[5]
	<b>Decisions regarding own health care</b>	<b>Decisions regarding large household purchases</b>	<b>Decisions regarding visits to family/relatives</b>	<b>Decisions regarding what to do with husband's earning</b>	<b>Intra Household Decision Making Power</b>
<b>Panel A: Full Sample</b>					
LNL	0.001 (0.003)	0.011*** (0.003)	0.008*** (0.003)	0.001 (0.003)	0.002 (0.002)
Observations	145,218	145,218	145,218	141,870	144,233
R-squared	0.055	0.061	0.066	0.052	0.047
SD LNL	0.847	0.847	0.847	0.849	0.848
<b>Panel B: Restricted Sample (Respondent living at the same place for at least 10 years)</b>					
LNL	0.002 (0.003)	0.010*** (0.003)	0.006* (0.003)	0.001 (0.003)	0.002 (0.002)
Observations	87,418	87,418	87,418	85,665	87,076
R-squared	0.054	0.056	0.060	0.052	0.045
<b>Panel C: Robustness to omitted variables for full sample: Oster bounds (<math>R_{max} = 1.3R_{squared}</math>)</b>					
$\delta = 0.10$	[0.00099,0.00106]	[0.01065,0.01073]	[0.00823,0.00825]	[0.00079,0.00096]	[0.00206,0.00216]
$\delta = 0.25$	[0.00087,0.00106]	[0.01065,0.01086]	[0.00823,0.00829]	[0.00051,0.00096]	[0.00190,0.00216]
$\delta = 0.50$	[0.00065,0.00106]	[0.01065,0.01111]	[0.00823,0.00835]	[-0.00001,0.00096]	[0.00159,0.00216]
$\delta = 1$	[0.00006,0.00106]	[0.01065,0.01177]	[0.00823,0.00853]	[-0.00140,0.00096]	[0.00078,0.00216]

Notes: All specifications include controls for individual/household characteristics, district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard deviation of the log of nighttime light+1 has been reported in Panel A. The reported Oster bounds are obtained from the full sample with the main specification in Panel C. Standard errors in parentheses are clustered at district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%



Table 5. Effect of Urbanization on Access to Information

	[1]	[2]	[3]	[4]	[5]
	<b>Read a newspaper or magazine</b>	<b>Listen to the radio</b>	<b>Watch television</b>	<b>Access to any of the information sources</b>	<b>Access to Mobile Phones</b>
<b>Panel A: Full Sample</b>					
LNL	0.021*** (0.001)	0.003* (0.002)	0.014*** (0.002)	0.013*** (0.002)	0.029*** (0.002)
Observations	1,262,783	1,262,783	1,262,783	1,262,783	205,655
R-squared	0.394	0.130	0.320	0.321	0.291
SD LNL	0.862	0.862	0.862	0.862	0.857
<b>Panel B: Restricted Sample (Respondent living at the same place for at least 10 years)</b>					
LNL	0.022*** (0.002)	0.003** (0.002)	0.018*** (0.002)	0.015*** (0.002)	0.032*** (0.002)
Observations	871,028	871,028	871,028	871,028	140,999
R-squared	0.412	0.136	0.319	0.322	0.288
<b>Panel C: Robustness to omitted variables for full sample: Oster bounds (Rmax = 1.3Rsquared )</b>					
$\delta = 0.10$	[0.01525,0.02059]	[0.00240,0.00269]	[0.00870,0.01427]	[0.00768,0.01271]	[0.02586,0.02868]
$\delta = 0.25$	[0.00672,0.02059]	[0.00193,0.00269]	[-0.00010,0.01427]	[-0.00029,0.01271]	[0.02132,0.02868]
$\delta = 0.50$	[-0.00909,0.02059]	[0.00102,0.00269]	[-0.01619,0.01427]	[-0.01490,0.01271]	[0.01271,0.02868]
$\delta = 1$	[-0.04992,0.02059]	[-0.00137,0.00269]	[-0.05706,0.01427]	[-0.05213,0.01271]	[-0.01002,0.02868]

Notes: All specifications include controls for individual/household characteristics, district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard deviation of the log of nighttime light+1 has been reported in Panel A. The reported Oster bounds are obtained from the full sample with the main specification in Panel C. Standard errors in parentheses are clustered at district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table 6. Effect of Urbanization on Attitude Toward Intimate Partner Violence (IPV)

	[1] IPV is justified if wife goes out without informing husband	[2] IPV is justified if wife neglects the house or the children	[3] IPV is justified if wife argues with the husband	[4] IPV is justified if wife refuses to have sex with the husband
Panel A: Full Sample				
LNL	-0.011*** (0.002)	-0.007* (0.004)	-0.012*** (0.002)	-0.005** (0.002)
Observations	203,222	205,082	203,347	201,920
R-squared	0.106	0.083	0.098	0.054
SD LNL	0.857	0.857	0.857	0.857
Panel B: Restricted Sample (Respondent living at the same place for at least 10 years)				
LNL	-0.013*** (0.003)	-0.009** (0.004)	-0.014*** (0.003)	-0.006*** (0.002)
Observations	139,129	140,512	139,247	138,007
R-squared	0.106	0.081	0.099	0.056
Panel C: Robustness to omitted variables for full sample: Oster bounds ( $R_{max} = 1.3R_{squared}$ )				
$\delta = 0.10$	[-0.01080,-0.01007]	[-0.00619,-0.00463]	[-0.01305,-0.01216]	[-0.00491,-0.00434]
$\delta = 0.25$	[-0.01080,-0.00888]	[-0.00619,-0.00209]	[-0.01305,-0.01072]	[-0.00491,-0.00343]
$\delta = 0.50$	[-0.01080,-0.00662]	[-0.00619,0.00271]	[-0.01305,-0.00798]	[-0.00491,-0.00169]
$\delta = 1$	[-0.01080,-0.00064]	[-0.00619,0.01536]	[-0.01305,-0.00071]	[-0.00491,0.00290]

Notes: All specifications include controls for individual/household characteristics, district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard deviation of the log of nighttime light+1 has been reported in Panel A. The reported Oster bounds are obtained from the full sample with the main specification in Panel C. Standard errors in parentheses are clustered at district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table 6 (cont..). Effect of Urbanization on Attitude Toward Intimate Partner Violence (IPV)

	[5] IPV is justified if wife doesn't cook food properly	[6] IPV is justified if husband suspects wife being unfaithful	[7] IPV is justified if wife shows disrespectful for in-laws	[8] Attitude toward IPV
Panel A: Full Sample				
LNL	-0.011*** (0.002)	-0.011*** (0.002)	-0.013*** (0.003)	-0.015*** (0.003)
Observations	203,833	203,112	203,468	202,622
R-squared	0.065	0.081	0.120	0.154
SD LNL	0.857	0.857	0.857	0.857
Panel B: Restricted Sample (Respondent living at the same place for at least 10 years)				
LNL	-0.011*** (0.002)	-0.013*** (0.003)	-0.015*** (0.003)	-0.017*** (0.003)
Observations	139,594	139,039	139,332	138,642
R-squared	0.067	0.083	0.122	0.152
Panel C: Robustness to omitted variables for full sample: Oster bounds (Rmax = 1.3Rsquared )				
$\delta = 0.10$	[-0.01060,-0.01000]	[-0.01089,-0.00993]	[-0.01287,-0.01155]	[-0.01509,-0.01343]
$\delta = 0.25$	[-0.01060,-0.00903]	[-0.01089,-0.00838]	[-0.01287,-0.00942]	[-0.01509,-0.01074]
$\delta = 0.50$	[-0.01060,-0.00719]	[-0.01089,-0.00543]	[-0.01287,-0.00538]	[-0.01509,-0.00565]
$\delta = 1$	[-0.01060,-0.00230]	[-0.01089,0.00235]	[-0.01287,0.00529]	[-0.01509,0.00778]

Notes: All specifications include controls for individual/household characteristics, district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard deviation of the log of nighttime light+1 has been reported in Panel A. The reported Oster bounds are obtained from the full sample with the main specification in Panel C. Standard errors in parentheses are clustered at district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table 7. Effect of Urbanization on Intimate Partner Violence

	[1]	[2]	[3]	[4]	[5]	[6]
	<b>Less Severe Physical Violence</b>	<b>Severe Physical Violence</b>	<b>Sexual Violence</b>	<b>Emotional Violence</b>	<b>Any Violence</b>	<b>Marital Stress</b>
<b>Panel A: Full Sample</b>						
LNL	0.005** (0.002)	0.002 (0.001)	0.001 (0.001)	0.004** (0.002)	0.004 (0.003)	-0.003 (0.003)
Observations	116,168	116,168	116,168	116,168	116,168	116,168
R-squared	0.090	0.048	0.031	0.045	0.090	0.086
SD LNL	0.849	0.849	0.849	0.849	0.849	0.849
<b>Panel B: Restricted Sample (Respondent living at the same place for at least 10 years)</b>						
LNL	0.002 (0.003)	0.002 (0.002)	0.001 (0.002)	0.005** (0.002)	0.002 (0.003)	-0.006* (0.003)
Observations	70,894	70,894	70,894	70,894	70,894	70,894
R-squared	0.092	0.049	0.034	0.048	0.091	0.085
<b>Panel C: Robustness to omitted variables for full sample: Oster bounds (Rmax = 1.3Rsquared )</b>						
$\delta = 0.10$	[0.00484,0.00616]	[0.00211,0.00266]	[0.00110,0.00143]	[0.00371,0.00434]	[0.00419,0.00563]	[-0.00279,-0.00208]
$\delta = 0.25$	[0.00484,0.00827]	[0.00211,0.00355]	[0.00110,0.00196]	[0.00371,0.00534]	[0.00419,0.00796]	[-0.00279,-0.00093]
$\delta = 0.50$	[0.00484,0.01226]	[0.00211,0.00524]	[0.00110,0.00298]	[0.00371,0.00724]	[0.00419,0.01234]	[-0.00279,0.00126]
$\delta = 1$	[0.00484,0.02265]	[0.00211,0.00962]	[0.00110,0.00563]	[0.00371,0.01219]	[0.00419,0.02376]	[-0.00279,0.00706]

Notes: All specifications include controls for individual/household characteristics, district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard deviation of the log of nighttime light+1 has been reported in Panel A. The reported Oster bounds are obtained from the full sample with the main specification in Panel C. Standard errors in parentheses are clustered at district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table 8. Effect of Urbanization on Health Status

	[1]	[2]	[3]	[4]	[5]
	Height-for-Age Z-Score (HAZ)	Weight-for-Age Z-Score (WHZ)	Normal weight measured by BMI	Anemia	Major Morbidity
Panel A: Full Sample					
LNL	-0.043*** (0.003)	0.061*** (0.004)	-0.008*** (0.001)	-0.003* (0.001)	0.004*** (0.001)
Observations	1,231,514	1,220,737	1,232,140	1,222,554	1,241,929
R-squared	0.112	0.170	0.027	0.058	0.044
SD LNL	0.856	0.857	0.856	0.856	0.864
Panel B: Restricted Sample (Respondent living at the same place for at least 10 years)					
LNL	-0.041*** (0.003)	0.063*** (0.005)	-0.009*** (0.001)	-0.003* (0.001)	0.005*** (0.001)
Observations	848,867	840,823	849,329	842,421	856,062
R-squared	0.111	0.176	0.027	0.059	0.044
Panel C: Robustness to omitted variables for full sample: Oster bounds (Rmax = 1.3R <sub>squared</sub> )					
$\delta = 0.10$	[-0.04841,-0.04256]	[0.05235,0.06143]	[-0.00815,-0.00668]	[-0.00251,-0.00238]	[0.00412,0.00446]
$\delta = 0.25$	[-0.05768,-0.04256]	[0.03787,0.06143]	[-0.00815,-0.00433]	[-0.00251,-0.00218]	[0.00357,0.00446]
$\delta = 0.50$	[-0.07472,-0.04256]	[0.01099,0.06143]	[-0.00815,0.00002]	[-0.00251,-0.00180]	[0.00251,0.00446]
$\delta = 1$	[-0.11755,-0.04256]	[-0.05859,0.06143]	[-0.00815,0.01129]	[-0.00251,-0.00079]	[-0.00028,0.00446]

Notes: All specifications include controls for individual/household characteristics, district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard deviation of the log of nighttime light+1 has been reported in Panel A. The reported Oster bounds are obtained from the full sample with the main specification in Panel C. Standard errors in parentheses are clustered at district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table 9. Effect of Urbanization on Financial Autonomy

	[1]	[2]	[3]
	Ownership of House	Ownership of Land	Access to money or a bank account
Panel A: Full Sample			
LNL	-0.013*** (0.003)	-0.036*** (0.003)	0.003 (0.002)
Observations	205,655	205,655	205,655
R-squared	0.143	0.120	0.154
SD LNL	0.857	0.857	0.857
Panel B: Restricted Sample (Respondent living at the same place for at least 10 years)			
LNL	-0.008** (0.004)	-0.036*** (0.003)	0.002 (0.003)
Observations	140,999	140,999	140,999
R-squared	0.153	0.125	0.153
Panel C: Robustness to omitted variables for full sample: Oster bounds (Rmax = 1.3R <sup>squared</sup> )			
$\delta = 0.10$	[-0.01310,-0.01210]	[-0.03567,-0.03481]	[0.00114,0.00255]
$\delta = 0.25$	[-0.01310,-0.01048]	[-0.03567,-0.03342]	[-0.00113,0.00255]
$\delta = 0.50$	[-0.01310,-0.00739]	[-0.03567,-0.03074]	[-0.00544,0.00255]
$\delta = 1$	[-0.01310,0.00078]	[-0.03567,-0.02352]	[-0.01675,0.00255]

Notes: All specifications include controls for individual/household characteristics, district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard deviation of the log of nighttime light+1 has been reported in Panel A. The reported Oster bounds are obtained from the full sample with the main specification in Panel C. Standard errors in parentheses are clustered at district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table 10. Effect of Urbanization on Spouse Education

	[1]	[2]
	Husband is literate	Education gap between wife and husband
Panel A: Full Sample		
LNL	-0.013*** (0.002)	0.207*** (0.024)
Observations	153,870	153,870
R-squared	0.254	0.319
SD LNL	0.848	0.848
Panel B: Restricted Sample (Respondent living at the same place for at least 10 years)		
LNL	-0.016*** (0.002)	0.219*** (0.030)
Observations	94,184	94,184
R-squared	0.255	0.299
Panel C: Robustness to omitted variables for full sample: Oster bounds ( $R_{\max} = 1.3R_{\text{squared}}$ )		
$\delta = 0.10$	[-0.01597,-0.01275]	[0.20605,0.20688]
$\delta = 0.25$	[-0.02110,-0.01275]	[0.20470,0.20688]
$\delta = 0.50$	[-0.03056,-0.01275]	[0.20214,0.20688]
$\delta = 1$	[-0.05451,-0.01275]	[0.19541,0.20688]

Notes: All specifications include controls for individual/household characteristics, district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard deviation of the log of nighttime light+1 has been reported in Panel A. The reported Oster bounds are obtained from the full sample with the main specification in Panel C. Standard errors in parentheses are clustered at district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table 11. Effect of Urbanization on Miscellaneous outcomes

	[1]	[2]
	Child preference toward son	Have a health insurance
<b>Panel A: Full Sample</b>		
LNL	-0.005*** (0.001)	-0.013*** (0.002)
Observations	1,262,783	1,262,783
R-squared	0.087	0.285
SD LNL	0.862	0.862
<b>Panel B: Restricted Sample (Respondent living at the same place for at least 10 years)</b>		
LNL	-0.006*** (0.001)	-0.011*** (0.002)
Observations	871,028	871,028
R-squared	0.092	0.304
<b>Panel C: Robustness to omitted variables for full sample: Oster bounds (Rmax = 1.3R<sup>squared</sup>)</b>		
$\delta = 0.10$	[-0.00476,-0.00331]	[-0.01281,-0.01182]
$\delta = 0.25$	[-0.00476,-0.00096]	[-0.01281,-0.01021]
$\delta = 0.50$	[-0.00476,0.00343]	[-0.01281,-0.00716]
$\delta = 1$	[-0.00476,0.01491]	[-0.01281,0.00094]

Notes: All specifications include controls for individual/household characteristics, district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard deviation of the log of nighttime light+1 has been reported in Panel A. The reported Oster bounds are obtained from the full sample with the main specification in Panel C. Standard errors in parentheses are clustered at district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%



# APPENDIX

Table A1. Heterogeneity test on Labor Market Outcomes

	[1]	[2]	[3]	[3]
	Currently employed in paid work	Employed in paid work in the last twelve months	Currently employed in unpaid work	Employed in unpaid work in the last twelve months
<b>Panel A: Wealth</b>				
LNL×Poor	0.018*** (0.005)	0.017*** (0.005)	-0.009*** (0.002)	-0.012*** (0.002)
LNL	0.006** (0.002)	0.001 (0.003)	-0.013*** (0.001)	-0.018*** (0.001)
Poor	0.126*** (0.006)	0.167*** (0.007)	0.024*** (0.003)	0.031*** (0.004)
Observations	205,655	205,655	205,655	205,655
R-squared	0.103	0.127	0.045	0.056
<b>Panel B: Religion</b>				
LNL×Minority	0.001 (0.004)	0.005 (0.004)	0.003 (0.002)	0.003 (0.002)
LNL	0.009*** (0.002)	0.002 (0.003)	-0.015*** (0.001)	-0.020*** (0.001)
Minority	-0.003 (0.007)	-0.010 (0.007)	-0.003 (0.004)	-0.002 (0.005)
Observations	205,655	205,655	205,655	205,655
R-squared	0.103	0.127	0.045	0.056
<b>Panel C: Caste</b>				
LNL×DisadvCaste	-0.003 (0.003)	-0.007* (0.003)	-0.002 (0.001)	-0.004** (0.002)
LNL	0.012*** (0.003)	0.009*** (0.003)	-0.012*** (0.001)	-0.017*** (0.002)
DisadvCaste	0.040*** (0.015)	0.040** (0.016)	-0.024** (0.011)	-0.029** (0.013)
Observations	195,844	195,844	195,844	195,844
R-squared	0.104	0.128	0.045	0.056
<b>Panel D: Region</b>				
LNL×NBIMARU	0.007* (0.004)	0.008* (0.004)	-0.001 (0.002)	-0.002 (0.002)
LNL	0.007** (0.003)	0.001 (0.003)	-0.014*** (0.001)	-0.019*** (0.002)
NBIMARU	-0.058 (0.036)	-0.036 (0.044)	-0.003 (0.011)	-0.002 (0.013)
Observations	205,655	205,655	205,655	205,655
R-squared	0.103	0.127	0.045	0.056

Notes: The wealth binary variable in Panel A includes Poor(=1) and Non-Poor(=0). Panel B, the religion dummy, comprised of minority(=1), which provides for other than Hindu and majority(=1), which includes Hindu only. In Panel C, the caste dummy comprises backward(=1) and forward(=0) castes, and Panel D region comprises Northern, including the BIMARU(=1) states and other states(=0). All specifications include controls for individual/household characteristics and district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard errors in parentheses are clustered at the district level.

\*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table A2. Heterogeneity test on Women's Mobility

	[1]	[2]	[3]	[4]
	Traveling alone to market	Traveling alone to health facility	Traveling alone to places outside their village/town	Mobility: At least one of three places
<b>Panel A: Wealth</b>				
LNL×Poor	0.005 (0.005)	0.010* (0.005)	0.008 (0.005)	0.007 (0.005)
LNL	0.035*** (0.003)	0.032*** (0.003)	0.016*** (0.003)	0.027*** (0.003)
Poor	-0.030*** (0.007)	-0.016** (0.007)	0.011 (0.007)	-0.004 (0.007)
Observations	205,655	205,655	205,655	205,655
R-squared	0.150	0.152	0.135	0.137
<b>Panel B: Religion</b>				
LNL×Minority	-0.024*** (0.005)	-0.023*** (0.005)	-0.020*** (0.004)	-0.026*** (0.005)
LNL	0.041*** (0.003)	0.038*** (0.003)	0.022*** (0.003)	0.034*** (0.003)
Minority	0.023*** (0.007)	0.018** (0.007)	0.028*** (0.007)	0.026*** (0.007)
Observations	205,655	205,655	205,655	205,655
R-squared	0.150	0.152	0.136	0.137
<b>Panel C: Caste</b>				
LNL×DisadvCaste	-0.014*** (0.004)	-0.010** (0.004)	-0.014*** (0.004)	-0.012*** (0.004)
LNL	0.046*** (0.004)	0.042*** (0.004)	0.028*** (0.004)	0.038*** (0.004)
DisadvCaste	0.038** (0.018)	0.036* (0.019)	0.063*** (0.019)	0.045** (0.019)
Observations	195,844	195,844	195,844	195,844
R-squared	0.151	0.153	0.136	0.138
<b>Panel D: Region</b>				
LNL×NBIMARU	0.004 (0.005)	0.009* (0.005)	0.015*** (0.005)	0.008 (0.005)
LNL	0.034*** (0.003)	0.031*** (0.003)	0.013*** (0.003)	0.026*** (0.003)
NBIMARU	-0.016 (0.036)	-0.026 (0.040)	0.022 (0.036)	-0.042 (0.028)
Observations	205,655	205,655	205,655	205,655
R-squared	0.150	0.152	0.135	0.137

Notes: The wealth binary variable in Panel A includes Poor(=1) and Non-Poor(=0). Panel B, the religion dummy, comprised of minority(=1), which provides for other than Hindu and majority(=1), which includes Hindu only. In Panel C, the caste dummy comprises backward(=1) and forward(=0) castes, and Panel D region comprises Northern, including the BIMARU(=1) states and other states(=0). All specifications include controls for individual/household characteristics and district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard errors in parentheses are clustered at the district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table A3. Heterogeneity test on Women's Intra-Households Decision Making

	[1]	[2]	[3]	[4]	[5]
	Decisions regarding own health care	Decisions regarding large household purchases	Decisions regarding visits to family/relatives	Decisions regarding what to do with husband's earning	Intra Household Decision Making Power
<b>Panel A: Wealth</b>					
LNL×Poor	0.001 (0.005)	-0.002 (0.005)	-0.002 (0.005)	-0.001 (0.005)	-0.004 (0.004)
LNL	0.001 (0.003)	0.011*** (0.003)	0.009*** (0.003)	0.001 (0.003)	0.003 (0.002)
Poor	-0.002 (0.006)	-0.000 (0.006)	-0.005 (0.006)	-0.004 (0.007)	-0.009* (0.005)
Observations	145,218	145,218	145,218	141,870	144,233
R-squared	0.055	0.061	0.066	0.052	0.047
<b>Panel B: Religion</b>					
LNL×Minority	-0.003 (0.004)	-0.011** (0.005)	-0.003 (0.004)	-0.006 (0.004)	-0.002 (0.003)
LNL	0.002 (0.003)	0.013*** (0.003)	0.009*** (0.003)	0.002 (0.003)	0.003 (0.002)
Minority	0.015** (0.006)	0.011 (0.007)	0.006 (0.006)	0.017** (0.007)	0.009* (0.005)
Observations	145,218	145,218	145,218	141,870	144,233
R-squared	0.055	0.061	0.066	0.052	0.047
<b>Panel C: Caste</b>					
LNL×DisadvCaste	-0.004 (0.004)	-0.003 (0.004)	-0.004 (0.004)	-0.004 (0.004)	-0.005* (0.003)
LNL	0.005 (0.003)	0.014*** (0.003)	0.012*** (0.003)	0.005 (0.003)	0.007*** (0.002)
DisadvCaste	0.044** (0.020)	0.066*** (0.021)	0.039* (0.020)	0.017 (0.021)	0.030* (0.016)
Observations	138,576	138,576	138,576	135,343	137,609
R-squared	0.056	0.063	0.067	0.053	0.048
<b>Panel D: Region</b>					
LNL×NBIMARU	-0.004 (0.005)	-0.007 (0.005)	-0.005 (0.005)	-0.005 (0.005)	-0.002 (0.004)
LNL	0.002 (0.003)	0.013*** (0.003)	0.010*** (0.003)	0.002 (0.003)	0.003 (0.002)
NBIMARU	-0.001 (0.040)	0.026 (0.041)	0.027 (0.035)	-0.022 (0.033)	0.012 (0.033)
Observations	145,218	145,218	145,218	141,870	144,233
R-squared	0.055	0.061	0.066	0.052	0.047

Notes: The wealth binary variable in Panel A includes Poor(=1) and Non-Poor(=0). Panel B, the religion dummy, comprised of minority(=1), which provides for other than Hindu and majority(=1), which includes Hindu only. In Panel C, the caste dummy comprises backward(=1) and forward(=0) castes, and Panel D region comprises Northern, including the BIMARU(=1) states and other states(=0). All specifications include controls for individual/household characteristics and district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard errors in parentheses are clustered at the district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table A4. Heterogeneity test on Access to Information

	[1]	[2]	[3]	[4]	[5]
	Read a newspaper or magazine	Listen to the radio	Watch television	Access to any of the information sources	Access to Mobile Phones
<b>Panel A: Wealth</b>					
LNL×Poor	-0.006** (0.002)	0.002 (0.002)	0.034*** (0.004)	0.030*** (0.004)	-0.006 (0.005)
LNL	0.021*** (0.002)	0.002 (0.002)	0.009*** (0.002)	0.008*** (0.002)	0.030*** (0.002)
Poor	-0.208*** (0.004)	-0.060*** (0.003)	-0.448*** (0.006)	-0.380*** (0.005)	-0.288*** (0.007)
Observations	1,262,783	1,262,783	1,262,783	1,262,783	205,655
R-squared	0.395	0.130	0.320	0.322	0.291
<b>Panel B: Religion</b>					
LNL×Minority	-0.013*** (0.002)	-0.006** (0.002)	0.021*** (0.003)	0.016*** (0.002)	-0.007** (0.004)
LNL	0.023*** (0.002)	0.004** (0.002)	0.010*** (0.002)	0.009*** (0.002)	0.030*** (0.002)
Minority	0.017*** (0.004)	-0.000 (0.004)	-0.027*** (0.004)	-0.020*** (0.004)	0.019*** (0.007)
Observations	1,262,783	1,262,783	1,262,783	1,262,783	205,655
R-squared	0.395	0.130	0.320	0.321	0.291
<b>Panel C: Caste</b>					
LNL×DisadvCaste	-0.006*** (0.002)	0.000 (0.002)	0.010*** (0.002)	0.013*** (0.002)	-0.015*** (0.003)
LNL	0.025*** (0.002)	0.003 (0.002)	0.007*** (0.002)	0.003* (0.002)	0.040*** (0.003)
DisadvCaste	0.038*** (0.006)	0.016*** (0.006)	0.040*** (0.007)	0.038*** (0.007)	0.028* (0.015)
Observations	1,206,612	1,206,612	1,206,612	1,206,612	195,844
R-squared	0.395	0.114	0.323	0.323	0.293
<b>Panel D: Region</b>					
LNL×NBIMARU	-0.002 (0.003)	0.004 (0.003)	0.003 (0.003)	0.007** (0.003)	0.002 (0.004)
LNL	0.021*** (0.002)	0.001 (0.002)	0.013*** (0.002)	0.010*** (0.002)	0.028*** (0.002)
NBIMARU	-0.059* (0.034)	-0.030 (0.027)	0.026 (0.018)	0.016 (0.014)	0.041 (0.036)
Observations	1,262,783	1,262,783	1,262,783	1,262,783	205,655
R-squared	0.395	0.130	0.320	0.321	0.291

Notes: The wealth binary variable in Panel A includes Poor(=1) and Non-Poor(=0). Panel B, the religion dummy, comprised of minority(=1), which provides for other than Hindu and majority(=0), which includes Hindu only. In Panel C, the caste dummy comprises backward(=1) and forward(=0) castes, and Panel D region comprises Northern, including the BIMARU(=1) states and other states(=0). All specifications include controls for individual/household characteristics and district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard errors in parentheses are clustered at the district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table A5. Heterogeneity test on Attitude Toward Intimate Partner Violence (IPV)

	[1] IPV is justified if wife goes out without informing husband	[2] IPV is justified if wife neglects the house or the children	[3] IPV is justified if wife argues with the husband	[4] IPV is justified if wife refuses to have sex with the husband
<b>Panel A: Wealth</b>				
LNL×Poor	-0.003 (0.004)	-0.017** (0.007)	-0.003 (0.005)	-0.004 (0.004)
LNL	-0.010*** (0.002)	-0.004 (0.004)	-0.013*** (0.003)	-0.004** (0.002)
Poor	0.070*** (0.005)	0.091*** (0.010)	0.078*** (0.006)	0.044*** (0.005)
Observations	203,222	205,082	203,347	201,920
R-squared	0.106	0.083	0.098	0.054
<b>Panel B: Religion</b>				
LNL×Minority	-0.003 (0.004)	-0.009 (0.006)	-0.004 (0.004)	-0.003 (0.003)
LNL	-0.010*** (0.002)	-0.004 (0.004)	-0.012*** (0.003)	-0.004** (0.002)
Minority	0.009 (0.006)	0.031*** (0.011)	0.007 (0.006)	0.009* (0.005)
Observations	203,222	205,082	203,347	201,920
R-squared	0.106	0.083	0.098	0.054
<b>Panel C: Caste</b>				
LNL×DisadvCaste	0.003 (0.003)	0.000 (0.005)	0.002 (0.003)	0.000 (0.002)
LNL	-0.013*** (0.003)	-0.007 (0.005)	-0.014*** (0.003)	-0.005** (0.002)
DisadvCaste	-0.023 (0.018)	-0.151*** (0.042)	-0.037* (0.020)	-0.019 (0.014)
Observations	193,566	195,305	193,695	192,356
R-squared	0.099	0.083	0.092	0.050
<b>Panel D: Region</b>				
LNL×NBIMARU	0.010** (0.004)	0.006 (0.006)	0.012*** (0.005)	0.003 (0.003)
LNL	-0.014*** (0.003)	-0.008* (0.004)	-0.017*** (0.003)	-0.006*** (0.002)
NBIMARU	0.020 (0.030)	-0.037 (0.039)	-0.039 (0.046)	-0.029 (0.038)
Observations	203,222	205,082	203,347	201,920
R-squared	0.106	0.083	0.098	0.054

Notes: The wealth binary variable in Panel A includes Poor(=1) and Non-Poor(=0). Panel B, the religion dummy, comprised of minority(=1), which provides for other than Hindu and majority(=1), which includes Hindu only. In Panel C, the caste dummy comprises backward(=1) and forward(=0) castes, and Panel D region comprises Northern, including the BIMARU(=1) states and other states(=0). All specifications include controls for individual/household characteristics and district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard errors in parentheses are clustered at the district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table A5 (cont..). Heterogeneity test on Attitude Toward Intimate Partner Violence (IPV)

	[5] IPV is justified if wife doesn't cook food properly	[6] IPV is justified if husband suspects wife being unfaithful	[7] IPV is justified if wife shows disrespectful for in-laws	[8] Attitude toward IPV
<b>Panel A: Wealth</b>				
LNL×Poor	-0.002 (0.004)	-0.001 (0.004)	-0.001 (0.005)	-0.001 (0.006)
LNL	-0.010*** (0.002)	-0.011*** (0.002)	-0.013*** (0.003)	-0.015*** (0.003)
Poor	0.057*** (0.005)	0.061*** (0.006)	0.073*** (0.007)	0.102*** (0.007)
Observations	203,833	203,112	203,468	202,622
R-squared	0.065	0.081	0.120	0.154
<b>Panel B: Religion</b>				
LNL×Minority	-0.004 (0.003)	-0.009** (0.004)	-0.006 (0.004)	-0.001 (0.005)
LNL	-0.010*** (0.002)	-0.009*** (0.002)	-0.012*** (0.003)	-0.015*** (0.003)
Minority	0.008 (0.005)	0.004 (0.006)	0.010 (0.008)	0.005 (0.008)
Observations	203,833	203,112	203,468	202,622
R-squared	0.065	0.081	0.120	0.154
<b>Panel C: Caste</b>				
LNL×DisadvCaste	0.000 (0.003)	0.003 (0.003)	0.003 (0.004)	0.004 (0.004)
LNL	-0.011*** (0.003)	-0.013*** (0.003)	-0.014*** (0.004)	-0.018*** (0.004)
DisadvCaste	-0.012 (0.016)	-0.019 (0.019)	-0.052** (0.022)	-0.052** (0.022)
Observations	194,136	193,449	193,798	192,990
R-squared	0.065	0.076	0.119	0.152
<b>Panel D: Region</b>				
LNL×NBIMARU	0.009** (0.004)	0.004 (0.004)	0.006 (0.005)	0.008 (0.006)
LNL	-0.013*** (0.002)	-0.012*** (0.003)	-0.015*** (0.003)	-0.017*** (0.003)
NBIMARU	-0.038 (0.031)	0.011 (0.047)	0.028 (0.040)	-0.021 (0.044)
Observations	203,833	203,112	203,468	202,622
R-squared	0.065	0.081	0.120	0.154

Notes: The wealth binary variable in Panel A includes Poor(=1) and Non-Poor(=0). Panel B, the religion dummy, comprised of minority(=1), which provides for other than Hindu and majority(=1), which includes Hindu only. In Panel C, the caste dummy comprises backward(=1) and forward(=0) castes, and Panel D region comprises Northern, including the BIMARU(=1) states and other states(=0). All specifications include controls for individual/household characteristics and district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard errors in parentheses are clustered at the district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table A6. Heterogeneity test on Intimate Partner Violence

	[1]	[2]	[3]	[4]	[5]	[6]
	Less Severe Physical Violence	Severe Physical Violence	Sexual Violence	Emotional Violence	Any Violence	Marital Stress
<b>Panel A: Wealth</b>						
LNL×Poor	0.010* (0.005)	0.008** (0.003)	0.004 (0.003)	0.012*** (0.004)	0.008 (0.006)	-0.001 (0.005)
LNL	0.003 (0.002)	0.001 (0.001)	0.000 (0.001)	0.002 (0.002)	0.003 (0.003)	-0.003 (0.003)
Poor	0.107*** (0.007)	0.048*** (0.004)	0.030*** (0.004)	0.054*** (0.005)	0.116*** (0.007)	0.049*** (0.007)
Observations	116,168	116,168	116,168	116,168	116,168	116,168
R-squared	0.090	0.048	0.031	0.045	0.090	0.086
<b>Panel B: Religion</b>						
LNL×Minority	-0.003 (0.004)	0.001 (0.002)	-0.000 (0.002)	-0.000 (0.003)	-0.005 (0.004)	0.001 (0.004)
LNL	0.005** (0.003)	0.002 (0.001)	0.001 (0.001)	0.004* (0.002)	0.005* (0.003)	-0.003 (0.003)
Minority	-0.005 (0.008)	0.001 (0.004)	0.006 (0.003)	-0.007 (0.005)	-0.005 (0.008)	-0.012 (0.008)
Observations	116,168	116,168	116,168	116,168	116,168	116,168
R-squared	0.090	0.048	0.031	0.045	0.090	0.086
<b>Panel C: Caste</b>						
LNL×DisadvCaste	0.010*** (0.004)	0.003** (0.002)	0.002 (0.002)	0.002 (0.003)	0.008* (0.004)	0.003 (0.004)
LNL	-0.001 (0.003)	-0.000 (0.002)	0.000 (0.002)	0.003 (0.003)	-0.000 (0.004)	-0.004 (0.004)
DisadvCaste	0.070*** (0.018)	0.018* (0.011)	0.019* (0.011)	0.039*** (0.013)	0.072*** (0.020)	0.028 (0.021)
Observations	110,869	110,869	110,869	110,869	110,869	110,869
R-squared	0.090	0.048	0.031	0.045	0.091	0.086
<b>Panel D: Region</b>						
LNL×NBIMARU	0.006 (0.005)	0.003 (0.002)	0.002 (0.002)	-0.002 (0.003)	0.005 (0.005)	-0.006 (0.005)
LNL	0.003 (0.003)	0.001 (0.002)	0.000 (0.001)	0.004** (0.002)	0.003 (0.003)	-0.001 (0.003)
NBIMARU	0.026 (0.036)	0.027 (0.022)	-0.024 (0.023)	-0.001 (0.029)	0.022 (0.044)	-0.038 (0.045)
Observations	116,168	116,168	116,168	116,168	116,168	116,168
R-squared	0.090	0.048	0.031	0.045	0.090	0.086

Notes: The wealth binary variable in Panel A includes Poor(=1) and Non-Poor(=0). Panel B, the religion dummy, comprised of minority(=1), which provides for other than Hindu and majority(=1), which includes Hindu only. In Panel C, the caste dummy comprises backward(=1) and forward(=0) castes, and Panel D region comprises Northern, including the BIMARU(=1) states and other states(=0). All specifications include controls for individual/household characteristics and district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard errors in parentheses are clustered at the district level.

\*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%



Table A7. Heterogeneity test on Health Status

	[1]	[2]	[3]	[4]	[5]
	Height-for-Age Z-Score (HAZ)	Weight-for-Age Z-Score (WHZ)	Normal weight measured by BMI	Anemia	Major Morbidity
<b>Panel A: Wealth</b>					
LNL×Poor	0.001 (0.005)	-0.024*** (0.008)	-0.007*** (0.002)	0.005** (0.002)	-0.004*** (0.001)
LNL	-0.043*** (0.003)	0.065*** (0.005)	-0.007*** (0.001)	-0.003** (0.001)	0.005*** (0.001)
Poor	-0.298*** (0.007)	-0.724*** (0.011)	0.057*** (0.004)	0.052*** (0.003)	-0.025*** (0.001)
Observations	1,231,514	1,220,737	1,232,140	1,222,554	1,241,929
R-squared	0.112	0.170	0.027	0.058	0.044
<b>Panel B: Religion</b>					
LNL×Minority	0.012*** (0.005)	-0.006 (0.006)	-0.004** (0.002)	-0.000 (0.002)	0.000 (0.001)
LNL	-0.045*** (0.003)	0.063*** (0.004)	-0.007*** (0.001)	-0.002* (0.001)	0.004*** (0.001)
Minority	0.045*** (0.010)	0.071*** (0.010)	0.004 (0.004)	-0.008* (0.005)	0.002 (0.002)
Observations	1,231,514	1,220,737	1,232,140	1,222,554	1,241,929
R-squared	0.112	0.170	0.027	0.058	0.044
<b>Panel C: Caste</b>					
LNL×DisadvCaste	0.000 (0.004)	-0.016*** (0.005)	0.002 (0.002)	0.007*** (0.002)	-0.001** (0.001)
LNL	-0.043*** (0.005)	0.074*** (0.006)	-0.010*** (0.002)	-0.007*** (0.002)	0.006*** (0.001)
DisadvCaste	-0.052*** (0.016)	-0.034* (0.019)	0.023*** (0.008)	-0.008 (0.007)	-0.004 (0.003)
Observations	1,176,789	1,166,442	1,177,363	1,168,281	1,186,761
R-squared	0.110	0.170	0.027	0.058	0.042
<b>Panel D: Region</b>					
LNL×NBIMARU	0.003 (0.006)	-0.015** (0.007)	-0.005* (0.003)	0.002 (0.003)	-0.001 (0.001)
LNL	-0.043*** (0.003)	0.066*** (0.005)	-0.007*** (0.001)	-0.003* (0.002)	0.005*** (0.001)
NBIMARU	-0.126*** (0.032)	-0.096 (0.061)	0.073*** (0.023)	-0.011 (0.021)	-0.037*** (0.014)
Observations	1,231,514	1,220,737	1,232,140	1,222,554	1,241,929
R-squared	0.112	0.170	0.027	0.058	0.044

Notes: The wealth binary variable in Panel A includes Poor(=1) and Non-Poor(=0). Panel B, the religion dummy, comprised of minority(=1), which provides for other than Hindu and majority(=1), which includes Hindu only. In Panel C, the caste dummy comprises backward(=1) and forward(=0) castes, and Panel D region comprises Northern, including the BIMARU(=1) states and other states(=0). All specifications include controls for individual/household characteristics and district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard errors in parentheses are clustered at the district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table A8. Heterogeneity test on Financial Autonomy

	[1]	[2]	[3]
	Ownership of House	Ownership of Land	Access to money or a bank account
<b>Panel A: Wealth</b>			
LNL×Poor	-0.010* (0.006)	-0.002 (0.006)	0.015*** (0.005)
LNL	-0.012*** (0.003)	-0.035*** (0.003)	0.000 (0.002)
Poor	-0.011 (0.008)	-0.019** (0.008)	-0.113*** (0.007)
Observations	205,655	205,655	205,655
R-squared	0.143	0.120	0.154
<b>Panel B: Religion</b>			
LNL×Minority	-0.014*** (0.005)	-0.008 (0.005)	0.006 (0.004)
LNL	-0.010*** (0.003)	-0.034*** (0.003)	0.001 (0.002)
Minority	0.016* (0.008)	0.015** (0.008)	-0.003 (0.006)
Observations	205,655	205,655	205,655
R-squared	0.144	0.120	0.154
<b>Panel C: Caste</b>			
LNL×DisadvCaste	-0.003 (0.004)	-0.002 (0.004)	-0.005 (0.003)
LNL	-0.010** (0.004)	-0.032*** (0.004)	0.008** (0.003)
DisadvCaste	0.124*** (0.020)	0.096*** (0.017)	0.053*** (0.017)
Observations	195,844	195,844	195,844
R-squared	0.144	0.121	0.155
<b>Panel D: Region</b>			
LNL×NBIMARU	-0.009 (0.007)	-0.005 (0.006)	-0.008* (0.004)
LNL	-0.010*** (0.004)	-0.034*** (0.004)	0.005* (0.003)
NBIMARU	0.122** (0.055)	0.110** (0.055)	0.095*** (0.029)
Observations	205,655	205,655	205,655
R-squared	0.144	0.120	0.154

Notes: The wealth binary variable in Panel A includes Poor(=1) and Non-Poor(=0). Panel B, the religion dummy, comprised of minority(=1), which provides for other than Hindu and majority(=1), which includes Hindu only. In Panel C, the caste dummy comprises backward(=1) and forward(=0) castes, and Panel D region comprises Northern, including the BIMARU(=1) states and other states(=0). All specifications include controls for individual/household characteristics and district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard errors in parentheses are clustered at the district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table A9. Heterogeneity test on Spouse Education

	[1]	[2]
	Husband is literate	Education gap between wife and husband
<b>Panel A: Wealth</b>		
LNL×Poor	-0.017*** (0.005)	0.023 (0.041)
LNL	-0.010*** (0.002)	0.203*** (0.026)
Poor	-0.207*** (0.006)	4.262*** (0.061)
Observations	153,870	153,870
R-squared	0.255	0.319
<b>Panel B: Religion</b>		
LNL×Minority	-0.001 (0.004)	0.201*** (0.044)
LNL	-0.012*** (0.002)	0.165*** (0.024)
Minority	-0.000 (0.007)	-0.091 (0.069)
Observations	153,870	153,870
R-squared	0.254	0.319
<b>Panel C: Caste</b>		
LNL×DisadvCaste	0.009*** (0.002)	0.107*** (0.031)
LNL	-0.019*** (0.002)	0.126*** (0.032)
DisadvCaste	0.013 (0.017)	-0.398*** (0.145)
Observations	146,898	146,898
R-squared	0.253	0.318
<b>Panel D: Region</b>		
LNL×NBIMARU	-0.001 (0.003)	0.001 (0.034)
LNL	-0.013*** (0.002)	0.206*** (0.027)
NBIMARU	0.053*** (0.020)	-0.437 (0.277)
Observations	153,870	153,870
R-squared	0.254	0.319

Notes: The wealth binary variable in Panel A includes Poor(=1) and Non-Poor(=0). Panel B, the religion dummy, comprised of minority(=1), which provides for other than Hindu and majority(=0), which includes Hindu only. In Panel C, the caste dummy comprises backward(=1) and forward(=0) castes, and Panel D region comprises Northern, including the BIMARU(=1) states and other states(=0). All specifications include controls for individual/household characteristics and district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard errors in parentheses are clustered at the district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%

Table A10. Heterogeneity test on Miscellaneous outcomes

	[1]	[2]
	Child preference toward son	Have a health insurance
<b>Panel A: Wealth</b>		
LNL×Poor	0.004* (0.002)	-0.005* (0.003)
LNL	-0.005*** (0.001)	-0.012*** (0.002)
Poor	0.043*** (0.003)	0.015*** (0.004)
Observations	1,262,783	1,262,783
R-squared	0.087	0.285
<b>Panel B: Religion</b>		
LNL×Minority	0.002 (0.002)	0.000 (0.002)
LNL	-0.005*** (0.001)	-0.013*** (0.002)
Minority	0.001 (0.003)	-0.001 (0.006)
Observations	1,262,783	1,262,783
R-squared	0.087	0.285
<b>Panel C: Caste</b>		
LNL×DisadvCaste	-0.001 (0.001)	-0.013*** (0.002)
LNL	-0.004*** (0.002)	-0.003 (0.003)
DisadvCaste	0.027*** (0.006)	0.083*** (0.007)
Observations	1,206,612	1,206,612
R-squared	0.089	0.285
<b>Panel D: Region</b>		
LNL×NBIMARU	-0.002 (0.002)	-0.003 (0.004)
LNL	-0.004*** (0.001)	-0.012*** (0.003)
NBIMARU	0.043*** (0.016)	-0.044** (0.019)
Observations	1,262,783	1,262,783
R-squared	0.087	0.285

Notes: The wealth binary variable in Panel A includes Poor(=1) and Non-Poor(=0). Panel B, the religion dummy, comprised of minority(=1), which provides for other than Hindu and majority(=0), which includes Hindu only. In Panel C, the caste dummy comprises backward(=1) and forward(=0) castes, and Panel D region comprises Northern, including the BIMARU(=1) states and other states(=0). All specifications include controls for individual/household characteristics and district characteristics interacted with survey round, district fixed effects, and state-survey round fixed effects. Standard errors in parentheses are clustered at the district level. \*\*\* p<0.01-significant at 1%, \*\* p<0.05-significant at 5%, \* p<0.1-significant at 10%