I Z A Institute of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 13881

Mining and Gender Gaps in India

Amanda Guimbeau
James Ji
Nidhiya Menon
Yana van der Meulen Rodgers

NOVEMBER 2020

I Z A Institute
of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 13881

Mining and Gender Gaps in India

Amanda Guimbeau
Brandeis University

James Ji
Brandeis University

Nidhiya Menon
Brandeis University and IZA

Yana van der Meulen Rodgers
Rutgers University

NOVEMBER 2020

ISSN: 2365-9793

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Mining and Gender Gaps in India*

This study on the economics of gender differences examines whether the mining industry acts as a blessing or curse for women's well-being and economic status. The analysis focuses on the impact of proximity to mineral deposits and active mines on various measures of women's agency and health in India. Identification leverages the plausibly exogenous spatial variation in the occurrence of mineral deposits across districts. Results indicate that women's outcomes improve in the vicinity of mines with improvements in shared decision-making, reductions in barriers to accessing medical care, and reduced tolerance of physical violence. These benefits are pronounced among younger women, and in the proximity of mines that employ relatively high shares of women. The underlying mechanisms include employment gains for women and improvements in women's health near mines. Their children also experience gains in nutritional status. Men's likelihood of making decisions jointly with partners increases, and men are less likely to justify domestic violence. A key explanation for these results is the sharing of mining royalties with local groups that support investments in women and children. Findings imply that mineral mining can bring substantial benefits to women's well-being, which is critical for sustainable development.

JEL Classification: O13, Q32, J16, J12

Keywords: minerals, mining, women, agency, education, health, profit sharing, India

Corresponding author:
Nidhiya Menon
Department of Economics
Brandeis University
Waltham, MA 02453
USA

E-mail: nmenon@brandeis.edu

* We thank Dani Castillo and Yessinia Tejeda Lozano for excellent research assistance. The usual disclaimer applies. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

1. Introduction

Gender equality has become a focal point of scholarly discourse, government policies, international aid, and advocacy efforts. Pathways to promoting gender equality often include strengthening women's agency and improving their human capital through investment in schooling and the generation of meaningful employment. Some of these improvements for women accompany structural change and the concomitant shift from agriculture to industry. Yet economic development and structural change do not necessarily bring gains for women and improvements in gender equality, especially if unpaid work burdens, biased laws, differential access to resources, and social norms constrain women's ability to take advantage of new, well-paid employment opportunities (World Bank 2011). Adding to these complexities, relatively little is known about how structural change associated with the mining industry impacts women and gender equality.

The mining industry has long since been considered an enclave with few beneficial effects for local economies (Berman *et al.* 2017). Mineral-rich countries have often seen stagnation in other industries, particularly agriculture and manufacturing, arising from exchange rate overvaluation and high wage rates associated with natural resource booms – the so-called "Dutch Disease" phenomenon. Combined with political economy effects in which investment in mineral extraction is prioritized over other sectors including social services, these adverse effects have contributed to the view of mining as a "resource curse" (Auty 1993; Bebbington *et al.* 2008). However, a recent set of studies for sub-Saharan Africa have challenged this view. For example, Mamo *et al.* (2019) find large improvements in living standards as measured by night-lights in districts with new large-scale mining operations, albeit with few spillover effects to other districts. Similarly, Lippert (2014) uncovers positive effects from copper mining for household expenditures and other measures of well-being, and Benshaul-Tolonen (2018a) shows that open-pit gold mining causes a reduction in child mortality.[1] In sub-Saharan Africa, industrial mine operations contributed to a large employment shift for women away from agricultural self-employment toward wage employment and service-sector jobs that arose around the mining industry (Kotsadam and Benshaul-Tolonen 2016). However, this structural change also resulted in greater domestic violence against women in areas where wife beating was more commonly accepted (Kotsadam *et al.* 2017).

Our study adds new evidence to this literature in the context of mining in India. In particular, we causally estimate the impact of proximity to mineral deposits and mines on women's agency as measured by improvements in shared decision-making, declining acceptance of violence, and reductions in reported barriers to accessing medical care. We then analyze the underlying mechanisms by focusing on how mines affect women's education and health as well as child health. We also explore the consequences of legislation that requires mining companies to invest a fixed proportion of their profits back into local communities.

Our study uses India's 2015-2016 Demographic and Health Survey, which includes point coordinates for surveyed clusters, and we match that data with the geo-referenced location of mineral deposits and mines. Data from many additional sources are used to construct the sample. The analysis employs difference-in-differences methods to answer three questions. First, conditioning on the presence of deposits, what are the impacts of being proximate to active mines on measures of women's agency? Second, given that mining in general employs relatively few women, do the results differ if we focus on mines that engage relatively larger numbers of women? Third, what are the mechanisms that explain these patterns?

[1] In related work, Aragón and Rud (2013) find a positive backward linkage in terms of increased real income from a large-scale gold mine to surrounding areas in Peru.

This research contributes to a better understanding of whether mining serves as a resource curse or blessing, as well as the mechanisms through which the mining industry affects women's agency to further or hinder sustainable economic development. It also sheds light on the relationship between women's agency and the acceptance of domestic violence. Some studies have shown that measures of women's economic agency, such as increased ownership of assets and greater education for women, are associated with a decline in domestic violence. The primary transmission mechanism is that improved economic opportunities for women outside the household strengthen their bargaining power within the home. Even if the budget of the household remains constant, women's asset ownership may strengthen their negotiating power by improving their fallback position and reinforcing their ability to curtail domestic abuse (Panda and Agarwal 2005, Aizer 2010, Bobonis *et al.* 2013). However, changes that empower women economically could also contribute to a backlash effect among husbands. For example, in Bangladesh, increased female labor force participation is associated with higher rates of violence for some women as husbands try to counteract the increased autonomy of their wives (Heath 2014). Cools and Kotsadam (2017) also find evidence of backlash across Sub-Saharan Africa as increased education and employment for women are associated with a higher probability of experiencing intimate partner violence. Given this mixed evidence, our study furthers research by shedding light on the determinants of women's agency in the context of mining in India.

2. Background

India is rich in mineral and metal deposits. The country produces almost 84 minerals from approximately 3700 mines for an aggregate production of over 1 billion tons (India Bureau of Mines 2015). The main minerals include iron ore, manganese ore, bauxite, copper ore, lead and zinc ore, dolomite, limestone, and coal. The country also has stores of copper, gold, silver, diamond, nickel, and cobalt. Mining in India is associated not only with revenue gains but also environmental losses, especially deforestation (Ranjan 2019). Average daily employment in mines is around 512,000 workers in the organized sector.[2] An unorganized sector exists, but it is difficult to get a consistent set of employment numbers here. Closely related is small-scale and artisanal mining, some of which is organized but much is not. Estimates in Ghose (2003) indicate that India has approximately 3000 small-scale mines accounting for about half of the country's non-fuel mineral production, with a total employment of about 300,000 workers.

Female employment shares in mining are on average low. Data from the annual Government of India Ministry of Labor and Employment publications of the *Statistics of Mines in India Volume – 1 (Coal) and Volume – II (Non-Coal)* indicate that from 2010 to 2015, only 7.0 percent of all workers were women across all minerals/metals. However, female employment shares vary drastically by type of minerals. For example, the female employment share in quartz mining is 18.3 percent, in apatite rock phosphate mining 14.7 percent, and in dolomite mining 12.9 percent. Other minerals/metals that employ relatively high shares of women's labor include sillimanite, barytes, garnet, fire clay, fluorite, manganese, graphite, wollastonite, feldspar, and magnesite. Many minerals that have relatively high female employment shares are classified as precious minerals and metals. In fact, five of the eight precious minerals/metals employed more than the median share of female employment in 2010-

[2] Fuel accounted for 74 percent of total employment during 2013-14, with coal and lignite accounting for 93 percent of the labor force engaged during the same period. Metallic minerals accounted for 15 percent of total employment with iron ore, manganese ore, lead and zinc concentrates, bauxite and chromite employing 49 percent, 18 percent, 9 percent, and 8 percent each of total labor, respectively. Non-metallic minerals accounted for 11 percent of total employment with limestone, dolomite and garnet, steatite, kaolin and quartz employing the highest shares (*Indian Mineral Industry at a Glance*, 2013-2014, India Bureau of Mines).

2015 (the exceptions being diamond, gold, and kyanite).[3] In contrast, coal mining employs only 2.4 percent of women and iron mining employs 3.7 percent of women.

This study examines separately minerals/metals that employ relatively high shares of female labor, and we denote these as "HFLS" (high female labor shares). The rationale for highlighting variations in employment shares by gender is to test for Boserup's (1970) hypothesis that women's status is better when their labor is valued. That is, we take the plough-use versus shifting-cultivation intuition that Boserup developed and apply it to the mining industry. This application presumes that if men are required for mining minerals that require greater physical strength as operations are deeper underground, then women's status is relatively weaker in the surroundings of such a mine (as in coal mining). In contrast, mining minerals found closer to the surface does not require brawn-based labor that is as intensive (as in quartz mining), so then women's relative overall standing may be higher. To test this hypothesis, we construct separate measures for the type of active mine (all active mines versus HFLS active mines) to evaluate whether women's outcomes are relatively better in and around HFLS active mines using details on the identity of the mineral/metal mined.[4]

3. Data

This study uses the 2015-2016 wave of the India's Demographic and Health Survey (DHS – 4), a large nationally representative household survey with detailed information on individual and household characteristics for women aged 15-49, children aged 0-5 years, and men aged 15-54 years. This wave also includes geocoded spatial data documenting the

[3] The list of precious minerals/metals include apatite rock phosphate, diamond, dolomite, fluorite, gold, graphite, kyanite and sillimanite.
[4] We classify 22 minerals/metals as "HFLS" where female employment shares exceed the median value of 3.9 percent. In addition to those in the previous note, they include magnesite, feldspar, silica, vermiculite, wollastonite, manganese, quartz, calcite, laterite, china clay and white clay, chromite, fire clay, garnet, bauxite, steatite, barytes and stone.

geographic location of survey clusters. Using the micro-level data from the DHS for women and geocoded locations of mineral deposits and active mines from the *Mineral Atlas of India* (Geological Survey of India, 2001) and the *United States Geological Survey (USGS)*, we construct a novel database on women's agency and human capital measures and proximity to mines. We complement this data with various proxies for the level of mining activities at the district level constructed from official reports from the India Bureau of Mines.

3.1 Demographic and Health Survey data

In the DHS – 4, women are asked about their background characteristics, employment, types of earnings, and agency (including household decision-making, barriers to accessing medical treatment, mobility, attitudes, and house and land ownership). The survey sampled 723,875 eligible women aged 15-49 with 699,686 women completing interviews. One eligible woman per household was randomly selected to answer the domestic violence module, with the vast majority (95 percent) of these women being married. The male survey sampled 122,051 eligible men with a final response rate of 92 percent; our male sample for the analysis of decision-making and violence consists of married men only. Although the data contain anthropometrics on approximately 248,000 children ages five and below, our sample is lower at approximately 20,000 children after the merging process with the mining data. This is true for the women and men samples as well. The DHS – 4 is a stratified two-stage nationally representative sample, and the 2011 census is used as the sampling frame for the selection of Primary Sampling Units (PSUs). The PSUs (or clusters) correspond to villages in rural areas and to Census Enumeration Blocks (CEBs) in urban areas. We obtain the geographic coordinates for the surveyed DHS clusters and use them to match respondents to the nearest mineral deposit and active mine.[5,6]

3.2 Deposit and Mining Data

We use the *Mineral Atlas of India* (Geological Survey of India, 2001) to obtain the type, location, and size of mineral deposits. The Atlas contains 76 map sheets showing the geographic distribution of mineral deposits across the country. Minerals are classified into four categories: (i) base metals, light, and precious metals; (ii) chemical, fertilizer, and ceramic; (iii) iron, ferrous, alloy metals; and (iv) other industrial and precious minerals. The map sheets also provide information on other geological features including lithology rock type, the age of the host rocks, the size – which is proportional to the number of metric tons of deposit reserves at each site, and the main mineral present. We geocode all the map sheets to obtain the deposits' geographic coordinates needed to construct our proximity measures. Given information on the presence of mineral types at each site, we are able to create variables to measure proximity to different types of minerals (mainly HFLS versus non-HFLS).

Figure 1 shows India with geocoded deposits of various types overlaid on district boundaries. A higher concentration of deposits exists in the Eastern, Northwestern, and Central states. In all, our geo-referencing exercise allows us to locate 2,553 deposits across the country. Our data on the location of mines is obtained from the *United States Geological Survey (USGS)* dataset on past, current, and future industrial mines.[7] We compile the USGS data using the

[5] Since DHS surveys contain sensitive information, the precise location is not provided. Rather, urban clusters and rural clusters are displaced up to 2 and 5 kilometers, respectively (the displacement method does not move households across any regional boundaries though). This should not affect results as the measurement error is orthogonal to our variables of interest (Burgert *et al*. 2013).
[6] Out of the 28,522 clusters, we cannot obtain the coordinates of 131 clusters as the source of data used is neither from the Global Positioning System (GPS) nor from a gazetteer of village/place names. These clusters have (0,0) coordinates and are excluded from our analysis.
[7] The USGS data for India does not provide information on start dates of mines.

National Minerals Information Center for Asia and Pacific (2010) which provides the maps of mineral facilities in India, and by using the *Mineral Resources Data System* (2007) which provides a collection of reports for metallic and nonmetallic mineral resources throughout the world.[8] For reference, Appendix Figure 1 shows an example of a map sheet from the Mineral Atlas, and Appendix Figure 2 shows the distribution of active and inactive mines.

3.3 Other Data

Since new mines often open far from developed areas (Mamo *et al*. 2019) and since they are unlikely to take gender norms and women's outcomes into consideration in making decisions, we are less concerned about reverse causality in the context of this study. Still, to help address this potential issue, the empirical model we employ controls for levels of local development (including the degree of urbanization, population density, and infrastructure) by incorporating the log of the Global Human Footprint (GHF) provided for each cluster, which ranges from 0 (extremely rural) to 100 (extremely urban). This index is the normalized version of the Human Influence Index (HII) - a global dataset available at a spatial resolution of 1 by 1 km grid cells and created from 9 data layers covering human access (roads, railroads, navigable rivers, coastlines), human population pressure (population density), human land use, and infrastructure (nighttime lights, land use/land cover, and built-up areas).[9] Indicator variables from the DHS are also included for whether the main source of drinking water in the household is piped water, and whether the household has access to electricity.

---

[8] Most records for India are simple reports of the type of minerals in some locations, with a few reporting the deposit names, location, commodities, geologic characteristics, resources, reserves, and production (these few reports are assigned an A grade by USGS to reflect their diversity of information provided in the database).

[9] The data is provided as part of the DHS GIS Data 2015. The GHFI index is the HII normalized by biome and realm developed by the Last of the Wild Project (LWP-2). The average of an index is for the location within a 2 km (urban) or 10 km (rural) buffer surrounding the DHS survey cluster. Data for 1995-2004 is used. See Wildlife Conservation Society, and Center for International Earth Science Information Network-Columbia University-2005: "Global Human Footprint Dataset."

Our study includes information from various government reports. First, we use the annual publications *Statistics of Mines in India* from the Directorate-General of Mines Safety (Ministry of Labor and Employment) from 2010 to 2015 to compile district-level data on employment.[10] To classify Indian districts into high, medium, or low mineral potential districts, we use the *Bulletin of Mining Leases and Prospecting Licenses*, an annual publication of the India Bureau of Mines. These reports are available from 2000 to 2015 and provide district-level mining areas as well as the state-wise, district-wise, and mineral-wise distribution of mining leases granted, executed, renewed, and revoked. Appendix Figure 3 shows the share of leased area in 2014 across India with the high/medium mineral potential districts. As of 2014, the *Mining Lease Directory* reports that there were 10,982 mining leases granted for 64 different minerals. The five highest shares of leased areas are for the states of Rajasthan (18.5 percent), Orissa (16.2 percent), Andhra Pradesh (13.5 percent), Karnataka (10.5 percent), and Madhya Pradesh (7.23 percent). The district shares vary between 0 and 6.4 percent. Finally, we obtain the district-level production data from the *Indian Minerals Yearbooks* (Part III – Mineral Reviews) from 2011 by digitizing the entire database of 70 minerals and aggregating across minerals. Domestic and foreign market prices are from the same yearbooks (Part I – General Reviews).

3.4 Summary Statistics

Table 1 reports the summary statistics for women. We construct an index that encapsulates information provided across several questions in each outcome of interest. Panel A shows the summary statistics for the binary outcomes that equal 1 if the woman respondent

[10] Statistics of Mines, Volume I for coalmines covers all coalmines that come under the purview of the 1952 Mines Act. These publications contain state and district-level information on number of mines, production, mechanization, and the number of accidents in mines. Volume II for non-coal mines provide statistics for metalliferous and oil mines. Data on employment is available on a gender-disaggregated basis. But data on output and average weekly wages are only reported on an aggregate basis.

agrees to the statement that beating is justified for a set of reasons listed. On average, 37 percent of women consider beating to be justified if the wife neglects children, while 30 percent report that they agree that domestic violence is justified if she goes out without telling her partner or husband. An average of 14 percent report that they have experienced at least one form of emotional violence recently. In Panel B, we consider the barriers women face when seeking healthcare for themselves. Approximately 18 percent, 26 percent, and 19 percent report that seeking permission, obtaining money, and the fear of going alone to the health provider, respectively, are serious hurdles. Summary statistics for variables related to decision-making are noted in Panel C, and those for the human capital, profit-sharing, and financial independence variables are in Panel D. In particular, 29 percent of women report that they are currently working, with the majority of those women working in agriculture (18 percent). Panel E reports the statistics for the individual/household controls.

In Appendix Table 1, we report and discuss the summary statistics for married male respondents in the DHS – 4. We use these data to evaluate whether men's attitudes towards domestic violence and shared decision-making change in ways consistent with the women's results in mining areas.

To quantify treatment, we calculate the distances to the nearest deposit and to the nearest mine for each cluster's centroid. These measures vary largely across DHS – 4 clusters, with means of 29.6 km and 45.25 km, respectively. We then define an indicator variable labeled as 'deposit' that equals 1 if there is a mineral deposit within 5 km of the respondent's cluster. Another indicator variable labeled as 'active mine' equals 1 if there is an active mine within 5 km. Our main treatment variable of interest is the interaction of these two variables. We construct similar variables for exposure to HFLS and non-HFLS mines. Appendix Table 2 reports summary statistics for the proximity variables and for the intensity variables (where intensity is measured using count variables of mining activities in each cluster).

4. Methodology

In the baseline specification relating measures of women's agency and human capital to proximity to active mines, we follow Kotsadam and Benshaul-Tolonen (2016) and Benshaul-Tolonen (2019) to consider a difference-in-differences (DD) framework that conditions on treatment and control groups based on distance measures. Equation (1) is as follows:

$$Y_{icd} = \beta_0 + \beta_1 deposit_c + \beta_2 activemine_c + \beta_3 (deposit_c \times activemine_c) + \beta_4 young_i + \beta_5 (deposit_c \times activemine_c \times young_i) + X_i + \lambda_d + \lambda_s + \epsilon_{icd} \quad (1)$$

where Y_{icd} is the outcome for individual *"i",* in cluster *"c"*, in district *"d"*. The presence of mineral deposits is an exogenous measure and in equation (1), the indicator variable $deposit_c$ equals 1 if there is a deposit within 5 km of a respondent's cluster. We begin with a cut-off distance of 5 km (following Von der Goltz and Barnwal 2019), and then consider other radii of 10, 15, 20, 25, and 30 km around mines to track the mining footprint, to obtain an evaluation of possible spillover effects and to test whether theories of enclave development are validated.[11] Appendix Box 1 presents evidence that the proportion of workers who travel 5 km or less to access their place of work is approximately 70 percent in India. Hence, our focus on the 5km distance around clusters for a baseline is appropriate.

We define the indicator variable $activemine_c$ to equal 1 if there is at least one active mine within 5 km of the respondent's cluster. The treatment variable of interest is the interaction term $deposit_c \times activemine_c$ and the coefficient of interest is β_3. This interaction equals 1 when the respondent is geographically close to an active mineral mine conditional on the

[11] Studies in the related literature (e.g. Aragón and Rud 2013, Kotsadam and Benshaul-Tolonen 2016) suggest that areas within 5-20 km from an active mine are directly exposed.

presence of a deposit. The variable $young_i$ equals 1 if the respondent is 15-25 years old. We include the triple interaction term ($deposit_c \times activemine_c \times young_i$) to estimate additional impacts of proximity for women in this age group. All results tables include F-test statistics that these differential impacts for young women are significantly different from zero.

The vector of individual controls X_i include the following individual, household, and contextual variables: differences in wife and partner's/husband's age, indicators for the woman's highest level of educational attainment, indicators for the partner's/husband's level of educational attainment, a measure of the number of living children in the household, a rural/urban dummy, the number of years the respondent has been living in the current place of residence (to address migration), and the three indicators of local development. When the outcome variable is related to domestic violence, we additionally control for whether the respondent's father used to beat her mother. The parameters λ_d and λ_s are district and state fixed-effects, and ϵ_{icd} is the idiosyncratic error term. We restrict the sample to individuals living within 100 km from a mineral deposit in keeping with related studies such as Benshaul-Tolonen (2019). Regressions are weighted and robust standard errors are clustered at the DHS cluster level. We consider specification (1) for the full sample of deposits and active mines, and separately for deposits and HFLS active mines.

The use of district and state fixed-effects allows us to control for the time-invariant characteristics that could explain differences between treated and control groups, including institutional factors, sectoral composition, cultural norms pertaining to women's role in the economy and at home, and district-level extractive industry strategies. These characteristics also include factors that large mining companies may internalize in their cost-benefit analyses of location choice. Unobserved differences at the district level such as the ease of doing business, transparency, governance practices, levels of corruption, and other factors not related to resource endowments are also absorbed by these controls as long as they do not vary over time.

Equation (1) conditions on the presence of deposits which may be thought of as a measure of proximity. However, the actual number of proximal deposits, which may be thought of as a measure of intensity, can also matter. Hence, we estimate the effects of the number of mineral deposits that are within 5 km of each cluster using the same structure as in equation (1) except that the dummy variable for proximity is replaced with a count variable of the number of deposits within 5 km. Regression results report parameters for both proximity and intensity.

5. Results for the Impact of Mines

5.1. Women's Acceptance of Domestic Violence

Table 2 reports the β_3 and β_5 terms from equation (1) for women's acceptance of different agency measures. The column headings indicate the specific outcome variables estimated. Panel A reports results for coefficients that condition on the presence of a HFLS mineral/metal mine whereas Panel B reports results for all mines. The binary dependent variables take a value of 1 if the female respondent says that she considers that beating is justified for reasons reported in each column. In column (6), the index ranging from 0 to 1 is constructed by considering the answers to the five questions related to attitude towards domestic violence. It equals 1 if the respondent says that beating is justified in each case. The mean value of the index is 0.3. In column (7), "emotional violence" is a variable that equals 1 if the respondent says that she has experienced one of three possible examples of emotional violence listed in the survey (partner humiliates you, threatens to harm you or someone close to you, and insults you).

Focusing on Panel A, the β_3 coefficients reported are negative in all but one instance (measured with precision in columns (1) and (3) only though). The estimates in column (1) indicate that in comparison to other women, those in the proximity of deposits and active HFLS mines are 16.4 percentage points less likely to accept that violence is justified for going out without permission. Similarly, those near HFLS mines are 38.1 percentage points less likely to accept that violence is justified for arguing with one's husband or partner. When we consider the differential impacts on the young, the only significant coefficient is in column (7) for emotional violence, whereas net effects for the young are mostly statistically zero except for the case of having a voice in arguments with the partner. In this case, the estimate indicates that young women are 37.4 percentage points less likely to accept that violence is justified.

Next, Panel A of Table 2 reports the impacts of the number of deposits. The β_3 coefficients are uniformly negative across all columns although only those in columns (1), (3) and (6) are measured without error. Focusing on the index measure, the coefficient in column (6) shows that comparing to other women, women in the vicinity of HFLS mines (conditional also on the number of deposits) are 16.4 percentage points less likely to accept that any of these measures are justified. Focusing on net effects, young women are 17.4 percentage points less likely to accept that abuse is justified if the wife goes out without permission, 35.6 percentage points less likely to accept that beating is justified if the women argues with the husband and 15.5 percentage points less likely to agree that physical abuse is justified in terms of the aggregate index indicator.

Panel B reports the mirror results when we condition on all active mines rather than HFLS mines alone. The results in this panel resonate with many noted in Panel A. In particular, the coefficient on the index measure indicates that women near deposits and active mines are 8.6 percentage points less likely to agree that physical violence is justified in any of these cases. Young women see significant net impacts when it comes to emotional violence, not cooking food properly, and refusing sex. Concomitant results that condition on the number of deposits are similar in sign but mostly insignificant. For the young, the parameters are significant for the same outcomes as the estimations that condition on proximity to a deposit. Overall, the results in Table 2 underline that women near active mines and deposits (especially HFLS mines) are less likely to accept that violence is justified, thus signaling an improvement in their agency.

5.2. Women's Barriers to Healthcare

Table 3 reports results for the β_3 and β_5 interaction terms when we study variables related to barriers that women may face while seeking medical care, including whether they need permission to go, whether they can obtain money for the treatment, and uncertainty/fear involved in traveling alone. The indicator variables in these columns take the value 1 if the woman reports that any of these was a "big problem". Column (4) reports results for the composite index. It ranges from 0 to 1 if the woman responds that each of these three dimensions was a "big problem" and has a mean value of 0.2.

Proximity to deposits and active HFLS mines has a negative impact on all the variables: the need for permission, money, and fear of going alone decline by 7.0 to 24.8 percentage points (fear is insignificant) for women in close proximity to active mines (Panel A). The net effects for young women are significantly different from zero. Estimates indicate that fear declines by 41.4 percentage points, while the need to ask for permission decreases by 24.6 percentage points. However, proximity to HFLS mines increases the need for money among young women by 68.1 percentage points. It is possible that seeking higher quality healthcare might explain this positive coefficient. The overall index measure, while significant for all women in the proximity of HFLS mines (and indicating an overall 16.6 percentage point decrease in such barriers), is not significantly different from zero for young women.

The second half of Panel A reports coefficients that condition on the number of deposits. Again, most coefficients of interest are negative, indicating a beneficial impact on these measures in the proximity of HFLS mines. The coefficient on the index shows that in comparison to other women, those in the proximity of HFLS mines conditional on the number of deposits experience a 15.8 percentage point decline in these barriers. Again, net impacts among the young are negative with regards to permission and fear, but positive when it comes to money.

Panel B in Table 3 reports results when we condition on all mines. In general, results are weaker as compared to those in Panel A. In fact, the only estimate that is significant is in the case of fear of accessing care alone. Women in the close vicinity of mines and deposits report a 7.4 percentage point decline in this measure. Overall, we conclude from Table 3 that proximity to HFLS mines in particular brings measurable benefits to women in reducing barriers to seeking healthcare.

5.3. Women's Attitude to Shared Decision-making

Table 4 has the same structure as the previous two results tables. Women are asked their opinion when it comes to decisions on five topics. Given we are interested in joint decision-making processes within the household, the binary dependent variables take a value of 1 if the respondent says that she thinks such decisions should be taken jointly with her partner or her husband. In column 6, index 1, ranging from 0 to 1, takes a value of 1 if the respondent answers "shared equally" when asked who should have greater say for all five decisions. The mean of this index is 0.8. In column 7, index 2, ranging from 0 to 1, takes a value of 1 if the respondent answers "shared equally" to the last four of the five decisions (excluding decisions on her own earnings). The mean of this index is 0.8. We consider these indexes separately to understand the influence of decision-making when it comes to own earnings.

Regarding decision-making about earnings, the HFLS mines sample size is too small to identify impacts (this is also the case for results for the index 1 variable). The estimate in column (4) indicates that although shared decision making when it comes to visits to family actually declines in the proximity of HFLS mines for all women, differential impacts on young women are all significant and positive (the net impact on the young is not significantly different from zero in any case though). Conditioning on the number of deposits results in similar patterns; positive differential patterns for young women in the proximity of HFLS mines but net impacts that are significantly different from zero only in the case of shared decision making about husband's earnings. In this case, young women in the proximity of HFLS mines report an 8.2 percentage point increase.

Panel B reports results that condition on all mines. For the most part, these coefficients are imprecisely estimated. Parameters in column (3) indicate that young women in proximity of all mines (and deposits) report greater shared decision making when it comes to large purchases, husband's earnings, and the composite index 2 variable. In comparison to their senior counterparts, young women in the proximity of mines report an 11.7 percentage point increase in shared-decision making when it comes to index 2, which, given the mean value of this indicator, is about a 15 percent increase. Conditioning on the number of deposits shows few differential impacts for young women in the vicinity of mines but overall net significance when it comes to shared decision-making over large purchases. We conclude that compared to the other measures of agency discussed above, the effects of mining on shared decision-making are noisier.

6. Mechanisms

Motivated by the literature on mineral wealth and human capital formation (Gylfason 2001, Ahlerup *et al*. 2019, Mejía 2020), we hypothesize that proximity to active mines might affect women's agency measures by improving their education and health. To evaluate this empirically, we use the same specification as in the main analysis in which the treatment variable is the interaction between an indicator for the presence of an active mine within 5 km of the respondent's cluster and an indicator for the presence of a mineral deposit within the same distance. We focus on two relevant dimensions: women's human capital improvements, and profit-sharing in mining communities.

6.1. Women's Human Capital

Table 5, which follows the same structure as above, reports the impact of mines on women's education. Results indicate that HFLS mines (conditional on the presence of a deposit) have strong positive impacts on young women. The chances of young women being literate improve by 27 percent and the chances of young women attaining some secondary school or higher improve by 28 percent. The effect on education when we condition on the number of deposits is in the same ballpark; young women experience net increases of about 26 percentage points. A likely explanation is better economic opportunities in and around HFLS mines through backward and forward linkages. Because literacy strengthens women's relative fallback position, these results highlight a possible pathway through which HFLS mines result in improvements in their agency. Estimates are mostly insignificant when we consider the impacts of all mines in Panel B.

Table 6 presents estimates for women's health including height, body mass index (BMI), overweight/obese, underweight, hemoglobin levels (HBA), anemic status, high blood pressure (BP), and high glucose level.[12] Compared to other women, those living near HFLS mines are up

[12] BMI is weight in kilograms (kg) divided by height in meters squared (m^2), and overweight/obese is defined as BMI greater than or equal to 25.0 while underweight is defined as BMI less than 18.5. A woman is anemic if her HBA level is below 12.0 g/dl (grams per deciliter).

to 28.2 percentage points less likely to be underweight. However, these women are also more likely to be anemic. Focusing on net impacts on young women, they are significantly more likely to be taller, to have higher BMI, less likely to be underweight, and less likely to have a high glucose level. These results point towards significant improvements in health status for young women living in proximity to HFLS mines, even though anemic status does appear to increase for young women which is consistent with evidence in Von der Goltz and Barnwal (2019). Many of these results hold when the estimates condition on the number of deposits, both for women in general and for young women in particular. On the other hand, results in Panel B which condition on all mines are mostly insignificant. There are some positive impacts on women in general in the close vicinity of mines when it comes to BMI, overweight/obese and underweight, but most net effects on the young are statistically zero.

The final set of results we consider for women's human capital involve their access to health insurance (Appendix Table 3). Estimates depict a similar story that positive impacts may be discerned mostly near HFLS mines, and mostly for young women. Young women see an 11.5 percent increase in having some form of health insurance in the case of mining proximity, and by 12.8 percent in the case of mining intensity. The probability of having health insurance from one's employer rises for this age group as well. However, the size of the impacts are smaller (1.0 percentage point and 0.9 percentage points, respectively). There are few significant coefficients when we condition on all mines.

Overall, we have presented robust evidence indicating that human capital improves for women living near HFLS mines, and the benefits are especially pronounced among young women. The gains in human capital spans multiple categories from education to personal health to insurance coverage, all of which can contribute to stronger agency for women.

6.2. Children's Health

In order to provide direct evidence that improvements in women's human capital occur near mines and is thus a mechanism for the positive impacts we document on their agency, we consider an outcome where mother's human capital and access to health insurance are crucial determinants: child health. Analyzing this outcome is thus a robustness check that women's education and health are indeed rising in the vicinity of mines. We consider standardized health measures for children between 0-59 months, including the height for age z-score (HAZ), the weight for age z-score (WAZ), and the weight for height z-score (WHZ).[13] Results are presented in Appendix Table 4. Estimates in Panel A indicate measurable impacts for children in the vicinity of HFLS mines in terms of WAZ and WHZ. In particular, WAZ and WHZ improve by 0.9 standard deviations and 0.9 standard deviations respectively, for children of young women near HFLS mines, which are large effects. Net effects on the children of young women have similar magnitudes in the case of mining intensity. In Panel B, there is some evidence that HAZ rises for children of women near all mines in the presence of deposits (0.5 standard deviations, which amounts to a medium-size effect).

6.3. Profit-Sharing in Mining Communities

Royalty receipts (an important source of revenue for states and local governments), when distributed properly among the affected population, can potentially explain the beneficial impacts for women near mines. Our hypothesis is that proximity to active HFLS mines affects women's employment and human capital outcomes (and thus agency) primarily because resource rents are distributed in an equitable way. These rents translate into better living conditions for women who

[13] We interpret these results cautiously given the reduced sample sizes (especially for HFLS mines).

are affected by mining activities.[14] Appendix Box 2 provides further details on our profit-sharing measure including its construction, the empirical specification that we employ in order to understand its effects, and the robustness of these results.

The outcomes we consider are related to women's employment and to variables potentially measuring the effects of profit sharing on earnings and awareness (and use) of financial opportunities. Table 7 reports coefficients on the interaction term from equation (3) where the outcome is a binary variable equal to 1 if the respondent says she was currently employed at the time of the survey (column 1), if she is involved on a full-time basis in the workforce (column 2), and if she is employed in agriculture, manufacturing, or services (columns 3-5). Results indicate that conditional on the presence of HFLS mines, increases in profit sharing per female population result in significant improvements for women's employment outcomes. Specifically, profit sharing near HFLS mines increases the probability that the woman is currently working, is in the workforce, works in the agricultural sector, and works in the manufacturing sector. On average, profit sharing with local communities and women in particular improves their employment prospects, which is potentially key to increasing their agency within the household.

We use four outcomes to measure women's financial independence in Table 8: in columns (1) and (2), the binary variable equals to 1 if the respondent reports "cash" as the main type of earnings and if she reports "earning more than husband/partner" when asked to compare her earnings with that of her husband/partner. In columns (3) and (4), the dependent variables

[14] The District Mineral Foundation (DMF) was officially instituted in March 2015 under the Mines and Minerals (Development and Regulation) Act (1957). It was implemented to "overturn the decades of injustice meted out to the thousands people living in deep poverty and deprivation in India's mining districts…as a non-profit trust, DMFs in every mining district have the precise objective to work for the interest and benefit of persons and areas affected by mining affected operations…at least 60 percent of the budget should go to areas such as welfare of women and children," (DMF Status Report, 2017).

equal 1 if the respondent says that she "owns a house alone" or if she says that she "owns a house alone and/or jointly", respectively. In columns (5) and (6), the outcomes relate to awareness and use of financial opportunities with variables coded as 1 if the respondent says that she is aware of loan programs available for personal or entrepreneurship uses, and if she borrows funds from these sources. Results show that increased profit sharing brings beneficial impacts that are measured with precision when it comes to earning cash, earning more than the partner, owning a house alone/jointly, knowing about loan programs, and availing of these programs. Similar to the increases in employment prospects, results in Table 8 indicate that profit sharing increases women's access to financial capital, which can improve their agency.

Taken together, proximity to HFLS mines results in positive outcomes for women's measures of agency through multiple channels, including improvements in employment prospects, better health, expanded access to health insurance, and through profit-sharing with local communities required by law for mining companies. These results are in line with Lippert (2014) which considers the spillovers of the resource boom in Zambia and finds that an increase in local copper production improves living standards for households close to mines. Our results are also in accordance with work on the extractive industry's multiplier effects and linkages (e.g., Aragón and Rud 2013) which posits positive local employment effects. In the context of India, the relatively higher share of female employment in HFLS mines generates similar dynamics.[15]

7. Robustness, Falsification and Specification checks

7.1. General Checks

[15] The DMF Status Report of 2017 provides details on allocation of mineral royalties for the welfare of women and children. In the district of Dandewada in Chhattisgarh for example, funds are used for the creation of women empowerment centers to promote training, production, and market linkages; in the district of Korba, the focus is on supplementary food for pregnant women, children, and on the distribution of sanitary equipment and medicine.

We conduct several robustness checks of the main results. First, we check to ensure that sorting into mining areas does not change population composition. We do this by restricting the sample to respondents who report that they have lived in the same village/district for at least ten or more years. We also ensure that the results hold when the districts' level of political spending is controlled for so that the fiscal revenue windfall from mining activities is not a confounding factor. Sorting or controlling for political spending does not affect our main estimates.

Next, we consider responses provided by men that should mirror those evident in the women's samples. Estimates in Appendix Table 5 show some improvement in agricultural work for men near HFLS mines (conditional on either the presence of a deposit or the number of deposits). When it comes to all mines, the only estimate that is measured with precision is the coefficient on whether the man is in the workforce; this estimate indicates that as compared to other men, those in the close vicinity of active mines conditional on the presence of a deposit are 2.9 percentage points more likely to be in the workforce.

Changes in men's attitudes towards domestic violence in the proximity of HFLS and all mines are reported in Appendix Table 6. These results confirm that proximity to mines and deposits (especially HFLS mines) reduces the tolerance of domestic violence. Five of the six estimates for all men in the vicinity of HFLS mines are negative and three of these are measured with precision. Focusing on the index measure and conditioning on the number of deposits, there is a 15.4 percentage point decline in the acceptance of violence by men near HFLS mines. This also highlights that women's agency shows consistent relative improvements mostly in cases where their labor is valued (in the case of HFLS metal/mineral mining). When we evaluate changes in attitudes in the presence of all mines, there is some evidence of opposite impacts especially among the young. This is consistent with evidence in Cools and Kotsadam (2017), Kotsadam *et al*. (2017), and Eze Eze (2019) that improvements in women's relative status can result in greater acceptance of violence.

Appendix Table 7 reports results for men's attitudes towards making household decisions in a joint fashion. Most of the estimates that are significant in the vicinity of HFLS mines are positive in sign, indicating that men are more likely to report shared decision-making. Considering the composite index measure, overall, men report a 24.4 percentage point increase in the willingness to share decision making jointly in the proximity of HFLS mines. The index coefficient is of similar magnitude when we condition on the number of deposits instead (24.9 percentage points higher). In the case of all mines, the increase in the index variable is of a smaller magnitude (9.6 percentage points) and among young men, there is increased willingness to make decision jointly when it comes to daily needs and the number of children. When we condition on the number of deposits instead, there is increased willingness to share decision making jointly for even more of the indicators. In sum, the results in these tables for men offer mirror-image support for the main results that mines bring benefits to measures of women's agency, especially near HFLS mines.

In terms of other general checks conducted, Appendix Box 3 provides further details on checks for pre-trends, determining treatment distance non-parametrically, falsification tests, and results that condition on environmental impacts as measured by $PM_{2.5}$.

7.2. Spatially Randomized Placebo Test

A concern may be that our results are spuriously driven by a mis-specified model such that any association between proximity to active mines and our outcomes of interest arises purely by chance. Therefore, we carry out a spatially randomized placebo test by randomly displacing the location of active mines and checking to see if the estimated effects still exist. This test is in the spirit of Benshaul-Tolonen (2018b) and Depetris-Chauvin and Ozak (2020). Specifically, we randomly offset the true location of active mines by up to 50 kilometers 1,000 times; use the biased locations to calculate new proximity measures; merge them with the DHS – 4 data; and re-estimate the main specifications to obtain new (biased) parameter estimates. For the sake of comparison, we present results on acceptance of physical violence only while considering proximity parameters for all mines.[16] Figure 2 shows the density distributions of point estimates from the 1,000 biased regression models with the proximity measures built from randomly displaced locations. The dotted red lines in this figure represent the 90 percent confidence intervals of the empirical distribution from the biased models. We also show the estimated net effects for the young women coefficients obtained from the main (true) specification for all mines (Panel B of Table 2) in solid blue lines in Figure 2.

If our result is due to a mis-specified model, then the placebo coefficients will be significantly different from zero. That is not the case in Figure 2, which indicates that the placebo effects are centered around zero in all seven measures of women's agency.[17] Furthermore, the placebo effects are distributed distinctly from our baseline estimates, as the blue lines representing our true coefficients lie to the left of zero to a discernible extent in five of the seven cases presented. We conclude that our original results cannot be attributed to a mis-specified model.

8. Conclusions and Policy Implications

This study uses data on individuals in the proximity of active mines in India to understand the consequences of the mining industry on measures of women's agency

[16] Results for other outcomes, for HFLS mines, and for the intensity measures are available on request.
[17] The means of the constructed empirical distributions are not precisely zero in some cases indicating that there likely exist weak spatial spillovers at a 50km radius, similar to Benshaul-Tolonen (2018b).

(acceptance of domestic violence, barriers faced in accessing medical care, and shared decision-making). We find that proximity to HFLS mineral/metal mines results in measurable benefits for women: they are less accepting of physical violence, face lower costs of accessing medical care, and report more equitable decision-making in a variety of spheres. Impacts are especially pronounced for younger women in the 15-25 year age group. Since HFLS mines are more likely to value women's labor as compared to other types of mines (coal for example), women's status is relatively stronger in the surroundings of such mines. This set of results supports Boserup's (1970) theory that women are regarded well in contexts where their labor is valued. We find evidence to support our findings on women's agency as women's human capital (education and health), access to health insurance, and children's health all improve in the vicinity of HFLS mines. Sharing of profits with local affected populations are another key explanatory factor; profit-sharing is found to bring substantial benefits in terms of women's employment and financial awareness and access. These factors are all ingredients in improving women's relative agency, and we document that they change in favorable directions but mostly in the close proximity of active HFLS mines. We also show that men's results mostly resonate with those for women.

Understanding how mining may improve women's agency and human capital can help to underline the unseen benefit of an industry that has often been portrayed as extractive and resource depleting. This study adds to the literature on whether and to what extent the mining industry contributes to sustainable development and social well-being. The results also have important implications for policies to protect women engaged in the mining sector, with wider relevance for other policies to improve social welfare in localities with mining. India's objective of eliminating gender-based violence is consistent with multiple aspects underscored in the

United Nations' Sustainable Development Goals (SDGs). There is mounting evidence on the link between achieving gender equality and empowering women and girls, poverty reduction, and sustainable use of natural resources. Our results indicate that policy reforms should consider how structural changes affect gender-based inequities, especially in areas that are in the close vicinity of an extractive industry.

In India, girls often work at the periphery of mines, with a high incidence of abuse (Eftimie *et al.* 2009a). Policies to protect them should include community initiatives with stakeholders from the government, the mining industry, and civil society. For example, interventions implemented to prevent and provide treatment for alcohol and substance abuse will help to protect women and girls. Other recommendations include government and company-led training programs for service providers on approaching incidents in a gender-sensitive manner (Eftimie *et al.* 2009a).

Our results lend themselves to policy reforms that strengthen women's agency and status in the mining industry through the enforcement of legislation and policies that support employment generation. Policy recommendations include capacity building programs for women to promote employment, training and mentoring to help women advance to higher-level positions within the mining industry, equal pay for equal work, improved working conditions, and strong enforcement of anti-harassment policies (Eftimie *et al.* 2009b). Mining is still a male-dominated industry. However, women and girls are taking on an increasingly important role in artisanal and small-scale mining (Bashwira *et al.* 2014). Small-scale and artisanal mining is more unsafe than large-scale mining with less protective gear and fewer regulations or enforcement. Greater emphasis on community dialogues and participatory planning in mining projects, both large and small, can help to give local women workers a stronger voice, thus ensuring that the extractive industry generates positive economic and social spillovers for local communities (Pokorny *et al.* 2019).

Building stronger institutions to help enforce legislation in areas with active mines also has resonance with the extent to which India's mining industry contributes to the overall economy in such a way that India's natural resource endowment is a blessing rather than a curse (Mehlum *et al.* 2006). Researchers, policymakers, and advocates have increasingly shown interest in exploring the extent to which mining extraction can be transformed from an enclave sector that generates adverse negative economic effects to a revenue-generating sector with beneficial effects. Our results suggest that this objective can be achieved in the case of improving women's agency in areas close to mines.

References

Aizer, A., 2010. “The Gender Wage Gap and Domestic Violence,” *American Economic Review* 100 (4): 1847–1859.

Ahlerup, P., Baskaran, T. and Bigsten, A., 2019. “Gold Mining and Education: a Long-Run Resource Curse in Africa?” *The Journal of Development Studies*, pp.1-18.

Aragón, Fernando, and Juan Pablo Rud. 2013. “Natural Resources and Local Communities: Evidence from a Peruvian Gold Mine,” *American Economic Journal: Economic Policy* 5 (2): 1-25.

Auty, Richard. 1993. *Sustaining Development in Mineral Economies: The Resource Curse Thesis*. London and New York: Routledge.

Bashwira, Marie-Rose, Jeroen Cuvelier, Dorothea Hilhorst, and Gemma Van der Haar. 2014. “Not Only a Man’s World: Women’s Involvement in Artisanal Mining in Eastern DRC,” *Resources Policy* 40: 109-116.

Bebbington, Anthony, Leonith Hinojosa, Denise Humphreys Bebbington, Maria Luisa Burneo, and Ximena Warnaars. 2008. “Contention and ambiguity: Mining and the possibilities of development,” *Development and Change* 39 (6): 887-914.

Benshaul-Tolonen, Anja. 2018a. “Local Industrial Shocks and Infant Mortality,” *The Economic Journal* 129 (620): 1561-1592.

_______. 2018b. “Endogenous Gender Norms: Evidence from Africa’s Gold Mining Industry,” Columbia Center for Development Economics and Policy CDEP-CGEG Working Paper no. 62.

Benshaul-Tolonen, Anja. 2019. “Endogenous Gender Roles: Evidence from Africa’s Gold Mining Industry.” Available at SSRN 3284519.

Berman, Nicolas, Mathieu Couttenier, Dominic Rohner, and Mathias Thoenig. 2017. "This Mine is Mine! How Minerals Fuel Conflicts in Africa," *American Economic Review* 107 (6): 1564-1610.

Bobonis, Gustavo J., Melissa Gonzalez-Brenes, and Roberto Castro. 2013 "Public Transfers and Domestic Violence: The Roles of Private Information and Spousal Control," *American Economic Journal: Economic Policy* 5 (1): 179–205.

Boserup, Ester. 1970. *Woman's Role in Economic Development*. New York: St. Martin's Press.

Burgert, Clara, Josh Colston, Thea Roy, and Blake Zachary. 2013. *Geographic Displacement Procedure and Georeferenced Data Release Policy for the Demographic and Health Surveys*. DHS Spatial Analysis Reports 7. Available at: https://www.dhsprogram.com/pubs/pdf/SAR7/SAR7.pdf

Cools, Sara and Andreas Kotsadam. 2017. "Resources and Intimate Partner Violence in Sub-Saharan Africa," *World Development* 95: 211–230.

Depetris-Chauvin, E., and O. Ozak. 2020. "The Origins of the Division of Labor in Pre-Modern Times," *Journal of Economic Growth* 25: 297-340.

Eftimie, Adriana, Katherine Heller, and John Strongman. 2009a. *Gender Dimensions of the Extractive Industries: Mining for Equity*. Report. Washington, DC: World Bank.

_______. 2009b. *Mainstreaming Gender into Extractive Industries Projects: Guidance Note for Task Team Leaders*. Report. Washington, DC: World Bank.

Eze Eze, Donatien. 2019. "Microfinance Programs and Domestic Violence in Northern Cameroon: The Case of the Familial Rural Income Improvement Program," *Review of Economics of the Household* 17: 947-967.

Ghose, M. K. 2003. "Indian Small-Scale Mining with Special Emphasis on Environmental Management," *Journal of Cleaner Production* 11 (2): 159-165.

Gylfason, T., 2001. Natural resources, education, and economic development. *European economic review*, *45*(4-6), pp.847-859.

Heath, Rachel. 2014. "Women's access to labor market opportunities, control of household resources, and domestic violence: Evidence from Bangladesh," *World Development* 57: 32–46.

India Bureau of Mines. 2015. *Indian Mineral Industry - At a Glance: 2013-14.*

Kotsadam, Andreas, Gudrun Østby, and Siri Aas Rustad. 2017. "Structural Change and Wife Abuse: A Disaggregated Study of Mineral Mining and Domestic Violence in Sub-Saharan Africa, 1999–2013," *Political Geography* 56: 53-65.

Kotsadam, Andreas, and Anja Benshaul-Tolonen. 2016. "African Mining, Gender, and Local Employment," *World Development* 83 (7): 325-339.

Lippert, Alexander. 2014. "Spill-Overs of a Resource Boom: Evidence from Zambian Copper Mines," OxCarre Working Papers 131, Oxford Centre for the Analysis of Resource Rich Economies, University of Oxford.

Mamo, Nemera, Sambit Bhattacharyya, and Alexander Moradi. 2019. "Intensive and Extensive Margins of Mining and Development: Evidence from Sub-Saharan Africa," *Journal of Development Economics* 139: 28-49.

Mehlum, Halvor, Karl Moene, and Ragnar Torvik. 2006. "Institutions and the Resource Curse," *The Economic Journal* 116 (508): 1-20.

Mejía, L.B., 2020. Mining and human capital accumulation: Evidence from the Colombian gold rush. *Journal of Development Economics*, p.102471.

Panda, Pradeep, and Bina Agarwal. 2005. "Marital Violence, Human Development and Women's Property Status in India," *World Development* 33 (5): 823-850.

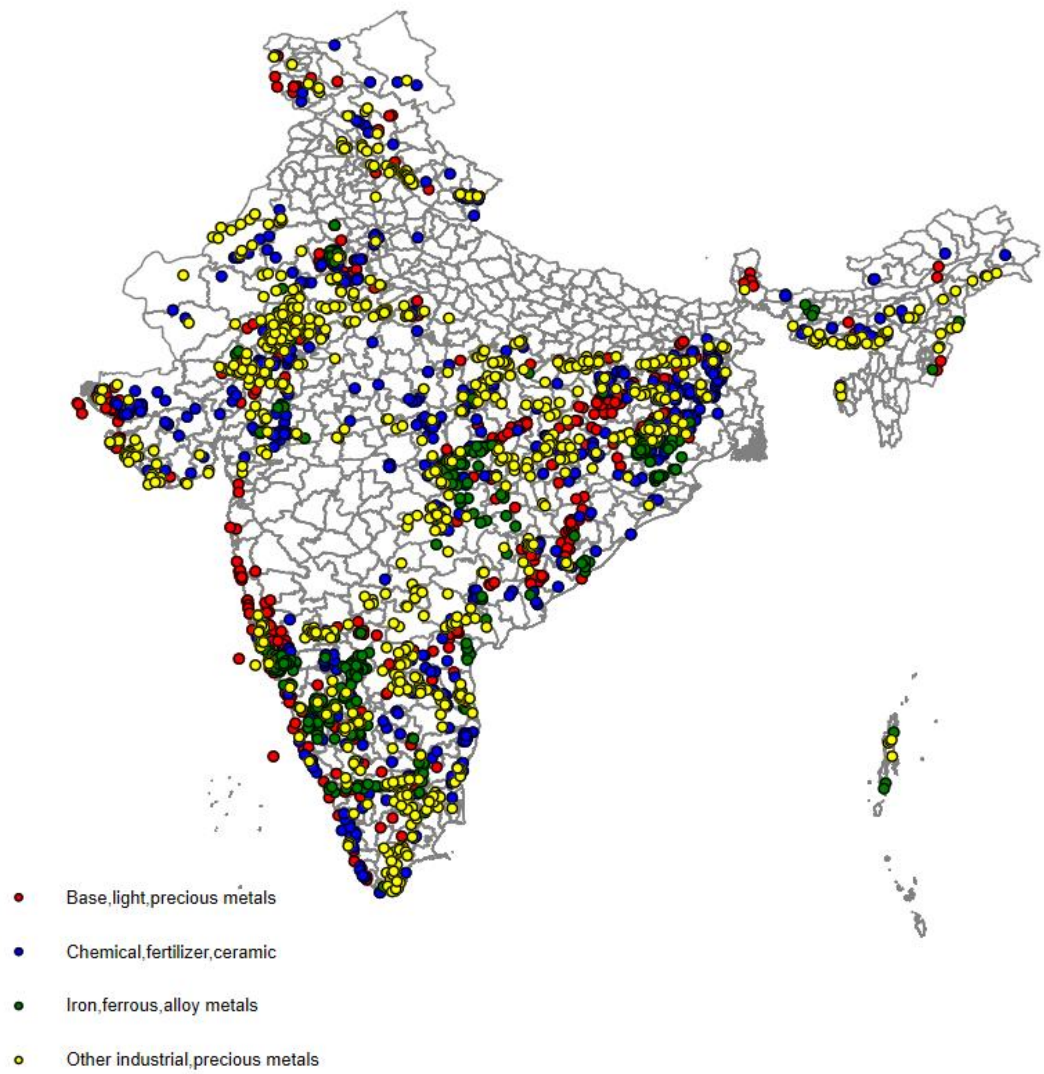
Pokorny, Benno, Christian von Lübke, Sidzabda Djibril Dayamba, and Helga Dickow. 2019. "All the Gold for Nothing? Impacts of Mining on Rural Livelihoods in Northern Burkina Faso," *World Development* 119: 23-39.

Ranjan, Ram. 2019. "Assessing the Impact of Mining on Deforestation in India," *Resources Policy* 60: 23-35.

Von der Goltz, Jan, and Prabhat Barnwal. 2019. "The Local Wealth and Health Effects of Mineral Mining in Developing Countries," *Journal of Development Economics* 139: 1-16.

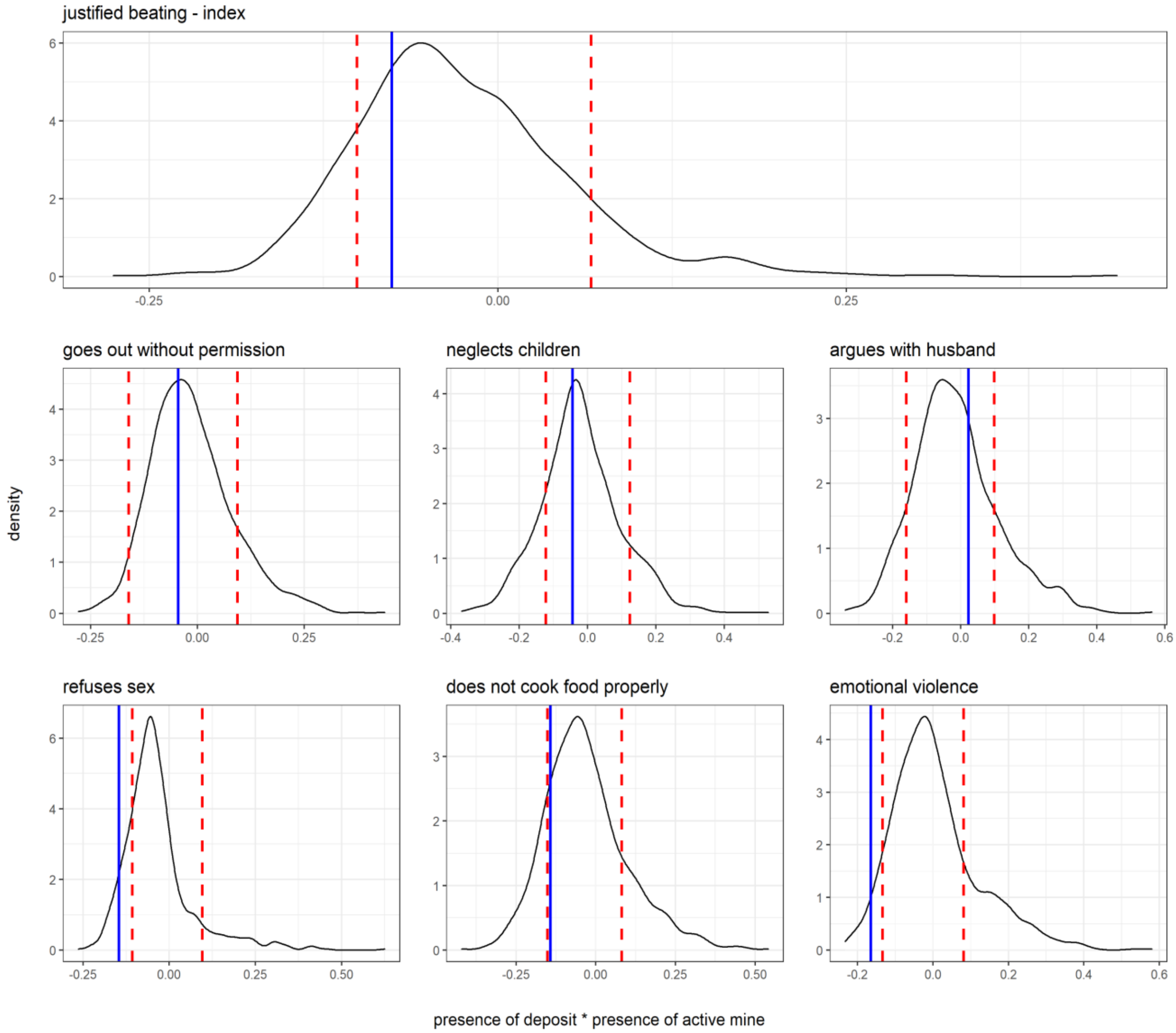
World Bank. 2011. *World Development Report 2012: Gender Equality and Development*. Washington DC: World Bank.

Figure 1: Distribution of mineral deposits in India



Source: Mineral Atlas of India (Geological Survey of India, 2001). Geo-referencing exercise carried out by authors.

Figure 2: Spatial randomization placebo test



Notes: This figure presents the density distributions of point estimates from 1000 replications of the regression model, with the location of active mines randomly displaced by a distance up to 50 kilometers. The estimated net effect for the young coefficient obtained from the main (true) specification for all mines (Panel B of Table 2) are depicted as the solid blue lines. The dotted red lines represent 90 percent confidence intervals of the empirical distributions of the displaced effects.

Table 1: Summary statistics for female respondents in DHS 2015-2016 (full sample)

	mean	standard deviation
Panel A		
Justifies beating if		
wife goes out without telling	0.300	0.458
neglects children	0.368	0.482
argues with husband	0.320	0.467
refuses sex	0.149	0.356
does not cook food properly	0.209	0.407
index	0.268	0.339
emotional violence	0.140	0.347
Panel B		
Barriers when seeking healthcare		
permission	0.176	0.381
money	0.261	0.439
fear to go alone	0.190	0.393
index	0.209	0.314
Panel C		
Final say in decision-making related to		
own earnings	0.822	0.383
own healthcare	0.761	0.427
large purchases	0.761	0.427
visits to family	0.774	0.418
husband's earnings	0.716	0.451
index1	0.808	0.309
index2	0.752	0.361
Panel D		
Mechanism - human capital and profit-sharing		
literate	0.622	0.485
height	152.078	5.892
BMI	22.314	4.262
overweight/obese	0.230	0.421
underweight	0.183	0.387
HBA	11.644	1.635
anemic	0.541	0.498
high BP	0.109	0.311
high glucose	0.497	0.500
HAZ	-1.301	1.693
WAZ	-1.457	1.240
WHZ	-1.020	1.431
any health insurance	0.277	0.448
health insurance from employer	0.007	0.082
health insurance from central/state government	0.160	0.367
profit-sharing per female population	0.163	0.946

currently working	0.285	0.452
is in the workforce	0.357	0.479
services	0.093	0.290
agriculture	0.182	0.386
manufacturing	0.077	0.266
earns cash	0.050	0.219
earns more than him	0.010	0.098
owns house alone	0.026	0.158
owns house alone/jointly	0.048	0.213
knows about loan program	0.086	0.280
knows about and has taken loan	0.022	0.148
Panel E		
Controls		
age difference between wife and partner/husband	5.490	4.355
woman has no education	0.331	0.471
woman has some or all primary school	0.149	0.356
woman has some secondary school	0.361	0.480
woman has completed secondary school or higher	0.159	0.366
number of living children in household	2.351	1.203
husband has no education	0.192	0.394
husband has some or all primary school	0.157	0.364
husband has some secondary school	0.424	0.494
husband completed secondary school or higher	0.225	0.418
father beat mother	0.228	0.420
rural/urban dummy	0.644	0.479
years living in place of residence	15.324	12.349
global human footprint (index, in log)	3.847	0.354
source of drinking water: piped water	0.558	0.497
electricity	0.930	0.255
natural log of $PM_{2.5}$	3.603	0.432

Notes: In Panel A, we code the variables such that they equal 1 if the female respondent says that she considers beating is justified for each reason listed. The related index ranging from 0 to 1 equals 1 if she says yes to each reason. In Panel B, the binary outcomes equal 1 if the respondent says that she considers the listed barriers as big problems when seeking healthcare, and the index reflects her answers to these three questions. In Panel C, all variables are binary and equal 1 if she says "equally/jointly" when asked who should have greater say when making the listed decisions. The index is constructed to consider their answers to this set of questions. Index2 does not include the answer to the first question because of a lack of variation in the data. In Panel D, the employment variables are binary and take a value of 1 if the female respondent says she is (i) currently working, (ii) is in the workforce (iii) in services (iv) in agriculture, and (v) in manufacturing. We also code the other human capital, profit-sharing, and financial independence variables, and report their summary statistics in Panel D. In Panel E, the individual controls include the difference in wife and partner's/husband's age, four indicator variables for the woman's highest level of educational attainment, similar indicator variables for the partner's/husband's level of educational attainment, a continuous variable for the number of living children in the household, a rural/urban dummy that equals 1 if the respondent lives in a rural area, the number of years the respondent has been living in the current place of residence and a dummy for whether or not the respondent's father used to beat her mother. We also include the global human footprint index (see text for further details), binary controls for the main source of drinking water being piped water and access to electricity, and the natural log of $PM_{2.5}$.

Table 2: Impact of mines on attitudes towards domestic violence

	Beating justified if the wife:						
	goes out without permission	**neglects children**	**argues with husband**	**refuses sex**	**does not cook food properly**	**index**	**emotional violence**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Panel A: HFLS mines							
Proximity (whether there is a deposit within 5 km):							
presence of deposit*presence of HFLS active mine	-0.164*	-0.186	-0.381**	0.001	-0.054	-0.149	-0.066
	(0.093)	(0.194)	(0.161)	(0.079)	(0.106)	(0.098)	(0.104)
presence of deposit*presence of HFLS active mine*young	0.017	0.003	0.007	-0.008	0.033	0.010	0.036**
	(0.022)	(0.024)	(0.024)	(0.020)	(0.023)	(0.017)	(0.015)
net effect for young	-0.147	-0.183	-0.374	-0.007	-0.020	-0.139	-0.030
F-statistic	2.400	0.880	5.400	0.010	0.040	2.140	0.080
	[0.121]	[0.347]	[0.020]	[0.936]	[0.848]	[0.144]	[0.774]
Observations	7,534	7,539	7,526	7,483	7,540	7,430	7,567
R-squared	0.212	0.237	0.152	0.087	0.093	0.216	0.115
Intensity (number of deposits within 5km):							
number of deposits*presence of HFLS active mine	-0.191**	-0.206	-0.363**	-0.011	-0.066	-0.164*	-0.0525
	(0.088)	(0.193)	(0.157)	(0.076)	(0.102)	(0.093)	(0.102)
number of deposits*presence of HFLS active mine*young	0.017	0.003	0.007	-0.008	0.033	0.010	0.036**
	(0.022)	(0.024)	(0.024)	(0.020)	(0.023)	(0.017)	(0.015)
net effect for young	-0.174	-0.203	-0.356	-0.020	-0.033	-0.155	-0.016
F-statistic	3.880	1.110	5.140	0.060	0.100	2.780	0.030
	[0.049]	[0.293]	[0.024]	[0.799]	[0.748]	[0.095]	[0.871]
Observations	7,534	7,539	7,526	7,483	7,540	7,430	7,567
R-squared	0.212	0.237	0.153	0.087	0.093	0.216	0.115

Panel B: All mines							
Proximity (whether there is a deposit within 5 km):							
presence of deposit*presence of active mine	-0.120*	-0.076	-0.108*	-0.101**	-0.072	-0.086*	-0.040
	(0.069)	(0.065)	(0.063)	(0.051)	(0.057)	(0.051)	(0.062)
presence of deposit*presence of active mine*young	0.075	0.032	0.131	-0.045	-0.070	0.010	-0.125**
	(0.076)	(0.078)	(0.105)	(0.044)	(0.054)	(0.057)	(0.054)
net effect for young	-0.045	-0.044	0.023	-0.146	-0.142	-0.076	-0.165
F-statistic	0.330	0.340	0.060	12.170	8.650	2.550	12.830
	[0.567]	[0.557]	[0.810]	[0.001]	[0.003]	[0.111]	[0.000]
Observations	30,699	30,707	30,668	30,569	30,701	30,358	30,804
R-squared	0.171	0.200	0.136	0.077	0.092	0.187	0.097
Intensity (number of deposits within 5km):							
number of deposits*presence of active mine	-0.017	-0.031	-0.001	-0.007	-0.008	-0.009	-0.006
	(0.018)	(0.019)	(0.024)	(0.017)	(0.019)	(0.014)	(0.019)
number of deposits*presence of active mine*young	0.011	0.011	0.034	-0.033***	-0.035**	-0.006	-0.047***
	(0.024)	(0.023)	(0.034)	(0.012)	(0.016)	(0.015)	(0.013)
net effect for young	-0.007	-0.020	0.033	-0.040	-0.043	-0.015	-0.053
F-statistic	0.060	0.540	0.930	7.490	5.650	0.970	10.670
	[0.813]	[0.462]	[0.334]	[0.006]	[0.018]	[0.324]	[0.001]
Observations	30,699	30,707	30,668	30,569	30,701	30,358	30,804
R-squared	0.171	0.200	0.136	0.076	0.092	0.187	0.097

Notes: The table reports the regression results for the interaction terms. Panel A reports the results when only precious minerals and HFLS mines are considered using either proximity dummies or intensity measured as count variables for the number of deposits and active mines that are within 5km. The binary dependent variables take a value of 1 if the female respondent says that she considers that beating is justified for reasons reported in each column. In column (6), the index, ranging from 0 to 1, is constructed by considering the answers to the 5 questions related to attitude towards domestic violence. It equals to 1 if the respondent says that beating is justified in each case. The mean value of the index is 0.27. In column (7), “emotional violence" is a variable that equals 1 if the respondent says that she has experienced one of the three possible examples of emotional violence listed. The sample is restricted to women who were interviewed for domestic violence only. The individual controls include the difference in wife and partner's/husband's age, three indicator variables for the woman's highest level of educational attainment (with the excluded category being "no education at all"), similar indicator variables for the partner's/husband's level of educational attainment, a continuous variable for the number of living children in the household, a rural/urban dummy that equals 1 if the respondent lives in a rural area, the number of years the respondent has been living in the current place of residence and a dummy for whether or not the respondent's father used to beat her mother. We also include the GHF (see text for further details) and binary controls for the main source of drinking water being piped water and access to electricity. All regressions are weighted, and include district and state fixed-effects. Robust standard errors clustered at the DHS cluster level. *presence of deposit*presence of active mine* takes a value of 1 if there is a deposit and an active mine within 5 km of the DHS cluster to which the respondent belongs. *number of deposits*presence of active mine* equals the number of deposits within 5 km of the DHS cluster interacted with the dummy for the presence of an active mine within 5 km of the same cluster. *"young"* is a binary variable that equals 1 if the female respondent is 15-25 years old. Coefficients and standard errors for the interactions with the young variable for proximity and intensity are the same in the case of HFLS mines due to rounding to three decimal digits. We report net effects on the young with associated *p*-values in square brackets. *** Denotes significance at the 1% level, ** at the 5% level and * at the 10% level.

Table 3: Impact of mines on barriers faced by women while seeking medical care

	Barriers while seeking medical care related to:			
	permission	**money**	**fear of going alone**	**index**
	(1)	**(2)**	**(3)**	**(4)**
Panel A: HFLS mines				
Proximity (whether there is a deposit within 5 km):				
presence of deposit*presence of HFLS active mine	-0.248***	-0.180**	-0.070	-0.166***
	(0.072)	(0.073)	(0.077)	(0.059)
presence of deposit*presence of HFLS active mine*young	0.002	0.861***	-0.345***	0.173***
	(0.016)	(0.017)	(0.015)	(0.013)
net effect for young	-0.246	0.681	-0.414	0.007
F-statistic	11.470	84.700	28.470	0.010
	[0.000]	[0.000]	[0.000]	[0.907]
Observations	10,715	10,715	10,715	10,715
R-squared	0.133	0.158	0.108	0.149
Intensity (number of deposits within 5km):				
number of deposits*presence of HFLS active mine	-0.232***	-0.177**	-0.065	-0.158***
	(0.070)	(0.071)	(0.075)	(0.058)
number of deposits*presence of HFLS active mine*young	0.002	0.861***	-0.345***	0.173***
	(0.016)	(0.017)	(0.015)	(0.013)
net effect for young	-0.229	0.683	-0.409	0.015
F-statistic	10.600	92.090	29.080	0.060
	[0.001]	[0.000]	[0.000]	[0.799]
Observations	10,715	10,715	10,715	10,715
R-squared	0.133	0.158	0.108	0.149
Panel B: All mines				

	(1)	(2)	(3)	(4)
Proximity (whether there is a deposit within 5 km):				
presence of deposit*presence of active mine	-0.045	-0.010	-0.074*	-0.043
	(0.052)	(0.051)	(0.044)	(0.042)
presence of deposit*presence of active mine*young	0.023	-0.004	0.066	0.028
	(0.078)	(0.057)	(0.056)	(0.045)
net effect for young	-0.023	-0.014	-0.008	-0.015
F-statistic	0.130	0.050	0.020	0.110
	[0.723]	[0.817]	[0.888]	[0.744]
Observations	43,723	43,723	43,723	43,723
R-squared	0.119	0.147	0.092	0.139
Intensity (number of deposits within 5km):				
number of deposits*presence of active mine	0.013	0.019	-0.005	0.009
	(0.025)	(0.023)	(0.021)	(0.022)
number of deposits*presence of active mine*young	-0.015	-0.014	0.009	-0.007
	(0.021)	(0.015)	(0.013)	(0.015)
net effect for young	-0.002	0.005	0.004	0.002
F-statistic	0.020	0.110	0.080	0.050
	[0.897]	[0.742]	[0.772]	[0.832]
Observations	43,723	43,723	43,723	43,723
R-squared	0.119	0.147	0.092	0.139

Notes: The table reports the regression results for the interaction terms. Panel A reports the results when only precious minerals and HFLS mines are considered using either proximity dummies or intensity measured as count variables for the number of deposits and active mines that are within 5 km. Women are asked 8 questions related to barriers they face when seeking medical care for themselves. We focus on three concerns directly related to women agency. The table shows the results when the binary dependent variables of interest take a value of 1 if the female respondent says that the reason provided in each column represents a big problem when seeking healthcare for herself. In column (4), the index is constructed based on answers provided to these three questions only. It ranges from 0 to 1 and takes a value of 1 if the respondent answers "big problem" when asked if permission, money, and the fear of going alone represent major barriers. The mean of this index is 0.209. The individual controls include the difference in wife and partner's/husband's age, three indicator variables for the woman's highest level of educational attainment (with the excluded category being "no education at all"), similar indicator variables for the partner's/husband's level of educational attainment, a continuous variable for the number of living children in the household, a rural/urban dummy that equals 1 if the respondent lives in a rural area, and the number of years the respondent has been living in the current place of residence. We also include the GHF (see text for further details) and binary controls for the main source of drinking water being piped water and access to electricity. All regressions are weighted, and include district and state fixed-effects. Robust standard errors are clustered at the DHS cluster level. presence of deposit*presence of active mine takes a value of 1 if there is a deposit and an active mine within 5 km of the DHS cluster to which the respondent belongs. number of deposits*presence of active mine equals the number of deposits within 5 km of the DHS cluster interacted with the dummy for the presence of an active mine within 5 km of the same cluster. "young" is a binary variable that equals 1 if the female respondent is 15-25 years old. Coefficients and standard errors for the interactions with the young variable for proximity and intensity are the same in the case of HFLS mines due to rounding to three decimal digits. We report net effects on the young with associated p-values in square brackets. *** Denotes significance at the 1% level, ** at the 5% level and * at the 10% level.

Table 4: Impact of mines on women's attitude to shared decision making

	Final say in decision-making related to:						
	own earnings	**own healthcare**	**large purchases**	**visits to family**	**husband's earnings**	**index 1**	**index 2**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Panel A: HFLS mines							
Proximity (whether there is a deposit within 5 km):							
presence of deposit*presence of HFLS active mine		-0.107	0.020	-0.148**	-0.001		-0.058
		(0.086)	(0.075)	(0.067)	(0.054		(0.062)
presence of deposit*presence of HFLS active mine*young		0.062***	0.100***	0.075***	0.081***		0.079***
		(0.017)	(0.018)	(0.017)	(0.018)		(0.016)
net effect for young		-0.045	0.120	-0.072	0.080		0.021
F-statistic		0.260	2.510	1.130	2.320		0.120
		[0.609]	[0.114]	[0.288]	[0.128]		[0.734]
Observations	3396	10711	10711	10711	10581	3265	10581
R-squared	0.116	0.064	0.067	0.065	0.064	0.12	0.078
Intensity (number of deposits within 5km):							
number of deposits*presence of HFLS active mine		-0.115	0.008	-0.153**	0.001		-0.062
		(0.080)	(0.070)	(0.064)	(0.047)		(0.058)
number of deposits*presence of HFLS active mine*young		0.062***	0.100***	0.075***	0.081***		0.079***
		(0.017)	(0.018)	(0.0172)	(0.018)		(0.015)
net effect for young		-0.053	0.108	-0.078	0.082		0.017
F-statistic		0.390	2.290	1.450	2.980		0.080
		[0.532]	[0.130]	[0.229]	[0.085]		[0.777]
Observations	3396	10711	10711	10711	10581	3265	10581
R-squared	0.116	0.064	0.067	0.065	0.064	0.12	0.078

Panel B: All mines							
Proximity (whether there is a deposit within 5 km):							
presence of deposit*presence of active mine	0.002	-0.050	0.000	0.033	-0.025	-0.102	-0.017
	(0.070)	(0.053)	(0.053)	(0.050)	(0.056)	(0.076)	(0.045)
presence of deposit*presence of active mine*young	-0.159	0.141*	0.179***	0.051	0.159**	0.020	0.135**
	(0.190)	(0.073)	(0.069)	(0.074)	(0.076)	(0.214)	(0.058)
net effect for young	-0.156	0.090	0.179	0.084	0.134	-0.082	0.117
F-statistic	0.630	1.280	6.550	1.200	2.920	0.140	3.130
	[0.428]	[0.258]	[0.011]	[0.274]	[0.087]	[0.711]	[0.077]
Observations	11,395	43,714	43,714	43,714	43,348	11,029	43,348
R-squared	0.097	0.050	0.047	0.055	0.043	0.104	0.059
Intensity (number of deposits within 5km):							
number of deposits*presence of active mine	-0.000	-0.016	0.001	0.016	-0.018	-0.009	-0.007
	(0.026)	(0.021)	(0.017)	(0.018)	(0.020)	(0.029)	(0.017)
number of deposits*presence of active mine*young	-0.053	0.007	0.034***	-0.012	0.043***	0.007	0.019*
	(0.042)	(0.019)	(0.013)	(0.011)	(0.014)	(0.051)	(0.010)
net effect for young	-0.053	-0.009	0.035	0.004	0.025	-0.002	0.012
F-statistic	2.050	0.180	3.270	0.050	1.730	0.000	0.450
	[0.152]	[0.674]	[0.071]	[0.819]	[0.189]	[0.964]	[0.503]
Observations	11,395	43,714	43,714	43,714	43,348	11,029	43,348
R-squared	0.097	0.050	0.047	0.055	0.043	0.104	0.059

Notes: The table reports the regression results for the interaction terms. Panel A reports the results when only precious minerals and HFLS mines are considered using either proximity dummies or intensity measured as count variables for the number of deposits and active mines that are within 5 km. Women are asked who they think should have greater say when it comes to decisions reported in columns (1) to (5). The binary dependent variables take a value of 1 if the respondent says that she thinks such decisions should be taken jointly with her partner or her husband. In column 6, index 1, ranging from 0 to 1, takes a value of 1 if the respondent answers "shared equally" when asked who should have greater say for the set of all five listed decisions. The mean of this index is 0.808. In column 7, index 2, ranging from 0 to 1, takes a value of 1 if the respondent answers "equally" to the last four listed decisions. The mean of this index is 0.752. The individual controls include the difference in wife and partner's/husband's age, three indicator variables for the woman's highest level of educational attainment (with the excluded category being "no education at all"), similar indicator variables for the partner's/husband's level of educational attainment, a continuous variable for the number of living children in the household, a rural/urban dummy that equals 1 if the respondent lives in a rural area, and the number of years the respondent has been living in the current place of residence. We also include the GHF (see text for further details) and binary controls for the main source of drinking water being piped water and access to electricity. All regressions are weighted, and include district and state fixed-effects. Robust standard errors are clustered at the DHS cluster level. *presence of deposit*presence of active mine* takes a value of 1 if there is a deposit and an active mine within 5 km of the DHS cluster to which the respondent belongs. *number of deposits*presence of active mine* equals the number of deposits within 5 km of the DHS cluster interacted with the dummy for the presence of active mine within 5 km of the same cluster. *"young"* is a binary variable that equals 1 if the female respondent is 15-25 years old. Coefficients and standard errors for the interactions with the young variable for proximity and intensity are the same in the case of HFLS mines due to rounding to three decimal digits. We report net effects on the young with associated *p*-values in brackets. *** Denotes significance at the 1% level, ** at the 5% level and * at the 10% level.

Table 5: Impact of mines on women's education

	Binary dependent variable	
	literate	**some secondary school or higher**
	(1)	**(2)**
Panel A: HFLS mines		
Proximity (whether there is a deposit within 5 km):		
presence of deposit*presence of HFLS active mine	-0.028	-0.159
	(0.072)	(0.086)
presence of deposit*presence of HFLS active mine*young	0.298***	0.439***
	(0.013)	(0.014)
net effect for young	0.270	0.280
F-statistic	14.100	10.530
	[0.000]	[0.001]
Observations	10,378	10,389
R-squared	0.416	0.437
Intensity (number of deposits within 5km):		
number of deposits*presence of HFLS active mine	-0.042	-0.176**
	(0.071)	(0.086)
number of deposits*presence of HFLS active mine*young	0.298***	0.439***
	(0.013)	(0.014)
net effect for young	0.257	0.263
F-statistic	13.110	9.400
	[0.000]	[0.002]
Observations	10,378	10,389
R-squared	0.416	0.437
Panel B: All mines		

Proximity (whether there is a deposit within 5 km):		
presence of deposit*presence of active mine	0.041	0.047
	(0.036)	(0.035)
presence of deposit*presence of active mine*young	0.071	-0.010
	(0.075)	(0.090)
net effect for young	0.112	0.037
F-statistic	2.320	0.170
	[0.128]	[0.679]
Observations	42,448	42,487
R-squared	0.382	0.412
Intensity (number of deposits within 5km):		
number of deposits*presence of active mine	-0.008	0.005
	(0.013)	(0.012)
number of deposits*presence of active mine*young	-0.011	-0.030
	(0.022)	(0.019)
net effect for young	-0.009	-0.025
F-statistic	0.150	1.510
	[0.703]	[0.219]
Observations	42,448	42,487
R-squared	0.382	0.412

Notes: The table reports the regression results for the interaction terms. Panel A reports the results when only precious minerals and HFLS mines are considered using either proximity dummies or intensity measured as count variables for the number of deposits and active mines that are within 5 km. The binary dependent variables take a value of 1 if the respondent says that she is literate (in column 1), and has achieved some secondary schooling (in column 2). The individual controls include the difference in wife and partner's/husband's age, three indicator variables for the partner's/husband's level of educational attainment, a continuous variable for the number of living children in the household, a rural/urban dummy that equals 1 if the respondent lives in a rural area, and the number of years the respondent has been living in the current place of residence. We also include the GHF (see text for further details) and binary controls for the main source of drinking water being piped water and access to electricity. All regressions are weighted, and include district and state fixed-effects. Robust standard errors are clustered at the DHS cluster level. *presence of deposit*presence of active mine* takes a value of 1 if there is a deposit and an active mine within 5 km of the DHS cluster to which the respondent belongs. *number of deposits*presence of active mine* equals the number of deposits within 5 km of the DHS cluster interacted with the dummy for the presence of active mine within 5 km of the same cluster. *"young"* is a binary variable that equals 1 if the female respondent is in the age group 15-25 years old. Coefficients and standard errors for the interactions with the young variable for proximity and intensity are the same in the case of HFLS mines due to rounding to three decimal digits. We report net effects on the young with associated *p*-values in brackets. *** Denotes significance at the 1% level, ** at the 5% level and * at the 10% level.

Table 6: Impact of mines on women's health

	height	BMI	overweight/ obese	underweight	HBA	anemic	high BP	high glucose
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: HFLS mines								
Proximity (whether there is a deposit within 5 km):								
presence of deposit*presence of HFLS active mine	0.438	0.106	-0.019	-0.282***	0.309	0.228**	-0.065	-0.183
	(1.243)	(0.573)	(0.068)	(0.056)	(0.274)	(0.090)	(0.067)	(0.125)
presence of deposit*presence of HFLS active mine*young	1.904***	1.667***	0.116***	-0.246***	-0.093	-0.064***	0.032***	-0.174***
	(0.244)	(0.195)	(0.020)	(0.015)	(0.075)	(0.020)	(0.012)	(0.020)
net effect for young	2.342	1.773	0.097	-0.528	0.217	0.164	-0.033	-0.357
F-statistic	3.470	9.650	2.040	86.060	0.600	3.270	0.240	8.130
	[0.063]	[0.002]	[0.154]	[0.000]	[0.437]	[0.071]	[0.623]	[0.004]
Observations	10,389	10,389	10,389	10,389	10,330	10,330	10,375	10,330
R-squared	0.097	0.275	0.187	0.135	0.096	0.089	0.134	0.058
Intensity (number of deposits within 5km):								
number of deposits*presence of HFLS active mine	0.110	-0.099	-0.051	-0.287***	0.305	0.254***	-0.088	-0.163
	(1.189)	(0.556)	(0.068)	(0.054)	(0.269)	(0.089)	(0.064)	(0.125)
number of deposits*presence of HFLS active mine*young	1.902***	1.664***	0.115***	-0.246***	-0.093	-0.064***	0.032**	-0.173***
	(0.244)	(0.195)	(0.020)	(0.015)	(0.075)	(0.020)	(0.012)	(0.020)
net effect for young	2.012	1.565	0.064	-0.533	0.212	0.19	-0.056	-0.337
F-statistic	2.800	7.980	0.900	93.690	0.600	4.470	0.770	7.330
	[0.095]	[0.005]	[0.344]	[0.000]	[0.438]	[0.035]	[0.381]	[0.007]
Observations	10,389	10,389	10,389	10,389	10,330	10,330	10,375	10,330
R-squared	0.097	0.275	0.186	0.135	0.096	0.089	0.134	0.058
Panel B: All mines								

Proximity (whether there is a deposit within 5 km):								
presence of deposit*presence of active mine	-0.654	1.222**	0.093**	-0.064**	0.092	-0.042	0.040	0.001
	(0.667)	(0.494)	(0.043)	(0.030)	(0.198)	(0.061)	(0.036)	(0.052)
presence of deposit*presence of active mine*young	-1.569	-0.507	-0.058	0.064	0.094	-0.024	-0.019	-0.060
	(1.064)	(0.525)	(0.066)	(0.064)	(0.365)	(0.096)	(0.027)	(0.068)
net effect for young	-2.223	0.715	0.035	0.000	0.187	-0.067	0.021	-0.059
F-statistic	5.300	2.190	0.270	0.000	0.330	0.520	0.260	0.720
	[0.021]	[0.139]	[0.600]	[0.998]	[0.566]	[0.471]	[0.609]	[0.397]
Observations	42,487	42,487	42,487	42,487	42,196	42,196	42,428	42,195
R-squared	0.103	0.209	0.144	0.097	0.076	0.066	0.128	0.044
Intensity (number of deposits within 5km):								
number of deposits*presence of active mine	-0.138	0.259	0.030*	-0.015	-0.060	0.019	0.008	-0.001
	(0.202)	(0.187)	(0.017)	(0.012)	(0.052)	(0.017)	(0.014)	(0.018)
number of deposits*presence of active mine*young	-0.225	-0.125	-0.023*	0.010	-0.044	0.002	0.004	-0.003
	(0.277)	(0.165)	(0.013)	(0.020)	(0.074)	(0.017)	(0.006)	(0.017)
net effect for young	-0.363	0.134	0.006	-0.005	-0.104	0.021	0.012	-0.004
F-statistic	1.340	1.560	0.290	0.090	2.260	1.380	0.960	0.050
	[0.248]	[0.212]	[0.590]	[0.764]	[0.133]	[0.240]	[0.326]	[0.822]
Observations	42,487	42,487	42,487	42,487	42,196	42,196	42,428	42,195
R-squared	0.103	0.208	0.144	0.096	0.076	0.066	0.127	0.044

Notes: The table reports the regression results for the interaction terms. Panel A reports the results when only precious minerals and HFLS mines are considered using either proximity dummies or intensity measured as count variables for the number of deposits and active mines that are within 5 km. BMI is weight in kilograms (kg) divided by height in meters squared (m^2), and overweight/obese is defined as BMI greater than or equal to 25.0 kg/m^2 while underweight is defined as BMI less than 18.5 kg/m^2. A woman is anemic if her HBA level is below 12.0 g/dl (grams per deciliter). The individual controls include the difference in wife and partner's/husband's age, three indicator variables for the partner's/husband's level of educational attainment, a continuous variable for the number of living children in the household, a rural/urban dummy that equals 1 if the respondent lives in a rural area, and the number of years the respondent has been living in the current place of residence. We also include the GHF (see text for further details) and binary controls for the main source of drinking water being piped water and access to electricity. All regressions are weighted, and include district and state fixed-effects. Robust standard errors are clustered at the

DHS cluster level. *presence of deposit*presence of active mine* takes a value of 1 if there is a deposit and an active mine within 5 km of the DHS cluster to which the respondent belongs. *number of deposits*presence of active mine* equals the number of deposits within 5 km of the DHS cluster interacted with the dummy for the presence of active mine within 5 km of the same cluster. *"young"* is a binary variable that equals 1 if the female respondent is in the age group 15-25 years old. We report net effects on the young with associated *p*-values in brackets. *** Denotes significance at the 1% level, ** at the 5% level and * at the 10% level.

Table 7: Profit sharing, proximity to mines and female employment for HFLS mines

	currently working (1)	is in the workforce (2)	agriculture (3)	manufacturing (4)	services (5)
Proximity (whether there is a deposit within 5 km):					
presence of deposit*presence of HFLS active mine	-0.155***	-0.266***	-0.288***	-0.038	0.016
	(0.058)	(0.057)	(0.067)	(0.025)	(0.062)
presence of HFLS active mine*profit sharing per female pop.	1.280***	0.943***	0.965***	0.084*	-0.028
	(0.145)	(0.130)	(0.168)	(0.051)	(0.160)
Observations	10,715	10,703	10,703	10,566	10,566
R-squared	0.068	0.083	0.195	0.019	0.063

Notes: The table reports the coefficients on the interaction terms. Panel A reports the results when only HFLS mines are considered using proximity dummies while Panel B reports the results for non-HFLS mines. In column (1), the binary dependent variable equals to 1 if the female respondent says that she is currently working, and in column (2), the indicator variable takes a value of 1 if she is in the workforce. Columns (3) to (5) consider binary occupational outcomes related to employment in agriculture, manufacturing, and services. The individual controls include the difference in wife and partner's/husband's age, three indicator variables for the woman's highest level of educational attainment (with the excluded category being "no education at all"), similar indicator variables for the partner's/husband's level of educational attainment, a continuous variable for the number of living children in the household, a rural/urban dummy that equals 1 if the respondent lives in a rural area, and the number of years the respondent has been living in the current place of residence. We also include the GHF (see text for further details) and binary controls for the main source of drinking water being piped water and access to electricity. All regressions include state fixed-effects. Robust standard errors are clustered at the DHS cluster level. All regressions are weighted. *presence of deposit*presence of active mine* takes a value of 1 if there is a deposit and an active mine within 5 km of the DHS cluster to which the respondent belongs. *presence of active mine*profit sharing per female population* is the interaction term between the presence of active mine (HFLS or non-HFLS) within 5 km of the DHS cluster and the continuous variable for district-level profit sharing per female population. We report net effects with associated *p*-values in brackets. *** Denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 8: Profit sharing, proximity to mines and female financial independence for HFLS mines

	earns cash (1)	**earns more than him (2)**	**owns house alone (3)**	**owns house alone/jointly (4)**	**knows about loan program (5)**	**knows about and has loan (6)**
Proximity (whether there is a deposit within 5 km):						
presence of deposit*presence of HFLS active mine	-0.081	0.029	0.087*	-0.016	-0.119	0.003
	(0.056)	(0.029)	(0.050)	(0.150)	(0.133)	(0.087)
pres. of prec. active mine*profit sharing per female pop.	0.765***	1.104***	0.160	1.130***	1.046***	0.528**
	(0.137)	(0.060)	(0.119)	(0.386)	(0.355)	(0.220)
Observations	10,715	10,686	10,715	10,715	10,715	10,715
R-squared	0.063	0.032	0.069	0.053	0.126	0.102

Notes: The table reports the coefficients on the interaction terms. Panel A reports the results when only HFLS mines are considered using proximity dummies while Panel B reports the results for non-HFLS mines. In column (1), the dependent variable equals to 1 if the female respondent says that she earns "cash" instead of "in-kind" as earnings, and in column (2), the variable is coded as 1 if she reports earning more than her partner/husband. In columns (3) and (4), the dependent variables equal 1 if the respondent says that she "owns a house alone", and if she says that she "owns a house alone and/or jointly", respectively. In the last two columns, the variables relate to awareness of financial opportunities and the binary dependent variables equal 1 in column (5) if she says that she is aware of a program in the area that gives loans to women to start or expand a business, and in column (6), if she says that she has taken a loan, cash or in-kind, from this program to start or expand a business. The individual controls include the difference in wife and partner's/husband's age, three indicator variables for the woman's highest level of educational attainment (with the excluded category being "no education at all"), similar indicator variables for the partner's/husband's level of educational attainment, a continuous variable for the number of living children in the household, a rural/urban dummy that equals 1 if the respondent lives in a rural area, and the number of years the respondent has been living in the current place of residence. We also include the GHF (see text for further details) and binary controls for the main source of drinking water being piped water and access to electricity. All regressions include state fixed-effects. Robust standard errors are clustered at the DHS cluster level. All regressions are weighted. *presence of deposit*presence of active mine* takes a value of 1 if there is a deposit and an active mine within 5 km of the DHS cluster to which the respondent belongs. *presence of active mine*profit sharing per female population* is the interaction term between the presence of active mine (HFLS or non-HFLS) within 5 km of the DHS cluster and the continuous variable for district-level profit sharing per female population. We report net effects with associated *p*-values in brackets. *** Denotes significance at the 1% level, ** at the 5% level, and * at the 10% level.

ONLINE APPENDIX

Appendix Box 1: Choice of Baseline Distance

To determine the appropriate treatment distance for our empirical framework, we study the commuting behavior of workers in India. In 2011, the Census in India reported the mode of travel and the travel distances of workers in the country for the first time. The data is available by gender, and for both rural and urban areas in each state.[1] Appendix Figure 4 shows that more than half of the women interviewed report that they walk to work, against 28 percent of male respondents reporting so. In rural India, two-thirds of women walk to work, while only 28 percent of men do so, and 1 out of 4 men uses a bicycle to access work compared to only 1 out of 20 women who work. Appendix Figure 5 shows the distance to work by gender and by mode of travel. Out of all workers interviewed, around a quarter of male respondents and 45 percent of female respondents do not travel at all for work. The corresponding proportions for rural areas are 33 percent and 55 percent for male and female workers, respectively. Out of all the respondents reporting that they had to commute to work, 16 percent reported a travel distance of up to 1 km; 23 percent reported a distance of 2-5 km, with mild differences in the proportions for male and female respondents, and between rural and urban areas. Taking these together, the census data reveals that the proportion of workers who travel 5 km or less to access their place of work is approximately 70 percent. Hence, our focus on the 5km distance around clusters for a baseline is appropriate.

We also refer to the relevant literature on mining and development to ensure that this baseline distance is in line with previous studies (indicating treatment effects for communities within 5-20 km of the mine). Kotsadam and Benshaul-Tolonen (2016) use a baseline distance of

[1] These are for workers who were engaged in economic activities; not cultivators or agricultural laborers or in household industries (Source: censusindia.gov.in/2011Census).

20 km to estimate a mine's footprint. Benshaul-Tolonen (2018) uses a baseline distance of 10 km when considering the potential impact of opening mines on gender norms, while Benshaul-Tolonen (2019) relies on a treatment distance of 15 km. Von der Goltz and Barnwal (2019) define a DHS cluster as being in the direct vicinity of a mine if it is within 5 km of the nearest mine. In these cases as in ours, the choice of baseline distance is based on the commuting behavior of workers and on the related literature on the health, development, and employment effects of mines on local communities.

Appendix Box 2: Profit-Sharing in Mining Communities

We first consider the effects of three different district-level proxies of profit sharing on women living within 5 km of an active HFLS/non-HFLS mine, and in a district that distributes royalties in specific ways. To construct these proxies, we use a 2011 official report provided by the Center for Science and Environment, India.[2] Prepared to understand the major implications of the Draft Mines and Minerals (Development and Regulation) (MMDR) Act Bill of 2011, the report provides scope to understand the possible effects of district-level profit sharing of mineral wealth on affected populations.[3] Referring specifically to the profit-sharing concept introduced for the first time under sub-section 2 of Section 43 of the draft, it states that *"a mine leaseholder is to pay annually to the District Mineral Foundation (DMF), as specified in Section 56, an amount equal to 26 percent of profit after tax or a sum equivalent to the royalty paid during the year, whichever is higher".* This allows us to proxy for the amount each affected individual, household, and woman receives from resource abundance in mineral-producing districts, keeping in mind that the major challenge in the implementation of the DMF is to identify people affected

[2] For more details, see "Sharing The Wealth of Minerals: A report on Profit Sharing with Local Communities", Center for Science and Environment, New Delhi, India (2011).
[3] The Draft MMDR Act Bill of 2011 considers, within a well-defined framework, amongst other things, what goes to affected people/communities.

by mining, and that affected districts adjacent to mineral-producing areas should also receive compensation for the possible loss of livelihoods, land, and displacement.[4]

The first proxy considered is profit sharing per affected population. We use the mineral-specific reports contained in the *Indian Minerals Yearbook 2014*, digitize the district-level values of production for each mineral, and then aggregate them to obtain the total value of mineral production for the period 2013-2014. We also compiled the district-wise total mineral leased area, manually digitized from the *Bulletin of Mining leases and Prospecting Licenses, 2014* from the Indian Bureau of Mines. This allows us to obtain the total mine leased area for each district as of 2014.[5] Since the Draft MMDR includes the provision that the mining industry should provide at a minimum the royalty, we assume that the share of profits distributed to local communities is equal to the royalty. Referring to the royalty contribution of major Indian mining companies, we set the royalty to be equal to 10.5 percent of the total value of mineral production.[6]

To estimate the population affected by mining activities, the report further assumes that the direct effects of health, displacement, and livelihoods are scattered over at least twice the size of the leased area, and that the population density over the affected area is in turn directly proportional to the average population density of the State. We construct the district-wise profit

[4] Pradhan Mantri Khanij Kshetra Kalyan Yojana (PMKKKY) guidelines for DMF Trusts define mining-affected people as people who have legal and occupational rights over the land being mined; people who have usufruct and traditional rights over the land being mined, displaced families, and families whose health, livelihoods, and quality of life are directly affected by mining activities.

[5] This excludes atomic minerals, coal, lignite, petroleum, and natural gas (but includes the minerals declared as minor).

[6] During the fiscal year of 2009-2010, Coal India Limited (CIL) paid 11.6 percent of gross sales as royalty, cess, and dead rent burden. The other big mining companies-Rajasthan State Mines and Minerals Limited (RSMM) paid 10.6 percent, The Singareni Collieries Company Limited (SCCL) paid 8.6 percent, while Gujarat Mineral Development Corporation (GMDC) paid 5.7 percent during 2009-2010 (Source: Report from the Centre for Science and Development, 2011). Any mining company must also pay other taxes like education cess, sales tax, and corporate tax. If all these taxes are taken into account, then the average tax burden is estimated to be 22 per cent, ranging between 14 to 34 percent. We assume, as per the official report, a minimum average of 10.5 percent.

sharing per affected population following the report, and interact it with the presence of an active mine. We also construct two other profit-sharing measures that do not rely on the district's leased area but is instead on a per capita basis: (i) profit-sharing per household, and (ii) profit-sharing per female population (on the basis that at least 60 percent of royalties collected is allocated to the welfare of women and children).[7] Given its particular relevance, we report results for profit sharing per female population in the paper (results for per affected population and profit-sharing per household are available on request). Our specification is as follows:

$$Y_{icd} = \beta_0 + \beta_1 deposit_c + \beta_2 activemine_c + \beta_3(deposit_c \times activemine_c) + \beta_4 profitsharing_d + \beta_5(activemine_c \times profitsharing_d) + X_i + \lambda_s + \epsilon_{icd} \quad (3)$$

where the variables Y_{icd}, $deposit_c$, $activemine_c$, X_i, λ_s, and ϵ_{icd} the same as in the main specification of equation (1). $profitsharing_d$ is the district-level proxy for profit sharing per affected population/female population/household. The coefficient of interest is β_5. We report the coefficients on $(deposit_c \times activemine_c)$ and on $(activemine_c \times profitsharing_d)$ in the results tables.[8]

We consider the robustness of our estimates by including additional district-level controls that could affect both women's employment opportunities and the value of mineral production distributed to local communities. In results available on request, we add these controls sequentially in regressions involving the binary dependent variable for women's employment

[7] The report assumes an average household size of five. We use the number of households for each district provided by the 2011 Census, but also ensure the results hold if we make the same assumption as in the report.

[8] Our framework does not allow us to estimate the possible compensation made to adjacent non-mineral producing districts also facing the detrimental effects of mining activities. For instance, Bastar, Bijapur, Sukma, Kondagaon, and Narayanpur districts are adjacent to Dantewada in the state of Chhattisgarh and also contain mining-affected areas. Provisions have been made for compensation from the DMF fund, but since these were not made for 2014-2015, we assume that royalties collected in a district impact women's outcomes close to where the mine is located and that their effects are mostly limited to that district.

("is currently employed"). First, we control for the district's socio-economic vulnerability. We use the index constructed from the National Family Health Survey 2015-2016 by Acharya and Porwal (2020).[9] Following Berman *et al*. (2017), we also proxy for lootability. Since more precious minerals generate larger royalties and rents, they create incentives for loots and conflict. Lootability is determined not only by the value of precious commodities but also by the ease with which they can be extracted with artisanal tools. We use two different proxies for lootability and the likelihood of mineral-induced conflicts: (i) logged mean distance from each district's centroid to the nearest lootable gold or surface deposit, and (ii) a dummy variable that equals one if the district is affected by Maoist conflicts.[10]

Since the impact of profit-sharing on the local community depends on how resource rents are collected and distributed via institutional arrangements (Mehlum *et al*. 2006), our framework must also consider the district-level variation in administrative institutions, corruption, bureaucracy, and rule of law. Governance indicators are not available at such a disaggregated level so we include the number of intermediate and village panchayats (per 1000 inhabitants) instead. These are considered important institutions of local governance in Indian districts and states that ensure accountability and transparency in the collection and use of resource revenues.[11] They are likely to play a key role in ensuring that among other things, royalties are

[9] This study provides vulnerability indices that could improve the management and response of the Covid-19 pandemic in India. Three indicators are used to build the socio-economic index: the percentage of the population belonging to scheduled caste and scheduled tribe (to represent for marginalized groups), the proportion of the population aged 15 and above who have completed secondary or higher level of education, and an asset deprivation index (the proportion of households that do not have a motorized vehicle, television, computer, bicycle, and refrigerator, amongst others).

[10] We obtain the distance to the nearest lootable or surface gold deposit using AIDDATA (Source name: GOLDATA, for more details, see Balestri and Maggioni 2014). We calculate the district's number of gold/silver/diamonds from the data compiled to calculate production and profit-sharing values, and obtain the list of districts affected by Maoist conflicts from the South Asia Terrorism Portal.

[11] Data is obtained from the Local Government Directory. See website for more details: lgdirectory.gov.in. (Accessed on August 25, 2020).

not dissipated through leakages.[12] We also add as an additional variable the share of mineral-leased area held by the government to proxy for public/private sector involvement. Increased access to media may also influence agency measures and the distribution of rents. For this reason, we construct an index using the DHS data that is a composite variable for whether the respondent listens to the radio, watches TV, and reads the newspapers often. Results for these additional checks are available on request.

Appendix Box 3: Further Robustness, Falsification and Specification Checks

Check for Pre-Trends

Validity of the difference-in-differences framework depends on the absence of pre-trends in the treatment and control groups. We present these tests in Appendix Table 8. In the pre-treatment phase, the control group has no deposit within 5 km of each cluster and no active mine within 99 km (since 100 km is the limit of our data, we use a value very close to 100 km). The treatment group has a deposit within 5 km of each cluster but no active mine within 15 km. We run tests for pre-trends using future mines only, and then compare treatment and control groups in years before the mine opens. We report the mean and standard deviation for each of the control variables, the difference in means, and the standard error of the t-test for this difference between control and treatment groups in the pre-treatment phase. Although there are significant differences among some of the variables in this table, note that all regressions condition on these variables thus taking their influences into account.

Determining Treatment Distance Non-Parametrically

[12] Caselli and Michaels (2013) find that royalties from oil production in Brazil lead to significant increases in municipalities' spending on public goods and services, but that improvements in provision of public services are smaller relative to the reported fiscal spending increases. This suggests that there is "missing money" due to embezzlement.

Although we argue that given commuting distance and modes of travel to work for much of the Indian rural population, 5 km near deposits and mines is an appropriate measure of treatment distance, we also check for this non-parametrically. These results are presented in Appendix Figure 6. We follow Benshaul-Tolonen (2019) and use spatial lag models to construct these measures and concentrate on proximity to HFLS mines as that is where impacts discussed above are most evident and measured precisely. Although these estimates are mostly insignificant, the treatment effect is the largest at smaller treatment distances qualitatively, indicating the existence of spatial spillovers.[13] At the treatment distances become larger, the interaction term between the presence of deposits and the presence of a HFLS active mine for the acceptance of violence index become either smaller in magnitude or exhibit unexpected signs. Given this and justification from qualitative data from the 2011 Census on average commuting distance for workers, we use 5 km as the treatment distance for the analysis.

Falsification Tests and Evaluating Environmental Impacts

Appendix Table 9 presents falsification tests using information on past or future mines. For purposes of these tests, we present results only on the acceptance of domestic violence variables.[14] Since these mines are not currently active, there should be no significant impacts of such mines on any of the measures considered in Appendix Table 9. As before, there are too few past or future HFLS mines to identify impacts. Thus, we focus on those presented in Panel B that evaluates all mines. Of the three outcomes that are significant in this panel for all women near mines, one (goes out without permission) has a counter-intuitive sign. Contrasting these impacts with those in Panel B of Table 2 and focusing on the composite index variable, the

[13] Similar to Benshaul-Tolonen (2019), there is substantial noise in these spatially lagged models.
[14] Results for barriers to accessing medical care and attitudes towards shared decision-making are available on request.

coefficient on this variable indicated a significant 8.6 percentage point decline in Table 2 but is statistically zero in Appendix Table 9. Furthermore, net effects on the young were measured with precision in three of the seven cases in Table 2 but are all insignificant in Appendix Table 9. Overall, we conclude that it is active mines alone that results in beneficial measurable impacts for women in the close vicinity of mines as past/future mines have weaker or no impacts.

Next, we consider the environmental impact of mining by evaluating how pollution measured by $PM_{2.5}$ affects the incidence of domestic violence given evidence that air pollution affects cognitive functioning (Zhang *et al*. 2018). Again, we present results for this category of outcomes alone given their primary nature as a measure of women's agency.[15] The data on $PM_{2.5}$ at the district level are obtained from satellite measurement estimates generated from aerosol optical depth information collected using techniques developed in Dey *et al*. (2012). $PM_{2.5}$ is measured in micrograms per cubic meter of air, and we use its natural log version in these models. The results are in Appendix Table 10 which shows that although the effect of air pollution is measured with significance in some of the outcomes considered, the estimates of our main variables of interest either remain mostly unaltered or improve when we condition on $PM_{2.5}$. More specifically, whereas the composite index variable is insignificant for all women in the case of HFLS mines in Table 2, it indicates a precise 15.8 percentage point decrease in acceptance of this form of violence in Appendix Table 10. Considering impacts near all mines for this variable, again the magnitude is somewhat larger when $PM_{2.5}$ is taken into account (an 8.6 percentage point decline in Table 2 and a 9.0 percentage point decline in this table).

[15] Results for barriers to accessing medical care and attitudes towards shared decision-making are available on request.

Appendix References

Acharya, R. and Porwal, A., 2020. "A Vulnerability Index for the Management of and Response to the COVID-10 Epidemic in India: An Ecological Study," *The Lancet Global Health* 8(9): E1142-E1151.

Balestri, S. and Maggioni, M.A., 2014. Blood diamonds, dirty gold and spatial spill-overs measuring conflict dynamics in West Africa. *Peace Economics, Peace Science and Public Policy*, *20*(4), pp.551-564.

Benshaul-Tolonen, Anja. 2018. "Endogenous Gender Norms: Evidence from Africa's Gold Mining Industry," Columbia Center for Development Economics and Policy CDEP-CGEG Working Paper no. 62.

Benshaul-Tolonen, Anja. 2019. "Endogenous Gender Roles: Evidence from Africa's Gold Mining Industry." Available at SSRN 3284519.

Berman, Nicolas, Mathieu Couttenier, Dominic Rohner, and Mathias Thoenig. 2017. "This Mine is Mine! How Minerals Fuel Conflicts in Africa," *American Economic Review* 107 (6): 1564-1610.

Caselli, F., and Michaels, G. 2013. "Do Oil Windfalls Improve Living Standards? Evidence from Brazil," *American Economic Journal: Applied Economics* 5(1): 208-238.

Dey, S., L. Girolamo, A.V. Donkelaar, S.N. Tripathi, T. Gupta, and M. Mohan. 2012. "Variability of Outdoor Fine Particular (PM2.5) Concentration in the Indian Subcontinent: A Remote Sensing Approach," *Remote Sensing of Environment* 127: 153-161.

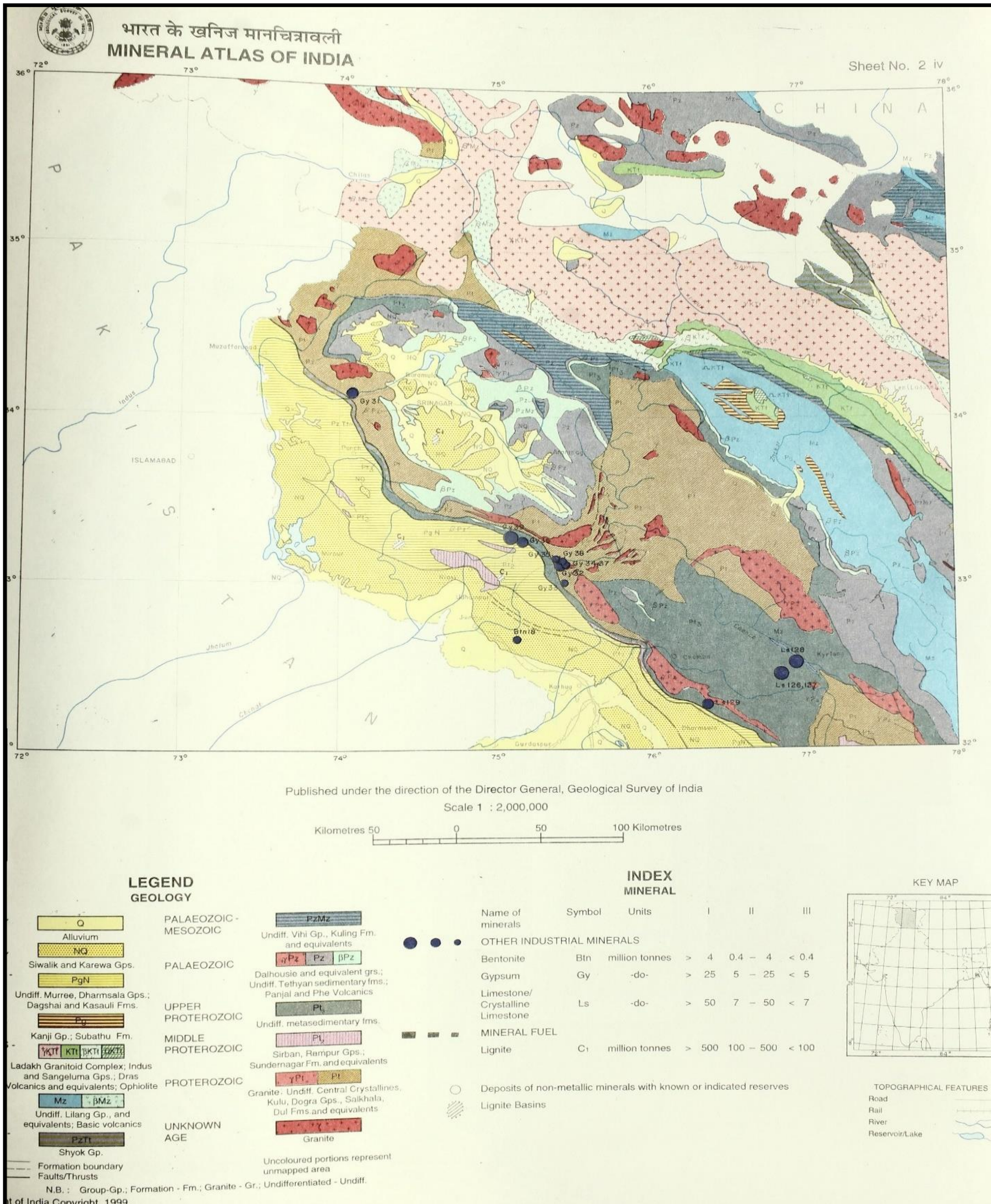
Kotsadam, Andreas, and Anja Benshaul-Tolonen. 2016. "African Mining, Gender, and Local Employment," *World Development* 83 (7): 325-339.

Mehlum, Halvor, Karl Moene, and Ragnar Torvik. 2006. "Institutions and the Resource Curse," *The Economic Journal* 116 (508): 1-20.

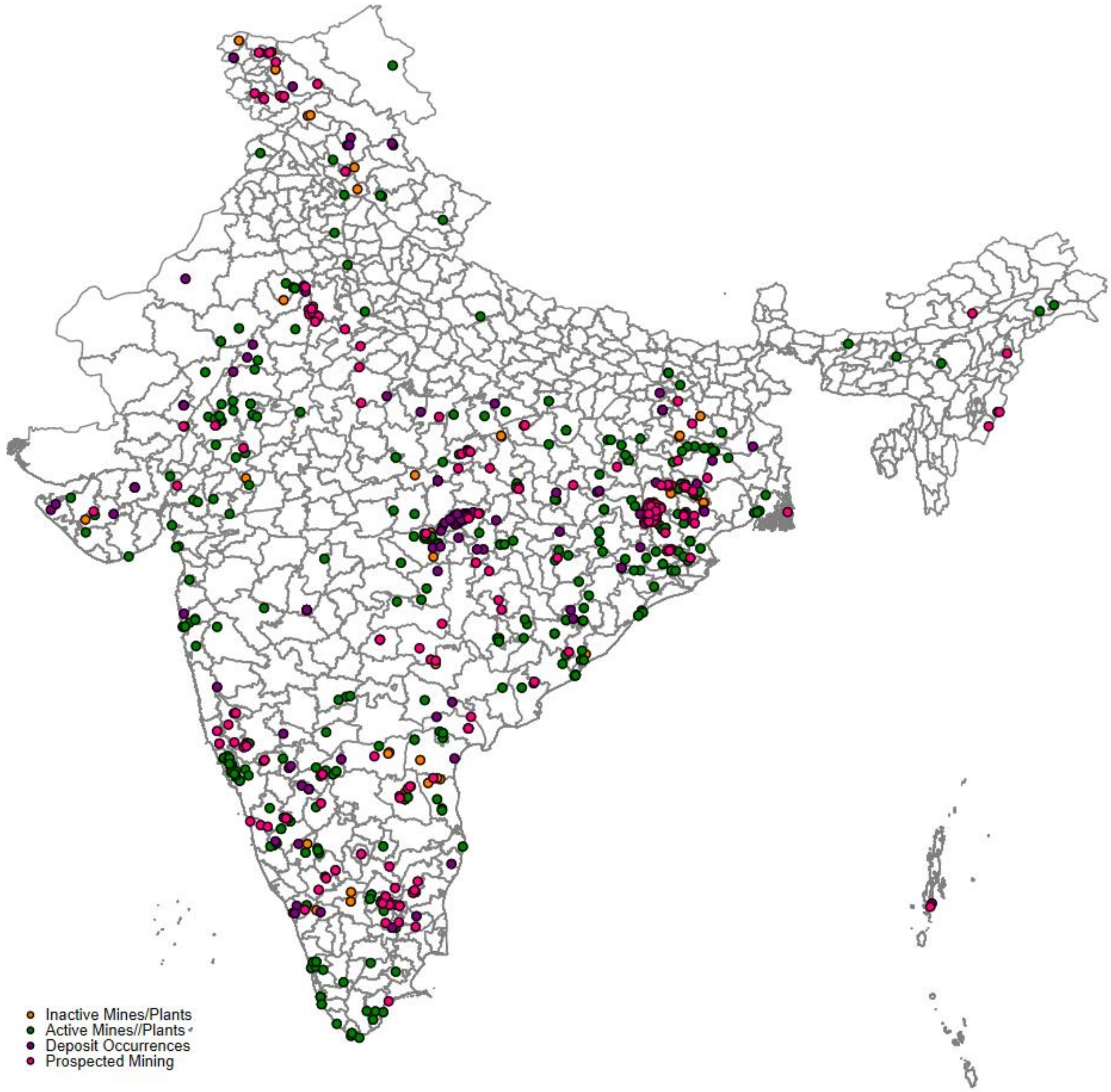
Von der Goltz, Jan, and Prabhat Barnwal. 2019. "The Local Wealth and Health Effects of Mineral Mining in Developing Countries," *Journal of Development Economics* 139: 1-16.

Zhang, Xin, Xi Chen, and Xiaobo Zhang. 2018. "The Impact of Exposure to Air Pollution on Cognitive Performance," *Proceedings of the National Academy of Sciences* 115 (37): 9193-9197.

Appendix Figure 1: An example of a map sheet from the Mineral Atlas of India, 2001

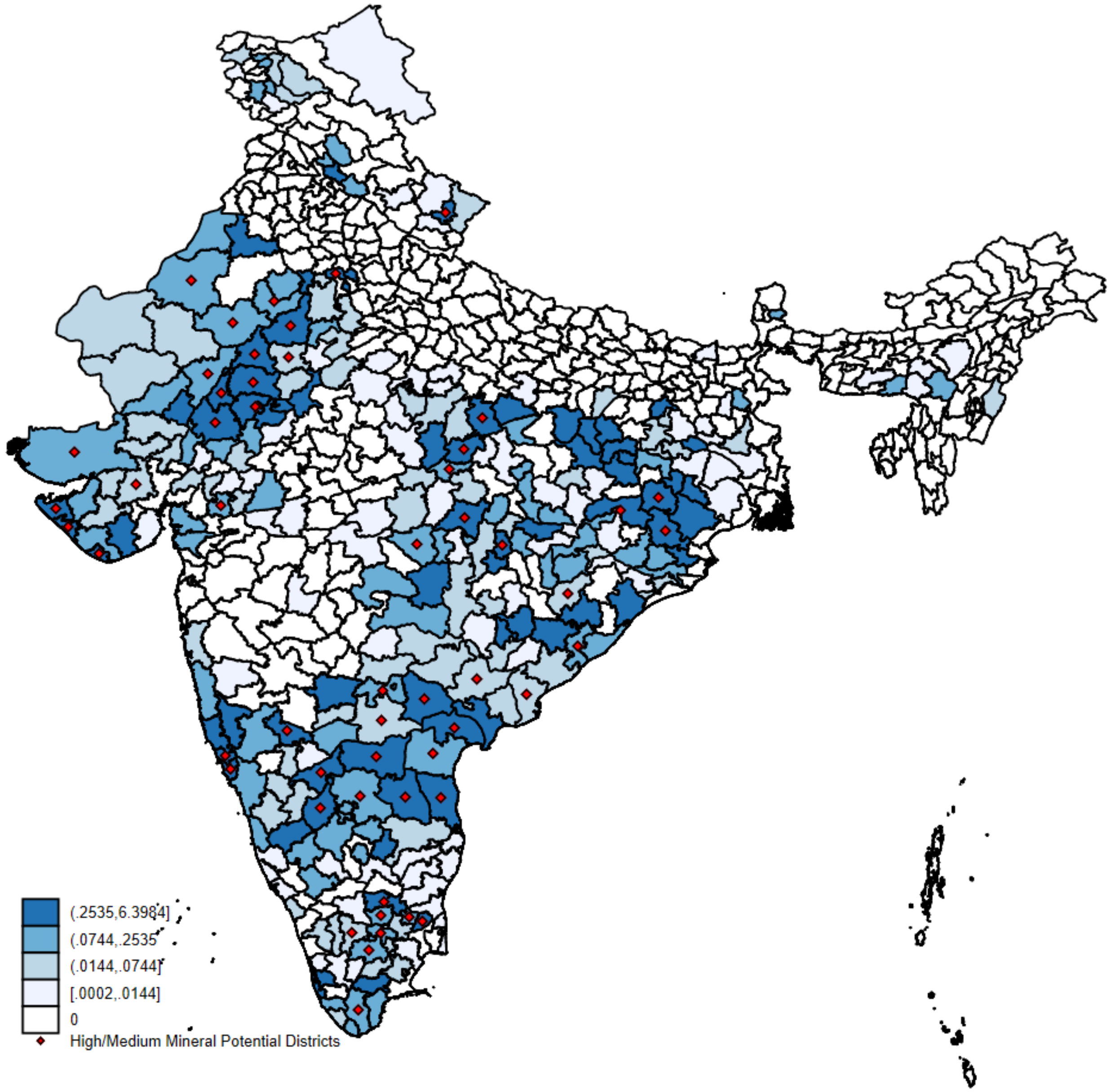


Appendix Figure 2: Distribution of active and inactive mines in India, 2007



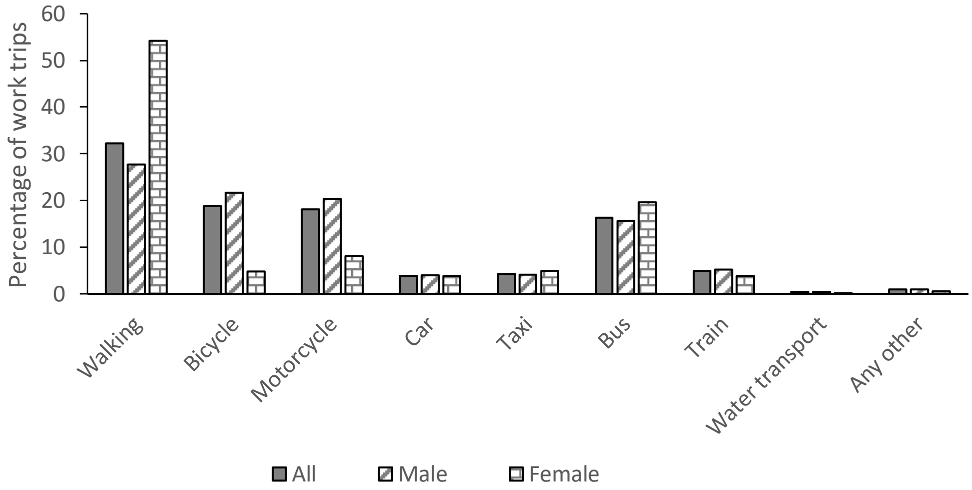
Source: United States Geological Survey, 2007

Appendix Figure 3: The share of leased area (percent) for districts in India, 2014



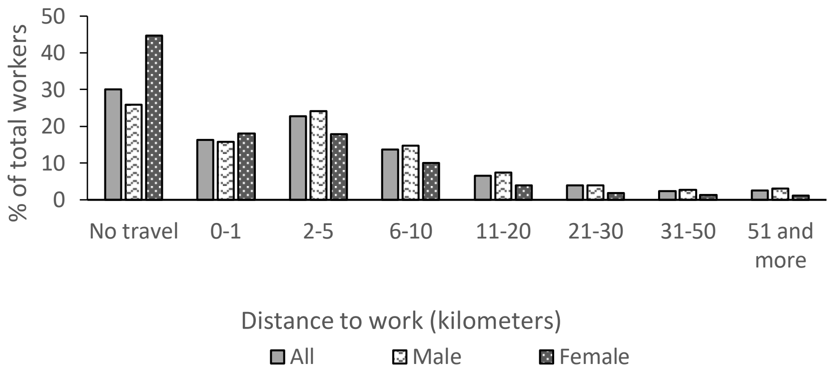
Source: Bulletin of Mining Leases and Prospecting Licenses (Indian Bureau of Mines, 2014).
Authors' calculations from official data.
Note: As of 2014, the Mining Lease Directory reports that there were 10,982 mining leases granted for 64 different minerals. The five highest shares of leased area are for the states of Rajasthan (18.5 percent), Orissa (16.2 percent), Andhra Pradesh (13.5 percent), Karnataka (10.5 percent), and Madhya Pradesh (7.23 percent). The district shares vary between 0 and 6.4 percent.

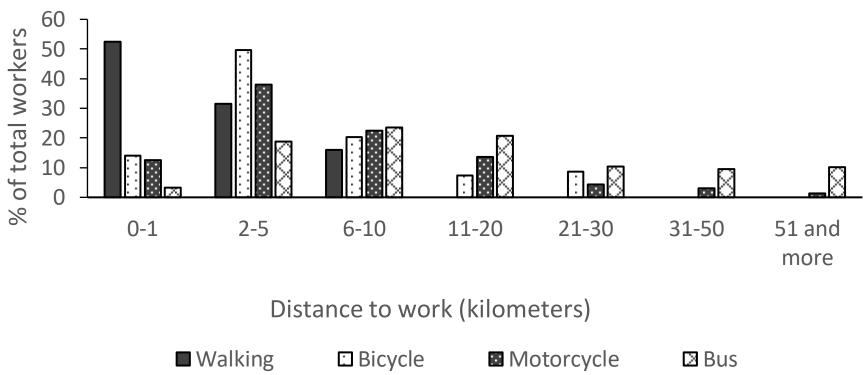
Appendix Figure 4: Mode of travel to commute to work for workers in India



Source: Authors' calculations from the 2011 Census of India

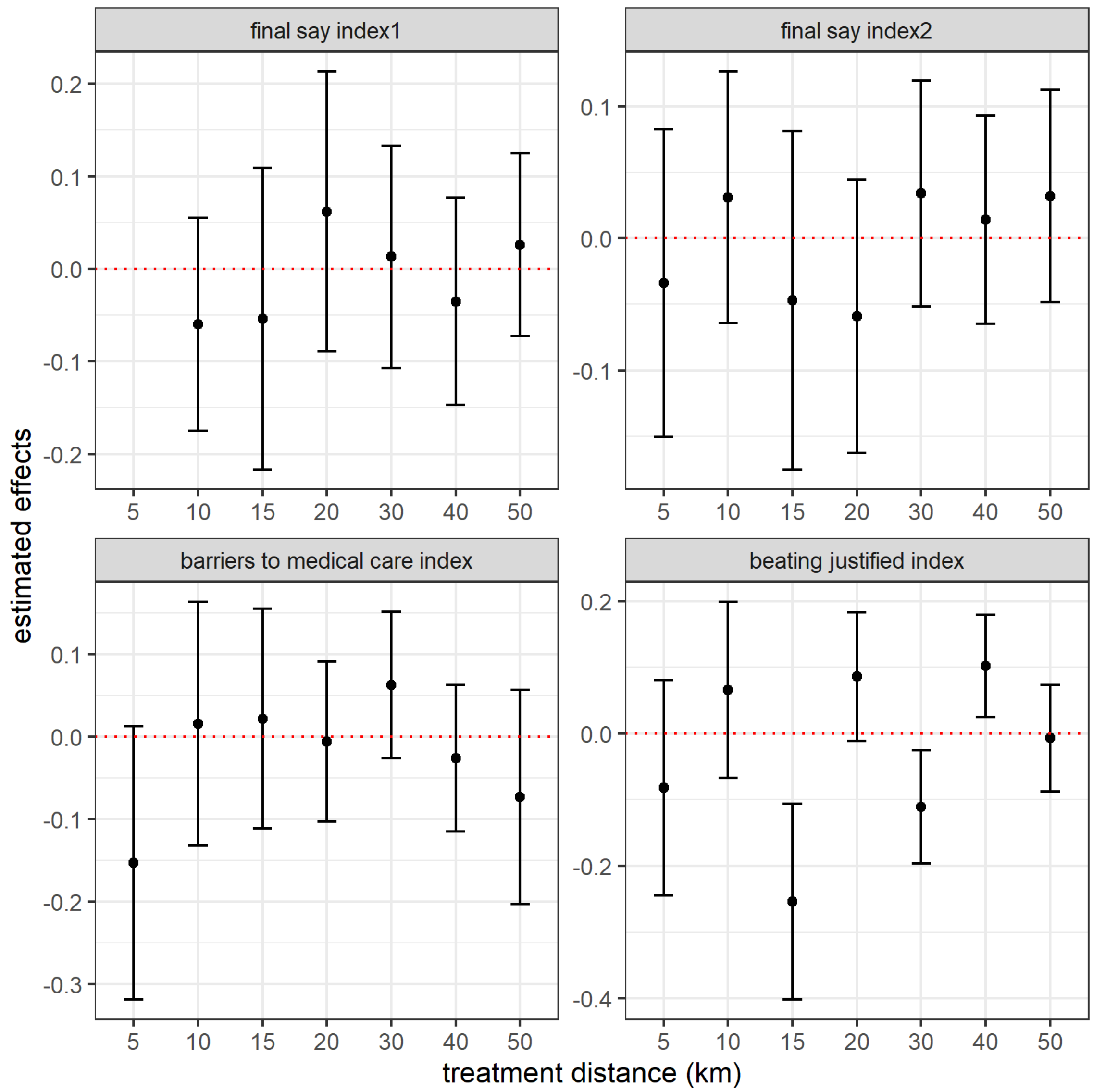
Appendix Figure 5: Distance from Residence to Work for Workers, by gender and by mode of travel, in India





Source: Authors' calculations from 2011 Census of India

Appendix Figure 6: Non-parametric determination of treatment distance



Notes: This figure plots point estimates of the interaction term "*presence of deposit_x km*presence of HFLS active mine_x km*" at different cutoff distances. The outcome variables are shown in the heading of each sub-plot. Each figure shows the point estimates and the 90% confidence intervals. In each model, the individual controls include the age difference between wife and partner/husband, three indicator variables for the woman's highest level of educational attainment (with the excluded category being "no education at all"), similar indicator variables for the partner's/husband's level of educational attainment, a continuous variable for the number of living children in the household, a rural/urban dummy that equals 1 if the respondent lives in a rural area, and the number of years the respondent has been living in the current place of residence. In models on the beating justified index, we also control for whether the female respondent's mother was beaten by the father. We also include the GHF (see text for further details) and binary controls for the main source of drinking water being piped water and access to electricity. All regressions are weighted, and include district and state fixed-effects. Robust standard errors are clustered at the DHS cluster level. *presence of deposit_x km*presence of HFLS active mine_x km* takes a value of 1 if there is a deposit and an active HFLS mine within x km of the DHS cluster to which the respondent belongs.

Appendix Table 1: Summary statistics for male respondents in DHS 2015-2016

	mean	standard deviation
Panel A		
currently working	0.924	0.265
is in the workforce	0.974	0.158
agriculture	0.445	0.497
Panel B		
Justifies beating if		
wife goes out without telling	0.148	0.355
neglects children	0.198	0.398
argues with husband	0.187	0.390
refuses sex	0.080	0.271
does not cook food properly	0.095	0.294
index	0.141	0.259
Panel C		
Final say in decision-making related to		
major purchases	0.623	0.485
daily needs for households	0.537	0.499
visits to wife's family	0.705	0.456
wife's earnings	0.676	0.468
number of children	0.870	0.336
his earnings	0.632	0.482
his healthcare	0.537	0.499
index	0.684	0.344
Panel D		
Controls		
age difference between husband and wife/partner	5.060	4.079
no education at all	0.161	0.368
some or all primary school	0.159	0.366
some secondary school	0.437	0.496
completed secondary school or higher	0.242	0.429
number of living children	2.065	1.399
father beats mother	0.221	0.415
rural/urban	0.611	0.488
years living in place of residence	34.797	18.981
global human footprint (index, in log)	3.866	0.356
source of drinking water: piped water	0.596	0.491
Electricity	0.939	0.240

Notes: In Panel A, the employment variables are binary and take a value of 1 if the male respondent says he is (i) currently working, (ii) is in the workforce (worked in the past 12 months), and (iii) in agriculture. In Panel B, we code the variables such that they are equal to 1 if the male respondent says that he considers beating is justified for each reason listed. The related index ranging from 0 to 1 equals 1 if he says yes to each reason. In Panel C, the binary outcomes equal 1 if the male respondent says "equally/jointly" when asked who would have greater say when making the listed decisions. The index is constructed to reflect their answers to this set of questions. In Panel D, the individual controls include the difference in wife and partner's/husband's age, four indicator variables for the man's highest level of educational attainment, a continuous variable for the number of living children in the household, a rural/urban dummy that equals 1 if the respondent lives in a rural area, and the number of years the respondent has been living in the current place of residence. We also include the global human footprint index (see text for further details) and binary controls for the main source of drinking water being piped water and access to electricity.

Discussion: In Panel A, we report the statistics for the employment variables. On average, 92 percent of male respondents report that they are currently working, and 45 percent report an agricultural job. In Panel B, we see that when it comes to proxies for attitudes towards domestic violence, approximately 19 percent of interviewed men consider that beating is justified if the wife argues with her partner/husband, while an average of 15 percent agrees with the statement that it is justified if the wife goes out without telling her partner/husband. Less than 10 percent report that beating is justified if she does not cook food properly. The index summarizing their answers to the questions related to domestic violence has a mean value of 0.14. In Panel C, we show variables related to joint decision-making in the household. Men are asked who they think should have greater say in household decision-making. The answers to each question are coded such that the binary variables take a value of 1 if the male respondent says that he thinks that such decisions should be taken “jointly/equally”. Overall, the index indicates that 68 percent of sampled men answered that such decisions should be taken jointly, with 87 percent reporting that the number of children is a decision that should be taken together and 71 percent reporting that visits to the partner’s/wife’s family should be decided jointly. About 54 percent believe that both partners should have a say when making decisions about daily household needs and the respondent’s healthcare. Panel D reports the statistics for the individual controls.

Appendix Table 2: Summary statistics for the treatment variables

	mean	standard deviation
Panel A: proximity measures		
deposit	0.067	0.250
active mine	0.034	0.182
HFLS active mine	0.005	0.068
non-HFLS active mine	0.035	0.183
past/future mine	0.017	0.127
distance to nearest deposit	29.567	22.804
distance to nearest active mine	45.254	26.063
distance to nearest HFLS active mine	62.408	23.911
distance to nearest non-HFLS active mine	46.235	26.664
deposit*active mine	0.005	0.073
deposit*HFLS active mine	0.000	0.016
deposit*non-HFLS active mine	0.006	0.074
deposit*past/future mine	0.002	0.040
Panel B: intensity measures		
number of deposits	0.092	0.418
number of deposits*active mine	0.010	0.192
number of deposits*HFLS active mines	0.000	0.016

Notes: Panel A shows the proximity measures. The variable "deposit" equals 1 if there is a mineral deposit within 5 km of the respondent's cluster. The variable "active mine" equals 1 if there is an active mine within 5 km of the respondent's cluster. The interaction term "deposit*active mine" is the variable of interest and equals 1 if there is a mineral deposit and an industrial scale active mine within 5 km of the respondent's cluster. The same idea applies for HFLS, non-HFLS, and past/future mines. In Panel B, we report the mean and standard deviation for each intensity measure. We use a count variable for the number of deposits within 5 km of the cluster. The variable of interest is the interaction between the number of deposits within 5 km and the dummy variable for whether there is an active mine within 5 km of the cluster. The same idea applies for deposits and HFLS active mines.

Appendix Table 3: Impact of mines on women's health insurance

	Insurance		
	Any	**employer**	**central/state government**
	(1)	**(2)**	**(3)**
Panel A: HFLS mines			
Proximity (whether there is a deposit within 5 km):			
presence of deposit*presence of HFLS active mine	-0.021	0.005	-0.023
	(0.068)	(0.004)	(0.066)
presence of deposit*presence of HFLS active mine*young	0.137***	0.005**	0.093***
	(0.016)	(0.002)	(0.014)
net effect for young	0.115	0.010	0.069
F-statistic	2.900	3.930	1.090
	[0.089]	[0.048]	[0.298]
Observations	10,389	10,389	10,389
R-squared	0.261	0.039	0.390
Intensity (number of deposits within 5km):			
number of deposits*presence of HFLS active mine	-0.009	0.004	-0.028
	(0.062)	(0.004)	(0.062)
number of deposits*presence of HFLS active mine*young	0.137***	0.005**	0.093***
	(0.016)	(0.002)	(0.014)
net effect for young	0.128	0.009	0.065
F-statistic	4.140	3.590	1.060
	[0.042]	[0.058]	[0.304]
Observations	10,389	10,389	10,389
R-squared	0.261	0.039	0.390
Panel B: All mines			
Proximity (whether there is a deposit within 5 km):			
presence of deposit*presence of active mine	0.012	-0.005	0.011

	(0.046)	(0.012)	(0.037)
presence of deposit*presence of active mine*young	-0.008	-0.001	0.046
	(0.085)	(0.008)	(0.071)
net effect for young	0.004	-0.005	0.057
F-statistic	0.000	0.400	0.660
	[0.958]	[0.526]	[0.417]
Observations	42,487	42,487	42,487
R-squared	0.236	0.071	0.345
Intensity (number of deposits within 5km):			
number of deposits*presence of active mine	-0.012	-0.001	0.000
	(0.021)	(0.003)	(0.013)
number of deposits*presence of active mine*young	-0.014	0.001	-0.001
	(0.013)	(0.001)	(0.010)
net effect for young	-0.026	-0.000	-0.000
F-statistic	1.480	0.010	0.000
	[0.225]	[0.916]	[0.977]
Observations	42,487	42,487	42,487
R-squared	0.236	0.071	0.345

Notes: The table reports the regression results for the interaction terms. Panel A reports the results when only precious minerals and HFLS mines are considered using either proximity dummies or intensity measured as count variables for the number of deposits and active mines that are within 5 km. The individual controls include the difference in wife and partner's/husband's age, three indicator variables for the partner's/husband's level of educational attainment, a continuous variable for the number of living children in the household, a rural/urban dummy that equals 1 if the respondent lives in a rural area, and the number of years the respondent has been living in the current place of residence. We also include the GHF (see text for further details) and binary controls for the main source of drinking water being piped water and access to electricity. All regressions are weighted, and include district and state fixed-effects. Robust standard errors are clustered at the DHS cluster level. *presence of deposit *presence of active mine* takes a value of 1 if there is a deposit and an active mine within 5 km of the DHS cluster to which the respondent belongs. *number of deposits *presence of active mine* equals the number of deposits within 5 km of the DHS cluster interacted with the dummy for the presence of active mine within 5 km of the same cluster. *"young"* is a binary variable that equals 1 if the female respondent is in the age group 15-25 years old. Coefficients and standard errors for the interactions with the young variable for proximity and intensity are the same in the case of HFLS mines due to rounding to three decimal digits. We report net effects on the young with associated *p*-values in brackets. *** Denotes significance at the 1% level, ** at the 5% level and * at the 10% level.

Appendix Table 4: Impact of mines on child health

	height for age z-score HAZ (1)	weight for age z-score WAZ (2)	weight for height z-score WHZ (3)
Panel A: HFLS mines			
Proximity (whether there is a deposit within 5 km):			
presence of deposit*presence of HFLS active mine	-0.118	0.835**	1.076**
	(0.644)	(0.357)	(0.428)
presence of deposit*presence of HFLS active mine*young	0.092	0.043	-0.165***
	(0.076)	(0.053)	(0.058)
net effect for young	-0.026	0.878	0.910
F-statistic	0.000	6.040	4.570
	[0.967]	[0.014]	[0.033]
Observations	4,759	4,759	4,759
R-squared	0.120	0.160	0.094
Intensity (number of deposits within 5km):			
number of deposits*presence of HFLS active mine	-0.236	0.775**	1.085**
	(0.624)	(0.346)	(0.419)
number of deposits*presence of HFLS active mine*young	0.092	0.044	-0.166***
	(0.076)	(0.053)	(0.058)
net effect for young	-0.143	0.819	0.920
F-statistic	0.050	5.600	4.870
	[0.817]	[0.018]	[0.028]
Observations	4,759	4,759	4,759
R-squared	0.119	0.159	0.094

Panel B: All mines			
Proximity (whether there is a deposit within 5 km):			
presence of deposit*presence of active mine	0.464*	0.242	-0.064
	(0.254)	(0.218)	(0.254)
presence of deposit*presence of active mine*young	-0.230	-0.332	-0.193
	(0.214)	(0.297)	(0.374)
net effect for young	0.234	-0.089	-0.257
F-statistic	0.650	0.170	0.790
	[0.420]	[0.678]	[0.373]
Observations	19,746	19,746	19,746
R-squared	0.128	0.165	0.080
Intensity (number of deposits within 5km):			
number of deposits*presence of active mine	0.099	0.015	-0.064
	(0.079)	(0.062)	(0.069)
number of deposits*presence of active mine*young	-0.068	-0.066	-0.007
	(0.048)	(0.052)	(0.057)
net effect for young	0.031	-0.051	-0.070
F-statistic	0.230	1.210	1.090
	[0.634]	[0.272]	[0.296]
Observations	19,746	19,746	19,746
R-squared	0.128	0.165	0.080

Notes: The table reports the regression results for the interaction terms. The dependent variables for child health are all continuous. Panel A reports the results when only precious minerals and HFLS mines are considered using either proximity dummies or intensity measured as count variables for the number of deposits and active mines that are within 5 km. The individual controls include the difference in wife and partner's/husband's age, three indicator variables for the partner's/husband's level of educational attainment, a continuous variable for the number of living children in the household, a rural/urban dummy that equals 1 if the respondent lives in a rural area, and the number of years the respondent has been living in the current place of residence. We also include the GHF (see text for further details) and binary controls for the main source of drinking water being piped water and access to electricity. All regressions are weighted, and include district and state fixed-effects. Robust standard errors are clustered at the DHS cluster level. *presence of deposit*presence of active mine* takes a value of 1 if there is a deposit and an active mine within 5 km of the DHS cluster to which the respondent belongs. *number of deposits*presence of active mine* equals the number of deposits within 5 km of the DHS cluster interacted with the dummy for the presence of active mine within 5 km of the same cluster. *"young"* is a binary variable that equals 1 if the female respondent is in the age group 15-25 years old. Coefficients and standard errors for the interactions with the young variable for proximity and intensity are the same in the case of HFLS mines due to rounding to three decimal digits. We report net effects on the young with associated *p*-values in brackets. *** Denotes significance at the 1% level, ** at the 5% level and * at the 10% level.

Appendix Table 5: Impact of mines on men's employment

	currently working (1)	is in the workforce (2)	agriculture (3)
Panel A: HFLS mines			
Proximity (whether there is a deposit within 5 km):			
presence of deposit*presence of HFLS active mine	0.036	0.008	0.170*
	(0.066)	(0.027)	(0.101)
Observations	8,799	8,789	8,789
R-squared	0.093	0.055	0.333
Intensity (number of deposits within 5km):			
number of deposits*presence of HFLS active mine	0.038	0.009	0.166*
	(0.065)	(0.027)	(0.098)
Observations	8,799	8,789	8,789
R-squared	0.093	0.055	0.333
Panel B: All mines			
Proximity (whether there is a deposit within 5 km):			
presence of deposit*presence of active mine	0.030	0.029*	-0.034
	(0.028)	(0.016)	(0.057)
presence of deposit*presence of active mine*young	-0.204	-0.224	-0.028
	(0.171)	(0.181)	(0.187)
net effect for young	-0.174	-0.195	-0.062
F-statistic	1.010	1.180	0.110
	[0.316]	[0.278]	[0.738]
Observations	35,174	35,129	35,129
R-squared	0.076	0.040	0.303

Intensity (number of deposits within 5km):			
number of deposits*presence of active mine	0.012	0.010	0.014
	(0.008)	(0.006)	(0.024)
number of deposits*presence of active mine*young	-0.106	-0.116	-0.035
	(0.089)	(0.091)	(0.085)
net effect for young	-0.094	-0.106	-0.021
F-statistic	1.120	1.360	0.060
	[0.290]	[0.244]	[0.805]
Observations	35,174	35,129	35,129
R-squared	0.076	0.040	0.303

Notes: The table reports the coefficients on the interaction terms. Panel A reports the results when only precious minerals and HFLS mines are considered using either proximity dummies or intensity measured as count variables for the number of deposits and active mines that are within 5 km. Sample sizes for young men are too small to be able to estimate differential and net effects for young men near HFLS mines. In column (1), the binary dependent variable equals to 1 if the male respondent says that he is currently working, and in column (2), the indicator variable takes a value of 1 if he is in the workforce. In column (3), "agriculture" equals 1 if he is employed in farming, fishing, hunting, or logging. The individual controls include the difference in husband and partner's/wife's age, three indicator variables for the man's highest level of educational attainment (with the excluded category being "no education at all"), a continuous variable for the number of living children in the household, a rural/urban dummy that equals 1 if the respondent lives in a rural area, and the number of years the respondent has been living in the current place of residence. We also include the GHF (see text for further details) and binary controls for the main source of drinking water being piped water and access to electricity. All regressions include district and state fixed-effects. Robust standard errors are clustered at the DHS cluster level. All regressions are weighted. *presence of deposit*presence of active mine* takes a value of 1 if there is a deposit and an active mine within 5 km of the DHS cluster to which the respondent belongs. *number of deposits*presence of active mine* equals the number of deposits within 5 km of the DHS cluster interacted with the dummy for the presence of an active mine within 5 km of the same cluster. *"young"* is a binary variable that equals 1 if the male respondent is 15-25 years old. We report net effects on the young with associated *p*-values in brackets. *** Denotes significance at the 1% level, ** at the 5% level and * at the 10% level.

Appendix Table 6: Impact of mines on men's attitudes to domestic violence

	Beating justified if the wife:					
	goes out without permission	neglects children	argues with husband	refuses sex	does not cook food properly	index
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: HFLS mines						
Proximity (whether there is a deposit within 5 km):						
presence of deposit*presence of HFLS active mine	-0.176*	0.093	-0.047	-0.242**	-0.247*	-0.148
	(0.104)	(0.089)	(0.105)	(0.114)	(0.129)	(0.091)
Observations	8,389	8,384	8,377	8,356	8,374	8,300
R-squared	0.164	0.170	0.133	0.118	0.116	0.195
Intensity (number of deposits within 5km):						
number of deposits*presence of HFLS active mine	-0.184*	0.080	-0.046	-0.245**	-0.250**	-0.154*
	(0.103)	(0.087)	(0.104)	(0.113)	(0.128)	(0.090)
Observations	8,389	8,384	8,377	8,356	8,374	8,300
R-squared	0.164	0.169	0.133	0.119	0.116	0.195
Panel B: All mines						
Proximity (whether there is a deposit within 5 km):						
presence of deposit*presence of active mine	0.005	-0.016	0.006	-0.003	-0.027	-0.008
	(0.057)	(0.069)	(0.063)	(0.051)	(0.054)	(0.052)
presence of deposit*presence of active mine*young	0.318**	0.284**	0.284**	0.078	0.058	0.200*
	(0.135)	(0.128)	(0.128)	(0.135)	(0.127)	(0.111)
net effect for young	0.323	0.268	0.290	0.074	0.032	0.191
F-statistic	4.820	3.820	4.580	0.280	0.060	2.640
	[0.028]	[0.051]	[0.033]	[0.600]	[0.809]	[0.104]

Observations	33,658	33,659	33,643	33,583	33,655	33,434
R-squared	0.129	0.169	0.112	0.094	0.096	0.174
Intensity (number of deposits within 5km):						
number of deposits*presence of active mine	0.001	-0.006	-0.008	-0.006	-0.007	-0.005
	(0.016)	(0.022)	(0.017)	(0.013)	(0.018)	(0.015)
number of deposits*presence of active mine*young	0.136*	0.119	0.127*	0.083	0.064	0.103
	(0.081)	(0.075)	(0.072)	(0.081)	(0.071)	(0.070)
net effect for young	0.137	0.113	0.119	0.078	0.057	0.098
F-statistic	2.640	2.150	2.590	0.870	0.610	1.840
	[0.104]	[0.142]	[0.108]	[0.351]	[0.433]	[0.274]
Observations	33,658	33,659	33,643	33,583	33,655	33,434
R-squared	0.129	0.168	0.112	0.094	0.096	0.174

Notes: The table reports the regression results for the interaction terms. Panel A reports the results when only precious minerals and HFLS mines are considered using either proximity dummies or intensity measured as count variables for the number of deposits and active mines that are within 5km. The binary dependent variables take a value of 1 if the male respondent says that he considers that beating is justified for reasons reported in each column. Sample sizes for young men are too small to be able to estimate differential and net effects for young men near HFLS mines. In column (6), the Index, ranging from 0 to 1, is constructed by considering the answers to the 5 questions related to attitude towards domestic violence. It equals to 1 if the respondent says that beating is justified in each case. The mean value of the index is 0.141. The individual controls include the difference in wife and partner's/husband's age, three indicator variables for the man's highest level of educational attainment (with the excluded category being "no education at all"), a continuous variable for the number of living children in the household, a rural/urban dummy that equals 1 if the respondent lives in a rural area, the number of years the respondent has been living in the current place of residence, and a dummy for whether or not the respondent's father used to beat her mother. We also include the GHF (see text for further details) and binary controls for the main source of drinking water being piped water and access to electricity. All regressions are weighted, and include district and state fixed-effects. Robust standard errors are clustered at the DHS cluster level. *presence of deposit*presence of active mine* takes a value of 1 if there is a deposit and an active mine within 5 km of the DHS cluster to which the respondent belongs. *number of deposits*presence of active mine* equals the number of deposits within 5 km of the DHS cluster interacted with the dummy for the presence of an active mine within 5 km of the same cluster. *"young"* is a binary variable that equals 1 if the male respondent is 15-25 years old. We report net effects on the young with associated *p*-values in brackets. *** Denotes significance at the 1% level, ** at the 5% level and * at the 10% level.

Appendix Table 7: Impact of mines on men's attitudes to shared decision-making

	Final say in decision-making related to:							
	major purchases	**daily needs**	**visits to wife's family**	**wife's earnings**	**no. of children**	**index**	**his earnings**	**his healthcare**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Panel A: HFLS mines								
Proximity (whether there is a deposit within 5 km):								
presence of deposit*presence of HFLS active mine	0.331***	0.478	0.248**	0.280*	0.129	0.244**	0.196	0.362***
	(0.105)	(0.138)	(0.114)	(0.146)	(0.087)	(0.102)	(0.174)	(0.124)
Observations	8,769	8,769	8,758	8,673	8,764	8,599	8,571	8,799
R-squared	0.130	0.116	0.084	0.071	0.089	0.115	0.108	0.095
Intensity (number of deposits within 5km):								
number of deposits*presence of HFLS active mine	0.326***	0.061	0.250**	0.293**	0.136*	0.249**	0.197	0.352***
	(0.010)	(0.135)	(0.108)	(0.139)	(0.083)	(0.098)	(0.169)	(0.118)
Observations	8,769	8,769	8,758	8,673	8,764	8,599	8,571	8,799
R-squared	0.130	0.116	0.084	0.082	0.089	0.115	0.108	0.096
Panel B: All mines								
Proximity (whether there is a deposit within 5 km):								
presence of deposit*presence of active mine	0.157**	0.173**	0.081	0.051	0.054	0.096*	0.075	0.040
	(0.074)	(0.082)	(0.056)	(0.061)	(0.035)	(0.050)	(0.073)	(0.084)
presence of deposit*presence of active mine*young	-0.198	0.080	-0.086	0.005	0.162***	0.073	0.022	0.134
	(0.204)	(0.144)	(0.136)	(0.140)	(0.059)	(0.106)	(0.171)	(0.167)
net effect for young	-0.040	0.253	-0.005	0.056	0.216	0.170	0.097	0.174
F-statistic	0.030	2.810	0.000	0.130	15.080	2.180	0.300	0.950
	[0.852]	[0.094]	[0.975]	[0.718]	[0.000]	[0.140]	[0.582]	[0.330]

Observations	35,034	35,052	35,021	34,830	35,071	34,566	34,494	35,174
R-squared	0.137	0.120	0.075	0.074	0.082	0.120	0.092	0.071
Intensity (number of deposits within 5km):								
number of deposits*presence of active mine	0.058***	0.076***	0.032**	0.016	0.014	0.037**	0.044	-0.013
	(0.022)	(0.023)	(0.017)	(0.019)	(0.011)	(0.015)	(0.032)	(0.028)
number of deposits*presence of active mine*young	0.007	0.098	0.017	0.069	0.077***	0.074	0.067	0.144***
	(0.089)	(0.039)	(0.062)	(0.043)	(0.023)	(0.035)	(0.069)	(0.046)
net effect for young	0.066	0.174	0.049	0.085	0.091	0.110	0.112	0.130
F-statistic	0.050	14.130	0.520	2.960	14.750	8.070	2.240	6.510
	[0.481]	[0.000]	[0.470]	[0.085]	[0.000]	[0.005]	[0.134]	[0.011]
Observations	35,034	35,052	35,021	34,830	35,071	34,566	34,494	35,174
R-squared	0.137	0.120	0.075	0.074	0.082	0.120	0.092	0.071

Notes: The table reports the regression results for the interaction terms. Panel A reports the results when only precious minerals and HFLS mines are considered using either proximity dummies or intensity measured as count variables for the number of deposits and active mines that are within 5 km. Sample sizes for young men are too small to be able to estimate differential and net effects for young men near HFLS mines. Men are asked who they think should have greater say when it comes to decisions reported in columns (1) to (5). The binary dependent variables take a value of 1 if the respondent says that he thinks such decisions should be taken jointly with his partner. In column 6, the index ranging from 0 to 1 takes a value of 1 if the respondent answers "shared equally" when asked who should have greater say for the set of all five listed decisions. The mean of this index is 0.684. The individual controls include the difference in wife and partner's/husband's age, three indicator variables for the man's highest level of educational attainment (with the excluded category being "no education at all"), a continuous variable for the number of living children in the household, a rural/urban dummy that equals 1 if the respondent lives in a rural area, and the number of years the respondent has been living in the current place of residence. We also include the GHF (see text for further details) and binary controls for the main source of drinking water being piped water and access to electricity. All regressions are weighted, and include district and state fixed-effects. Robust standard errors are clustered at the DHS cluster level. *presence of deposit*presence of active mine* takes a value of 1 if there is a deposit and an active mine within 5 km of the DHS cluster to which the respondent belongs. *number of deposits*presence of active mine* equals the number of deposits within 5 km of the DHS cluster interacted with the number of active mines within 5 km of the same cluster. "*young*" is a binary variable that equals 1 if the male respondent is 15-25 years old. We report net effects on the young with associated *p*-values in brackets. *** Denotes significance at the 1% level, ** at the 5% level and * at the 10% level.

Appendix Table 8: Summary statistics for individual and district characteristics in control and treatment groups

	Control		Treatment		
	mean	standard deviation	mean	standard deviation	difference
	(1)	(2)	(3)	(4)	(5)
Individual/districts' characteristics					
young (age 15-25)	0.145	0.353	0.166	0.372	-0.02
age difference between wife and partner/husband	5.199	3.836	5.236	3.873	-0.037
educational attainment:					
no education at all	0.344	0.475	0.35	0.477	-0.006
some or all primary school	0.152	0.359	0.138	0.345	0.014
some secondary school	0.37	0.483	0.349	0.477	0.021
completed secondary school or higher	0.135	0.342	0.163	0.369	-0.028*
number of living children in household	2.529	1.228	2.43	1.231	0.099**
husband's educational attainment:					
no education at all	0.183	0.388	0.204	0.403	-0.021
some or all primary school	0.195	0.398	0.137	0.344	0.058**
some secondary school	0.402	0.492	0.452	0.498	-0.05
completed secondary school or higher	0.207	0.407	0.204	0.403	0.003
rural/urban	0.853	0.354	0.651	0.477	0.202***
years living in place of residence	15.038	11.616	15.777	12.157	-0.739
Global Human Footprint (index, in log)	3.632	0.332	3.842	0.343	-0.210***
water	0.485	0.5	0.553	0.497	-0.068***
electricity	0.9	0.3	0.928	0.258	-0.028***
Main outcomes					
domestic violence index	0.242	0.305	0.226	0.324	0.015
barriers to health care index	0.275	0.339	0.212	0.32	0.063***
final-say in decision-making index 1	0.817	0.288	0.802	0.323	0.015
final-say in decision-making index 2	0.785	0.341	0.764	0.362	0.022
Mechanism related outcomes					
currently working	0.287	0.454	0.28	0.449	0.007
is in workforce	0.329	0.471	0.356	0.479	-0.026
services	0.043	0.204	0.089	0.285	-0.046**

agriculture	0.216	0.413	0.186	0.389	0.03
manufacturing	0.068	0.252	0.08	0.271	-0.012
literate	0.547	0.498	0.617	0.486	-0.070***
height	151.885	5.840	152.263	5.937	-0.378**
BMI	22.045	3.980	22.415	4.225	-0.371***
overweight/obese	0.204	0.403	0.231	0.422	-0.027**
underweight	0.193	0.395	0.173	0.378	0.020*
HBA	11.528	1.702	11.635	1.614	-0.107**
anemic	0.557	0.497	0.544	0.498	0.013
high BP	0.124	0.330	0.109	0.311	0.016*
high glucose	0.503	0.500	0.506	0.500	-0.04
HAZ	-1.445	1.58	-1.258	1.702	-0.187*
WAZ	-1.561	1.165	-1.476	1.220	-0.086
WHZ	-1.071	1.347	-1.081	1.465	0.011
earns cash	0.048	0.215	0.047	0.212	0.001
earns more than him	0.005	0.074	0.011	0.103	-0.005*
owns house alone	0.016	0.124	0.025	0.155	-0.009**
owns house alone/jointly	0.053	0.224	0.061	0.240	-0.008
knows about loan program	0.078	0.269	0.087	0.283	-0.009
knows about and has taken loan	0.022	0.146	0.022	0.146	0.000
any health insurance	0.153	0.360	0.233	0.423	-0.080***
insurance from employer	0.002	0.047	0.005	0.072	-0.003
insurance from central/state government	0.077	0.266	0.130	0.336	-0.053***

Notes: In the pre-treatment phase, the control group has no deposit within 5 km of each cluster and no active mine within 99 km (since 100 km is the limit of our data, we use a value very close to 100 km). The treatment group has a deposit within 5 km of each cluster but no active mine within 15 km. We run tests for pre-trends using future mines only, and then compare treatment and control groups in years before the mine opens. We report the mean and standard deviation for each of the control variables and for differences in the means. See Table 1a for further details on each variable. ***p<0.01, **p<0.05, *p<0.10 for the t-test.

Appendix Table 9: Impact of past/future mines on attitudes towards domestic violence

	Beating justified if the wife:						
	goes out without permission	neglects children	argues with husband	refuses sex	does not cook food properly	index	emotional violence
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel B: All mines							
Proximity (whether there is a deposit within 5 km):							
presence of deposit*presence of past/future mine	0.214***	0.120	0.074	-0.227**	-0.050	0.029	-0.186**
	(0.077)	(0.082)	(0.089)	(0.073)	(0.099)	(0.052)	(0.093)
presence of deposit*presence of past/future mine*young	-0.202	-0.128*	-0.062	0.081	0.030	-0.056	0.095
	(0.098)	(0.074)	(0.107)	(0.103)	(0.126)	(0.077)	(0.081)
net effect for young	0.013	-0.008	0.012	-0.145	-0.020	-0.027	-0.092
F-statistic	0.010	0.010	0.020	1.480	0.010	0.080	0.880
	[0.920]	[0.939]	[0.901]	[0.224]	[0.907]	[0.773]	[0.349]
Observations	20,298	20,316	20,282	20,212	20,305	20,068	20,367
R-squared	0.192	0.221	0.142	0.082	0.101	0.206	0.120

Notes: The binary dependent variables take a value of 1 if the female respondent says that she considers that beating is justified for reasons reported in each column. In column (6), the index ranging from 0 to 1 is constructed by considering the answers to the 5 questions related to attitude towards domestic violence. It equals 1 if the respondent says that beating is justified in each case. The mean index is 0.241. In column (7), "emotional violence" is a variable that equals 1 if the respondent says that she has experienced one of the three possible examples of emotional violence. The sample is restricted to women who were interviewed for domestic violence only. The individual controls include the difference in wife and partner's/husband's age, three indicator variables for the woman's highest level of educational attainment (with the excluded category being "no education at all"), similar indicator variables for the partner's/husband's level of educational attainment, a continuous variable for the number of living children in the household, a rural/urban dummy that equals 1 if the respondent lives in a rural area, the number of years the respondent has been living in the current place of residence and a dummy for whether or not the respondent's father used to beat her mother. We also include the GHF (see text for further details) and binary controls for the main source of drinking water being piped water and access to electricity. All regressions are weighted, and include district and state fixed-effects. Robust standard errors clustered at the DHS cluster level. *presence of deposit*presence of past/future mine* takes a value of 1 if there is a deposit and a past/future mine within 5 km of the DHS cluster to which the respondent belongs. *"young"* is a binary variable that equals 1 if the female respondent is 15-25 years old. We report net effects on the young with associated *p*-values in brackets. *** Denotes significance at the 1% level, ** at the 5% level and * at the 10% level.

Appendix Table 10: Impact of mines on attitudes towards domestic violence including natural log $PM_{2.5}$ as control

	Beating justified if the wife:						
	goes out without permission	**neglects children**	**argues with husband**	**refuses sex**	**does not cook food properly**	**index**	**emotional violence**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Panel A: HFLS mines							
Proximity (whether there is a deposit within 5 km):							
presence of deposit*presence of HFLS active mine	-0.154**	-0.253*	-0.330***	-0.004	-0.081	-0.158***	-0.177*
	(0.065)	(0.153)	(0.107)	(0.057)	(0.071)	(0.060)	(0.105)
presence of deposit*presence of HFLS active mine*young	0.013	-0.007	0.004	-0.005	0.029	0.006	0.037**
	(0.024)	(0.026)	(0.025)	(0.020)	(0.023)	(0.018)	(0.016)
natural log $PM_{2.5}$	-0.173*	-0.167**	-0.146**	0.033	-0.050	-0.105**	0.035
	(0.094)	(0.081)	(0.058)	(0.064)	(0.045)	(0.046)	(0.058)
net effect for young	-0.142	-0.260	-0.326	-0.009	-0.052	-0.152	-0.140
F-statistic	4.290	2.840	9.140	0.030	0.520	6.150	1.780
	[0.039]	[0.092]	[0.003]	[0.874]	[0.470]	[0.013]	[0.183]
Observations	7,536	7,541	7,528	7,486	7,542	7,433	7,569
R-squared	0.134	0.167	0.095	0.034	0.031	0.138	0.066
Intensity (number of deposits within 5km):							
number of deposits*presence of HFLS active mine	-0.193***	-0.282*	-0.319***	-0.020	-0.096	-0.181***	-0.169*
	(0.056)	(0.150)	(0.099)	(0.050)	(0.066)	(0.055)	(0.102)
number of deposits*presence of HFLS active mine*young	0.012	-0.007	0.004	-0.005	0.029	0.006	0.037**
	(0.024)	(0.026)	(0.025)	(0.020)	(0.023)	(0.018)	(0.016)
natural log $PM_{2.5}$	-0.176*	-0.169**	-0.145**	0.031	-0.052	-0.106**	0.035
	(0.094)	(0.081)	(0.057)	(0.064)	(0.045)	(0.046)	(0.058)
net effect for young	-0.181	-0.289	-0.315	-0.025	-0.067	-0.175	-0.132
F-statistic	9.310	3.640	9.890	0.250	1.040	9.540	1.680

	[0.002]	[0.057]	[0.002]	[0.621]	[0.308]	[0.002]	[0.195]
Observations	7,536	7,541	7,528	7,486	7,542	7,433	7,569
R-squared	0.133	0.167	0.095	0.034	0.031	0.138	0.066
Panel B: All mines							
Proximity (whether there is a deposit within 5 km):							
presence of deposit*presence of active mine	-0.138**	-0.113*	-0.117**	-0.070*	-0.064	-0.090*	-0.031
	(0.061)	(0.067)	(0.059)	(0.041)	(0.050)	(0.047)	(0.062)
presence of deposit*presence of active mine*young	0.019	-0.007	0.103	-0.073**	-0.103**	-0.024	-0.126***
	(0.080)	(0.078)	(0.100)	(0.037)	(0.046)	(0.054)	(0.046)
natural log $PM_{2.5}$	-0.052*	-0.031	-0.040	-0.002	-0.020	-0.030	0.032*
	(0.031)	(0.029)	(0.026)	(0.022)	(0.021)	(0.020)	(0.018)
net effect for young	-0.119	-0.121	-0.014	-0.143	-0.167	-0.114	-0.157
F-statistic	1.850	2.460	0.020	16.920	14.250	5.320	12.270
	[0.174]	[0.117]	[0.877]	[0.000]	[0.000]	[0.021]	[0.001]
Observations	30,005	30,010	29,973	29,878	30,005	29,670	30,107
R-squared	0.117	0.142	0.080	0.030	0.045	0.122	0.062
Intensity (number of deposits within 5km):							
number of deposits*presence of active mine	-0.030*	-0.035*	-0.004	-0.001	-0.000	-0.010	-0.001
	(0.017)	(0.019)	(0.025)	(0.015)	(0.019)	(0.014)	(0.019)
number of deposits*presence of active mine*young	0.006	0.005	0.034	-0.036***	-0.040**	-0.010	-0.048***
	(0.026)	(0.023)	(0.032)	(0.011)	(0.016)	(0.015)	(0.013)
natural log $PM_{2.5}$	-0.052*	-0.030	-0.041	-0.002	-0.021	-0.031	0.032*
	(0.031)	(0.029)	(0.026)	(0.022)	(0.021)	(0.020)	(0.018)
net effect for young	-0.024	-0.030	0.030	-0.037	-0.040	-0.019	-0.048
F-statistic	0.590	1.240	0.770	8.420	4.480	1.280	10.080
	[0.444]	[0.265]	[0.379]	[0.004]	[0.034]	[0.258]	[0.002]

Observations	30,005	30,010	29,973	29,878	30,005	29,670	30,107
R-squared	0.117	0.142	0.080	0.029	0.045	0.121	0.062

Notes: The table reports the regression results for the interaction terms. Panel A reports the results when only precious minerals and HFLS mines are considered using either proximity dummies or intensity measured as count variables for the number of deposits and active mines that are within 5km. The binary dependent variables take a value of 1 if the female respondent says that she considers that beating is justified for reasons reported in each column. In column (6), the index, ranging from 0 to 1, is constructed by considering the answers to the 5 questions related to attitude towards domestic violence. It equals to 1 if the respondent says that beating is justified in each case. The mean value of the index is 0.241. In column (7), "emotional violence" is a variable that equals 1 if the respondent says that she has experienced one of the three possible examples of emotional violence listed. The sample is restricted to women who were interviewed for domestic violence only. The individual controls include the difference in wife and partner's/husband's age, three indicator variables for the woman's highest level of educational attainment (with the excluded category being "no education at all"), similar indicator variables for the partner's/husband's level of educational attainment, a continuous variable for the number of living children in the household, a rural/urban dummy that equals 1 if the respondent lives in a rural area, the number of years the respondent has been living in the current place of residence and a dummy for whether or not the respondent's father used to beat her mother. We also include the GHF (see text for further details) and binary controls for the main source of drinking water being piped water and access to electricity. We exclude district fixed-effects as the $PM_{2.5}$ data are at the district level. All regressions are weighted and include state fixed-effects. Robust standard errors clustered at the DHS cluster level. *presence of deposit*presence of active mine* takes a value of 1 if there is a deposit and an active mine within 5 km of the DHS cluster to which the respondent belongs. *number of deposits*presence of active mine* equals the number of deposits within 5 km of the DHS cluster interacted with the dummy for the presence of an active mine within 5 km of the same cluster. *"young"* is a binary variable that equals 1 if the female respondent is 15-25 years old. We report net effects on the young with associated *p*-values in square brackets. *** Denotes significance at the 1% level, ** at the 5% level and * at the 10% level.