Minimum Wages around Birth and Child Health

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Abstract

We study the effects of minimum wages in Indonesia around the time of birth on child stunting up to 5 years of age. Indonesia is interesting for this study not only because it has the fifth highest burden of stunted children in the world, but also because minimum wages are an integral part of the Indonesian social policy debate, with protests by workers a regular occurrence. To the extent that minimum wages influence parental wage income, they might affect parental investments in child health. Using variations in annual fluctuations in real minimum wages in different Indonesian provinces, we find that children exposed to increases in minimum wages in their birth years have higher height-for-age (HAZ) scores in the first five years of their lives. Our estimated impacts are based on differences-in-differences models with province and year-of-birth fixed effects and are robust to inclusion of biological-sibling fixed effects and measures of child, parental, household and communal characteristics. The effects are prominent particularly among children whose fathers earn near the bottom of the wage distribution, whereas no effects are found for fathers whose earnings are in the top part of the wage distribution (placebo). We also use multiple sources of consumer price indices (CPI) (provincial and national) to explore robustness to different measures of real minimum wages. Our results are consistent with recent work from Indonesia based on "big push" models in which increases in minimum wages lead to a movement away from a low-wages and low-labor-demand equilibrium to a high-wages and high-labor demand equilibrium.

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1 Introduction

Recent surveys in The Lancet estimate that 250 million children under 5y of age in low-and middle-income countries (LMICs) are at risk of failing to reach their full developmental potential, with child height-for-age (HAZ) used as a key marker of child development (Adair et al 2013; Black et al 2013; Black et al 2017; Lu et al 2016). Furthermore, evidence is increasing rapidly that early-childhood nutrition is a key predictor of later life cognition and labor market success, suggesting serious long-run consequences of neglect of child development today (Almond et al 2017; Almond et al 2011; Behrman and Rosenzweig 2004; Behrman et al 2009; Crookston et al 2013: Currie and Vogl 2013; Heckman 2006; Hoddinot et al 2008, 2013a,b; Majid 2015; Maluccio et al 2009; Richter et al 2017). Increases in parental SES may be key to improving child nutrition, as parental SES is generally understood to be an important determinant of child health with the existence of a gradient between adult SES and child health now well-established (Case 2002; Currie 2009; Cutler et al 2012; Schady et al 2015). However, credibly establishing causal pathways between parental SES and child health has proved elusive, as concerns about reverse causation and omitted variable bias are often prominent (Baker and Stabile 2012; Chandra and Vogl 2010; Currie 2009; Cutler, Lleras-Muney, and Vogl 2012; Deaton 2002). One review article on the causes and consequences of early-childhood health notes that "(t)he number of studies associating poor child outcomes with low SES far exceeds the number that make substantive progress on this difficult question of causality" (Baker and Stabile 2012, p. 8).

We study minimum wages (MWs) around the time of birth and their causal effects on child nutritional status in Indonesia up to five years after birth. Indonesia carries the fifth highest burden of stunted children in the world, and MWs are an integral part of the social policy debate in Indonesia with regular worker protests for higher wages (Chun and Khor 2010; Magruder 2013). To the extent that MWs influence parental wage income, they might affect parental investments in child health. For example, if wages were to increase, families might be more likely to avail themselves of health services and engage in other salutary behaviors that may be particularly effective around the time of birth. However, with higher wages, mothers may also be likely to spend more time in the labor market at the expense of child care-giving activities (Behrman and Rosenzweig 2002). The time around birth is widely understood to be a critical period in shaping child nutrition and stunting levels, so that changes in parental economic conditions during children's early life may have particularly large effects on child health and nutrition.

Our paper makes three contributions. First, this is the first paper identifying the effects of MWs on children's heights-for-age (HAZ) in a national context. HAZ in the first five years of life is considered a key marker of overall child development, and a key outcome of interest for ending hunger and malnutrition in the planet as per the United Nation's Sustainable Development Goal 2 for 2025. In cross-country difference-in-difference estimates, spatial variation in minimum wage levels comes from a number of countries that may have very different legal, historical and socio-economic conditionss, whereas in our study this variation comes from different provinces within one country, Indonesia. Second, we study effects of minimum wages at birth on preschool child health up to 5 years after birth, motivated by life-course models of health that emphasize birth year as a critical period in child development (Behrman and Rosenzweig 2004; Currie and Vogl 2013; Almond and Currie 2011). Wehby et al (2016) study effects of MW on birth outcomes, whereas we are interested in lagged effects of MW at birth on preschool child health in a distinct critical/sensitive period between birth and age five years. Third, to the best of our knowledge, this is the first paper in the voluminous minimum wage literature (Belman et al 2015; Belman and Wolfson 2014; Neumark and Wascher 2010) to apply biological-sibling fixed-effect models with a sub-national differences-in-differences province-cohort model. Prior work even in the US has not used biological-sibling fixed-effects models in the context of MWs (Wehby et al 2016).

To identify causal effects, our basic model exploits timing of births relative to timing of changes in levels of MWs: some children happen to be born in years with higher MWs whereas others are born in years with lower MWs. Comparisons of siblings born from the same biological mothers helps address concerns about potential roles of unobserved factors leading some mothers to time births relative to changes in MWs. We further strength this basic strategy with a differences-in-differences (DiD) framework that compares cohort differences among biological siblings in provinces with high versus provinces with low MWs. We use data on child anthropometrics (0-5) from the 2007 wave of the Indonesian Family Life Survey (IFLS), a rich nationally-representative longitudinal dataset. A panel of policy data, from the Indonesian Bureau of Statistics, was constructed for province-specific MWs that covers the five years (2002–2007) and merged with the IFLS.

Our results show that children exposed to increases in minimum wages in the year of birth have higher height-for-age (HAZ) scores in the first five years of their lives. Furthermore, we use data on parental wages to focus on children of parents for whom the minimum wage is most likely to be binding- those whose parents are in the bottom 25th and 50th quantiles of the wage distribution. Parents in upper tails of the wage distribution are considered as part of a placebo sample. Our estimated impacts are evident with differences-in-differences models with province and year-of-birth fixed effects and are robust to inclusion of biological-sibling fixed effects, measures of child characteristics (age, gender) and parental characteristics (such as employment status, age and schooling attainment, household income and assets) as well as community covariates (provincial GDP and unemployment rates). The effects are prominent particularly among children whose fathers earn in near the bottom of the wage distribution, whereas no effects are found for fathers with earnings in the top part of the wage distribution (placebo). We also use multiple sources of CPI (provincial and national) to explore robustness to different measures of real minimum wages. Our results are consistent with recent work from Indonesia based on "big push" models where increases in minimum wages lead to a movement away from an equilibrium of low wages and low labor demand to one with high labor demand and high wages.

The rest of the paper is organized as follows: Section 2 reviews the literature on MWs, putting our findings and contributions into context. Section 3 details institutional background on MWs, with a focus on the process of MW determination and issues with respect to compliance with MWs in Indonesia. Section 4 reviews the data. Section 5 presents a simple conceptual framework for hypothesis generation. Section 6 presents the econometric models used for estimation. Section 7 presents our findings and discusses their robustness and their economic/health significance. Section 8 concludes. An Appendix with tables and figures follows.

2 Literature Review on Minimum Wages

The large literature on MWs, primarily from high-income countries, finds that MWs can increase the earnings of low-income workers without causing job losses as wage increases improve workers' productivity, particularly for workers in large firms (Card 1992; Card and Krueger 2000; Chun and Khor 2010; David et al 2016; Dube et al 2010; Levine 1992; MaCurdy 2015). However, theory and empirical findings have also suggested that higher MWs can lead to lower employment (especially for workers in smaller firms) as costs of production increase and firms respond by laying-off workers (Belman et al 2015; Belman and Wolfson 2014; Neumark and Wascher 2010). The limited but growing literature from LMICs generally finds highly heterogeneous effects of MW policies on employment and poverty (Betcherman 2012). Studies from middle-income contexts (Latin America) suggest that higher MWs can lead to increases in wages for workers earning near the MW (Bhorat 2014). Studies on low-income contexts (Sub-Saharan Africa) find that increases in MWs have small negative impacts, or no measurable impacts on employment (Bhorat et al 2017).

In Indonesia, some studies suggest that an increase in the MW may cause companies to demand less labor, thus reducing employment (Chun and Khor 2010). However, Alatas and Cameron (2008) argue that firm size matters: small domestic firms may register unemployment effects but there are no negative employment effects for medium- and large- sized firms. Instead of focusing on a firm's size, Magruder (2013) addresses the impact of the MW in different business sectors, in particular formal and informal. The results show that higher MWs induce workers away from informal to formal jobs, leading to decreases (increases) in employment in the informal (formal) as higher wages lead to greater demand for firm products. Using the IFLS, Hohbery and Lay (2015) find evidence of increased formal-sector wages without any adverse effects on formal-sector employment, but in contrast to Magrudger find no effects on the informal sector. Overall, past evidence from LMICs suggests that MWs have ambiguous effects on incomes of poor families.

2.1 Evidence on MWs and Child Health

There is very little known about effects of MWs on child health (Majid et al 2016). Majid et al (2016) examines effects of national MWs on children's height-for-age (HAZ) scores in 49 LMICs spread across the Americas, Africa and Asia (not including Indonesia) using child anthropometric data from the Demographic and Household Surveys (DHS) and linking them with a global MW dataset they compiled for this purpose. The researchers found that MWs were modestly associated with adverse effects on HAZ. Adverse effects of an increase in the MW were observed among girls and for children of fathers who were less than 35 years old, mothers aged 20-29, parents who were married, parents who were less educated, and parents involved in manual work. The authors also explored heterogeneity by region and GDP per capita at baseline (1999). Adverse effects were concentrated in lower-income countries and were most pronounced in South Asia. In contrast, increases in MWs improved children's HAZ in Latin America, and among children of parents working in skilled sectors. The authors found evidence of increased parental unemployment, as suggestive evidence supporting why MWs may have adverse health effects in certain contexts and highlighting the need for future country-specific studies paying greater attention to mechanisms, such as parental investments in their children.

In contrast to the Majid et al (2016) study on MWs and child health in LMICs, in a concurrent working paper, Wehby et al. (2016) investigate the effects of MW increases on birth outcomes in the US for less-skilled parents. Using birth data from Vital Statistics Natality Files in the US over 25 years, the authors find that increases in the MW are associated with higher birth weights, driven by increased gestational lengths and fetal growth rates. The authors also find evidence of increased prenatal care and lower incidence of smoking during pregnancy due to higher MWs, which serve as possible mechanisms explaining their findings. In terms of empirical strategy, the authors exploit period and state-level changes in MWs across years and match them to birth records. In terms of the literature on critical periods, their results suggest that both MWs during pregnancy and cumulative effects from two to three years prior to pregnancy may be important for birthweights/gestational lengths. Wehby et al (2016)'s focus is on effects of MW on birth outcomes rather than lagged effects of MW at birth (more specifically) on preschool child health more broadly. This is relevant because in many LMICs, heights after birth rather than birth weights are the more robust predictor of later life wellbeing (Hoddinott et al 2008; Maluccio et al 2009; Duc and Behrman 2017).

In contrast to Wehby et al., (2016), Horn et al. (2017) find mixed evidence of improvements in workers self-reported health for less-skilled individuals due to higher MWs in the US. In particular, for employed men there is some evidence for improved health, with no statistically significant effects on women's health. In terms of healthy behaviors, like Wehby et al. (2016), they find evidence of reduced smoking for women, but no such effects for men. However, MWs lead to unemployment effects for men and women, and with health worsening for unemployed men. To the extent that women's health during pregnancy primarily matters for birth outcomes and not men's health, the two studies are consistent, but they also highlight the importance of looking at different margins- pregnancy vs. overall health and to explore economic mechanisms (employed/unemployed) and health mechanisms in more detail to get a better sense of losers and winners and how effective MWs may be for different individuals. Our study builds from insights from the Majid et al (2016)'s earlier work and from the economics literature on MWs, but also important insights from these important ongoing US studies to make a contribution to the larger literature on effects of MWs on child health.

SUMMARY: Despite the huge numbers of children at risk of malnutrition in early life and growing evidence that early-life nutrition may have long-term effects on later life health and economic performance, there is very little literature on causal impact of income policies, particularly MWs, timed circa birth and their effectiveness in improving child health after birth. It's also unclear what the most critical periods are when income should be transferred to improve health and how family background shapes the health effectiveness of such transfer policies.

3 Background on Minimum Wages

More than 80% of LMICs have adopted MW laws, with many countries doing so in the last 20 years. Nominal MW levels have increased over time, with real MW levels increasing by more than 25% in 51% of the 80 countries with complete real wage data in 1999 and 2013 (Rodrriguez et al 2014). Many LMICs have national MWs only, but Indonesia is one of the few LMICs that have rich subnational and time variation in MWs. Even in the US minimum wages are not updated frequently, with the US federal minimum wage being last updated in 2009 (Chun and Khor 2010).

3.1 Institutional Background on Minimum Wages in Indonesia

Minimum wage policy was first introduced in Indonesia in the early 1970s, under President Suharto‘s “New Order” government. It has been the main instrument in labor-market interventions since the late 1980s (Bird and Manning 2005). The stated objective of setting a minimum wage was always to ensure access to basic consumption levels for the poor. Therefore, the government sets minimum wages based on the estimated value of a basic consumption bundle (SMERU 2001).

Monthly minimum wages apply to all full-time workers near the bottom of the wage scale, including those having worked for less than one year, and are revised on an annual basis to adjust for living costs, inflation and labor market conditions (Manning and Roesad 2007). Prior to January 2001, the central government determines the annual minimum wage for the whole country. Afterwards, as part of the more general movement towards increased regional autonomy, the setting of minimum wages was decentralized to provincial governors, mayors and regents as the respective heads of provinces, cities and districts. Negotiations thus take place at tripartite regional councils consisting of representatives of government, of employees (such as trade and labor unions) and of employers. Along with the help of the local mayors or regents, a minimum wage proposal is then formulated and handed to the provincial governor in charge of decreeing regional minimum wages (Better Work Indonesia 2013; Bird and Manning 2005; Widrarti 2006).

Figure 4 outlines the institutional process for determination of MWs in Indonesia. Wage council meetings begin in August or September every year, with negotiations extending from October to November and even December in exceptional cases. A decision for the MW level should be announced on November 1st, but many decisions in recent years have been made after that date, although still within November. The new wage then becomes effective as of January 1st of the following year (Better Work Indonesia 2012; Widarti 2006). Figure 5 summarizes the usual timeline. The timeline is important for us as it gives us confidence that those children whom we consider to be affected by MWs in any given year of birth are in fact fully exposed to any revisions to MWs in that particular year.

3.2 Compliance with Minimum Wages in Indonesia

Figure 3, adapted from Magruder (2013), shows data on the normalized wage distribution relative to minimum wages in Indonesia. Although many people earn below MWs (to left of 0), there is a clear spike in density around MW levels. More generally, alongside increases in the minimum wage, compliance has been noted to have increased since the mid-1990s. This was partly due to the increased bargaining power of trade unions in wage negotiations with employers in the new post-1998 democratic political system.

A report by Bird (2005) finds that the level of non-compliance in Indonesia was around 20%. This level varies across sectors and regions (Bhorat 2014). Another study found that firms of bigger size tend to pay higher wages and thus have higher compliance levels than smaller ones (SMERU 2001). Similarly, firms in capital-intensive sectors also pay more and comply more to wage floors than firms in labor-intensive industries, as well as foreign-owned firms compared to domestic firms and firms with export-targeted production compared to domestic-market firms. The main factor behind these findings is actually the firm size, as firms that are foreign-owned, export- and capital-intensive, all tend to be large companies with higher probabilities of compliance with minimum wage regulations. For example, workers in medium-sized firms were recorded to have a 21% higher probability of being paid above the minimum wage than workers in small firms, and workers in large firms a 44% higher probability than workers in small firms. Regarding employee characteristics, there seem to be differences in compliance related to gender, education, and age. Nevertheless, gender discrimination plays the major role. The same study found that female workers have a 19% lower chance of being paid above the minimum wage than male workers (SMERU 2001). Moreover, there is some correlation between compliance and the type of employment contract. 44% of daily casual workers are underpaid, in contrast with permanent workers who are paid the highest. Other factors include institutional factors such as the nature of sanctions, the amount of resources allocated to enforcement and the conduct of awareness campaigns, as well as labor market conditions such as unemployment rates and levels of unionization (Bhorat 2014; SMERU 2001).

Consequences of non-compliance not only include industrial strife, but can include governmental sanctions as well. Under Labor Act Article 176, labor inspectors (and even trade unions) are supposed to ensure proper implementation of minimum wages. When non-compliance is spotted during an inspection, legal sanctions can be applied. Criminal sanctions can take the form of one to four years of jail or a 100 to 400 million rupiah fines. Lighter sanctions include warnings and administrative sanctions, such as the prohibition of hiring foreign and/or outsourced workers. Cases are reviewed by the Governor and the final verdict depends on the report of non-compliance submitted by inspectors (Wage Indicator

Foundation 2016).

4 Data

Our study has considerable data requirements. It necessitates multilevel data linking province level minim wages to individual data on parents, children and communities. We need data on children's health, on parental labor market outcomes and we need to disentangle mechanisms by assuring that the data on children is linked to data on their actual biological parents at the time of birth when MWs differed across births. Furthermore, we need panel data on other confounding variables with provincial and time variation.

A panel of policy data for minimum wages was constructed for province-specific MWs that covers the post decentralized period 2002-2007 for each province of Indonesia. Similarly data on the consumer price index (CPI) at the province and national level was collected to compute alternate measures of real MWs at the provincial level. These data were collected through the Indonesian Bureau of Statistics and Indonesian Ministry of Manpower.

To obtain information on child health and other variables relating to household- and individual- levels, we use the Indonesian Family Life Survey (IFLS). Since 1993, this longitudinal survey, which is publicly available on RAND, has been collecting data as it pertains to the individual, the household, and the community. This data represents 83% of the Indonesian population across 13 out of 26 provinces. We obtain information from 2007 wave of the Indonesian Family Life Survey (IFLS). The child health outcomes of interest is HAZ score. WHO 2006 guidelines were used to determine HAZ scores based on anthropometric data on child height in cms and child age.[1] We also construct other parental variables, such as gender, age, education, employment, and income. Moreover, we connect information between each child and his or her parents so that the connection represents the family relationship at the time of the child's birth and its correlation with the changes in minimum wage.[2]

Last, we obtain data on covariates from the following sources: World Bank Development Indicators and the Indonesian Bureau of Statistics. The state-level variables includes unemployment rates and real GDP per capita at the provincial level.

[1] Alderman et al. (2015) discuss about the importance of HAZ scores in measuring child's early health through physical health growth.

[2] We follow the procedure of linking information between children and parents from the user guide books in 2007

5 Conceptual Framework

We consider a life-cycle framework, with emphasis on two stages: (1) the period during pregnancy and up to birth and (2) subsequent early childhood (i.e., before school-entry age up to five years). We conceptualize children as starting life with a vector of genetic and environmental endowments or "inputs" (Y_0). Conditional on these endowments, early childhood health is directly affected by investments that mediate the relationship between any MWs at birth and child health at birth and between child health at birth and after birth up to age five years. here are two types of investments in human development: (i) Familial investments such as provision of nutritious foods, supplements and vaccines and (ii) Public investments such as public expenditures on health care, etc (Behrman et al 1982; Behrman 1988; Behrman et al 1994; Cunha et al 2006; Cunha et al 2010; Heckman 2006).

Figure 5 presents an overview of this framework. MWs potentially increase the cost of production for firms, who may decide to fire workers or to retain them. Workers who are fired may respond by switching occupations from the formal sector to the informal sector. On the other hand, MWs may increase employment and wages if workers with higher pay consume more products and services, leading to more jobs with higher pay and a possible shift from informal to formal work. Based on the literature reviewed in the Background Section, firm size (small or medium/large) and sector (formal or informal) where parents worked prior to MW changes may play important roles in mediating the effects of MWs on parental earnings/wages. To the extent that MWs influence parental wage income, they might affect parental investments in child health. For example, if parental wages were to increase, families might be more likely to avail themselves of health services and engage in other salutary behaviors (eating more nutritious foods) that may be particularly effective around the time of birth. However, mothers may also be more likely to spend more time in the labor market at the expense of care-giving activities. Familial and public investments - in box at bottom left - may moderate not only the impact of changes in parental wages/earnings and their impacts on child health at birth, but also how outcomes at birth influence life after birth.

6 Econometric Models

We use the following models to estimate the effects of minimum wages at birth on child health:

$$y_{impt} = \alpha_0 + \alpha_1 MW_{pt} + \alpha_2 X_{impt} + g(p, t) + \varepsilon_{impt} \tag{1}$$

where y_{impt} is the set of outcomes of interest for child i (HAZ scores) of mother m living in province p and born in year t. MW_{pt} is a vector of minimum wages by provincial levels p in each year t in which child i was born. X_{impt} is a vector containing control variables categorized in four levels: child, parents (mother and father), household, and community. Child characteristics include age, age squared, and gender. Parental variables include age, age squared, grades of schooling attainment, and employment status (employed or unemployed). The household characteristics include information on name of province, urban or rural setting, asset index, total expenditure per capita, household size, whether each family owns a television, a refrigerator, a stove, or a toilet.[3] Community-level attributes cover unemployment rates and GDP on the provincial level. We construct the variables for employment by following Hohberg and Lay (2015).[4] In addition, g(p,t) represents for state and time fixed effects. Because each province takes into account its own economic conditions when deciding its minimum wage level, we want to account for heterogeneity from any correlation between these economic factors. To do so, we include provincial fixed effects to control for any time invariant differences among provinces, which may bias the effects of minimum wage levels on health. In addition, we use the child's year of birth fixed effects to control for other unobserved time-related characteristics. Lastly, ε_{impt} is an error term.

Apart from state and time fixed effects, we want to apply the variations in minimum wage within cohorts born from the same biological mother, γ_m. Thus, we introduce another equation:

$$y_{impt} = \widehat{\alpha}_0 + \widehat{\alpha}_1 MW_{pt} + \widehat{\alpha}_2 X_{impt} + \widehat{g}(p,t) + \gamma_m + \widehat{\varepsilon}_{impt} \tag{2}$$

where the sample is restricted to include families with two or more children per biological mother. All time-invariant unobservable factors that determine differences between children's HAZ across mothers will be controlled for. For instance, if mothers time their births to take advantage of MWs, all time-invariant factors shaping composition of births will be taken care of by comparing children of the same biological mother. Our identification strategy essentially compares differences in HAZ across biological siblings if one sibling is exposed to higher levels of MW than others and compares such differences across provinces in Indonesia with varying levels of MWs for robustness.

[3]We construct variables of household characteristics based on the definitions in the Data Appendix by Maccini and Yang (2009)

[4]Hohberg and Lay (2015) define workers from the formal sector if they report themselves as private or government workers. Those who consider themselves self-employed or unpaid family worker are placed under the informal sector.

7 Results

We show summary statistics for the key variables from our analyses in table 1. The average levels of the minimum wage calculated by national and provincial CPI values are USD 691.7 and USD 326.6 per month, respectively. The differences between the two highlight the importance of taking into account alternate measures of CPI in measurement of real minimum wages. Most papers use national CPIs because provincial CPIs are unavailable. What matters for our analysis however is not the absolute value of the two alternate measures, but how do changes in real minimum wages affect child health. The average of HAZ scores is 0.118, which implies that the average child in our IFLS sample is not undernourished, though there is a large SD of 1.852. The average mother is 30 years old, has 9.1 grades of schooling , whereas the average father is 34 years old and has 9.3 grades of schooling . Whereas 47% of mothers work, 99% of fathers in our sample work. 78% of Indonesian households own a TV, nearly everyone owns a stove but only 65% own a private toilet with septic tank and only 42% own a refrigerator. Monthly per capita expenditures are 108 USD and total assets average 1417 USD per capita. The average unemployment level is 10%, with significant variation between 4% to 18% across provinces. We use the 10% level of significance for results below, unless otherwise stated.

Table 2 shows the correlations between HAZ scores and different measures of the minimum wages when we primarily account for the child's variables. We study effects of real minimum wages in levels (linear effects) as well as in logs (which capture non linearity) using provincial CPI as well as national CPI. The different specifications are motivated by existing literature on minimum wages that uses a wide variety of measures to identify effects of minimum wages (Neumark and Wascher 2010). We find that 100,000 Rupiah ($\sim$7 USD) increase in monthly real minimum wage in year of birth leads to 0.2 increase in HAZ based on linear provincial or national CPI estimates for real minimum wages. Lagged estimates are significant based on national CPI.

Table 3 presents the links between the minimum wage measurements and HAZ among boys to account for the effect of heterogeneity by child gender. We find that an increase the minimum wage based on provincial CPI values, except for the log of the minimum wage, reduces HAZ for boys although these results are not statistically significant. However, the results from the national-CPI minimum wage show the positive correlation between the measurement of the economic instrument and child's health measure. From the results of the log national-CPI minimum wage, we can interpret that a 1% increase in the monthly real minimum wage ($\sim$7000 Rupiah) is associated with a 0.09 increase in height among boys. Alternatively, a 100,000 Rupiah ($\sim$7 USD) monthly increase in real minimum wage leads to 1.29 increase in HAZ for boys. However, there is no evidence of statistically significant correlation between these variables among girls (results available upon request).

Another possible source of heterogeneous effects on the relationship between the minimum wage and child health are parental characteristics, specifically financial resources. We explore these by restricting the sample based on parental salary. Table 4 and 5 provide results from the sample restriction by father's and mother's salary, respectively, at the 25th and 50th percentiles of earning from the corresponding parent sample. Children whose fathers earn less than 50th percentiles are more likely to have higher HAZ scores from an increase of the provincial-CPI minimum wage. In model 3, which serves as a placebo, we don't find any effects of minimum wages on child health for richer parents, which is reassuring. When we examine the sample restriction based on mother's salary in table 5, although the coefficient suggests greater effects in lowest quantiles of the mothers' earnings distribution, the estimates are noisy. The majority of mothers don't work in our sample whereas almost all fathers do, which may suggest that looking at fathers' wages is the right margin to explore such heterogeneity impacts rather than mothers' earnings.

We add a more complete set of parental characteristics, such as employment status, age, and educational attainment, in table 6. We observe a positive correlation between the minimum wage (provincial-CPI, national-CPI, and lagged value of national-CPI minimum wage measurements) and the child's HAZ scores. Table 7 shows more evidence of the association between the minimum wage and child's HAZ scores when we add household characteristics to the previous set of control variables. When we account for household attributes, we find that all of the results derived from different measurements of the minimum wage become generally bigger in magnitude and more precisely estimated with statistical significance at the 1% level. According to table 7, the results suggest that an increase in the minimum wage is correlated with an increase in health for children under five years old. To explore further robustness of our estimate to time-varying communal covariates, table 8a accounts for the provincial levels of GRDP per capita during the child's year of birth while table 8b considers the unemployment rate of the year before the child's year of birth. Although the significance level and the direction of the effect are the same, the estimated coefficients of the minimum wage from table 8a is slightly smaller than those from table 7 across all of the minimum-wage measurements.

Finally, with the same control-variables set as it pertains to the child, the parent, the household, and the community, we analyze the effect of minimum wage on children within cohorts born from the same biological mother. Tables 9a and 9b present the results of $\widehat{\alpha}_1$ from equation 2. Similar to the results from tables 8a and 8b, the positive correlation between the minimum wage and the child health are shown to be statistically significant at the 1% level.

7.1 Robustness

There are a number of challenges in investigating relations for poor populations between MWs and child health. Minimum-wage legislation may be introduced along with other legislation and polices or the effects may be driven by changes in birth composition/selective births: We deal with these issues by comparing within-province (and even across siblings) exposure to changes in levels of MWs rather than the introduction of new legislation (which may be bundled with other laws). We flexibly control for a wide range of baseline observables which may predict different parental compositions as well as time invariant unobservables (through biological-siblings comparisons). In addition we add controls for GDP/capita and province specific unemployment rates to test for robustness. Another concern may be that MWs can increase prices and reduce child investments through inflation: we estimate real MWs, which control for price changes using national and provincial CPI data. A third concern is measurement error. To the extent that we have classical measurement error, our estimates are biased downwards. For non-classical measurement error, we are able to control for time invariant unobservables through sibling fixed effects – we compare changes in child health and for children from same biological mother- so any time invariant component of error in say parental health investments reports or parental economic background (e.g. status/class) will be washed out.

7.2 Magnitude

Our estimates suggest a sizable effect of minimum wages not only in the year of birth but also up to two years prior to birth. In contrast to cross-country estimates, which suggested that increases in real monthly minimum wages were associated with harmful effects on child health (Majid et al 2016), our estimates suggest that minimum wages in Indonesia have had a positive and sizable effect on child height-for-age. If one takes estimates from Table 9b as the bench mark our estimates from 0.003 to 0.008 increase in HAZ for 0-5 years olds for a 1000 Rupiah increase which is equivalent to 0.3 to 0.8 increase for a 100,000 (∼7 USD) Rupiah increase. Our estimates based on the non-linear estimates suggest that a 1% increase in real MW leads to 0.006 to 0.06 increase based on provincial and national estimates. In terms of Rupiah/USD, provincial-CPI-based log estimates suggest that a 100,000 (∼7 USD) Rupiah increase in MW leads to 0.18 to 0.87 increase in child HAZ. Wehby et al (2016) do not study effects beyond birth , but they find rather modest effects on birth weight - a 1000 USD increase in annual household income (83.3 USD monthly) leads to a 8.5 gm increase in birth weight.

8 Conclusion

A large literature establishes "gradients" between parental SES and child health. However, there has been relatively little investigation of casual effects of parental SES on child health. Further- more, despite a voluminous literature on minimum wages in developed and developing countries, not much is known about health effects of minimum wages. Using variation in annual fluctuations in real minimum wages in different provinces of Indonesia, we find that children exposed to increases in minimum wages in their year of birth have higher height-for-age (HAZ) scores in the first five years of their lives. Furthermore, we use data on parental wages to focus on children of parents for whom the minimum wage is most likely to be binding- those whose parents are in the bottom 25th and 50th quantiles of the wage distribution. Parents in upper tails of the wage distribution are considered as part of a placebo sample. Our estimated impacts are evident with differences-in-differences models with province and year-of-birth fixed effects and are robust to inclusion of biological-sibling fixed effects, measures of child characteristics (age, gender) and parental characteristics (such as employment status, age and educational attainment, household income and assets) as well as community co- variates (provincial GDP and unemployment rates). The effects are prominent particularly among children whose fathers earn in the bottom of the wage distribution, whereas no effects are found for fathers who earn in the top part of the wage distribution (placebo). We also use multiple sources of CPI (provincial and national) to explore robustness to different measures of real minimum wages. Our results are consistent with recent work from Indonesia based on big push models where increases in minimum wages lead to a movement away from an equilibrium of low wages and low labor demand to with high demand high wages (Magruder 2013).

Our paper contributes to filling the current critical gap in knowledge on the impacts of income transfer polices, specially minimum wages, at birth in a poor population on development of an important measure of child envelopment and nutrition- height-for-age z scores (HAZ) up to five years after birth. This gap is critical because about 250 million children under five years of age in LMICs are at risk of failing to reach their full developmental potential and Indonesia, the country of our interest, bares the fifth greatest burden of stunting in the world. Central to our paper is an innovative identification strategy and rich panel data connecting annual fluctuations in province-level minimum wages to individual data on parental earnings/employment, and key child anthropometric measures, embed in a life-cycle framework motivated by recent conceptual work in (Cunha et al. 2006; Heckman 2006). The

US National Institute of Health considers research on social factors shaping child development, multilevel interaction and inputs to human health and to health and disease across the lifespan to be high priority. This paper contributes to this knowledge gap by evaluating the impact of annual variations in provincial MWs during a critical period (year of birth) on child nutrition up to five years after birth, paying attention to differential effects by parental background and critical periods of development.

9 Appendix

Supplementary data used to this study can be found at:

- https://www.bps.go.id/index.php
- https://www.rand.org/labor/FLS/IFLS.html

Table 1. Descriptive statistics IFLS wave in 2007

VARIABLES	(1) N	(2) Mean	(3) SD	(4) Min	(5) Max
Minimum wages (using national CPI)	4,705	691.7	157.0	446.2	1,080
Minimum wages (using provincial CPI)	4,700	326.6	146.6	88.74	891.4
Height-for-age z scores (HAZ) under five years of age	4,233	0.118	1.852	-4.997	4.997
Child's year of birth	4,705	2,005	1.738	2,002	2,008
Child's gender	4,705	0.518	0.500	0	1
Child's age	4,705	2.384	1.695	0	5
Child's age squared	4,705	8.556	8.647	0	25
Mom's employment	4,702	0.471	0.499	0	1
Mom's age	4,705	29.48	6.236	15	53
Mom's age squared	4,705	907.8	389.5	225	2,809
Mom's grades of schooling	4,648	9.144	3.905	0	16
Dad's employment	4,702	0.990	0.102	0	1
Dad's age	4,705	33.88	7.092	18	72
Dad's age squared	4,705	1,198	520.7	324	5,184
Dad's grades of schooling	4,610	9.249	4.030	0	16
Asset index	4,703	0.128	1.261	-5.190	2.170
Own television	4,703	0.783	0.412	0	1
Own refrigerator	4,705	0.423	0.494	0	1
Own private toilet with septic tank	4,705	0.648	0.478	0	1
Own stove	4,705	0.999	0.0357	0	1
Expenditures per capita in household (US dollars, monthly)	4,705	108.0	382.6	0	8,912
Total assets per capita in household (US dollars)	4,705	1,417	2,942	0	47,006
GRDP per capita in child's birth year at provincial level	4,705	7,498	6,790	3,296	37,600
Unemployment rate in child's birth year at provincial level	4,705	10.12	3.256	3.935	17.63

Note: Unemployment rates from 2005 to 2007 include two reports from February and August. The unemployment rates used in this study is the average of these monthly rates.

Table 2. Minimum wage effects on HAZ scores

	COEFFICIENTS							
VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Provincial MW	0.002**							
	(0.001)							
Provincial MW (t-1)		0.001						
		(0.001)						
Provincial MW (t-2)			0.000					
			(0.001)					
Log of Provincial MW				0.454				
				(0.534)				
National MW					0.002*			
					(0.001)			
National MW (t-1)						0.002*		
						(0.001)		
National MW (t-2)							0.001*	
							(0.000)	
Log of National MW								1.184
								(0.793)
Observations	4,228	4,225	4,221	4,228	4,233	4,233	4,233	4,233
R-squared	0.320	0.319	0.319	0.319	0.320	0.319	0.319	0.319

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The regressions control for province fixed effects, birth year fixed effect, and child's characteristics, which includes child’s age (in year), age squared, and gender. Standard errors are clustered at provincial level.

Table 3. Minimum wage effects on boy's HAZ scores

	COEFFICIENTS							
VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Provincial MW	-0.003							
	(0.006)							
Provincial MW (t-1)		-0.004						
		(0.008)						
Provincial MW (t-2)			-0.007					
			(0.006)					
Log of Provincial MW				4.246				
				(3.660)				
National MW					0.011**			
					(0.005)			
National MW (t-1)						0.005		
						(0.006)		
National MW (t-2)							-0.003	
							(0.004)	
Log of National MW								8.882**
								(3.580)
Observations	2,430	2,427	2,425	2,430	2,432	2,432	2,432	2,432
R-squared	0.792	0.792	0.792	0.792	0.793	0.793	0.793	0.793

Notes: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The regressions control for province fixed effects, birth year fixed effect, child's characteristics. Standard errors are clustered at provincial level.

Table 4. Minimum wage effects on HAZ by Father's salary

	COEFFICIENTS		
VARIABLES	Model 1	Model 2	Model 3
Provincial MW	0.003**	0.002*	0.002
	(0.001)	(0.001)	(0.001)
Observations	991	1,993	2,203
R-squared	0.385	0.371	0.292
Provincial MW (t-1)	0.003**	0.002**	-0.000
	(0.001)	(0.001)	(0.002)
Observations	991	1,993	2,200
R-squared	0.385	0.372	0.292
Provincial MW (t-2)	0.003**	0.003*	-0.000
	(0.001)	(0.001)	(0.002)
Observations	991	1,993	2,196
R-squared	0.385	0.372	0.292

Notes: Robust standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The regressions control for child characteristics with state and time fixed effects. Model 1 shows the coefficients from the sample restriction by the father's salary less than 25th percentile. Model 2 shows the coefficients from the sample restriction by the father's salary less than 50th percentile. Model 3 shows the results from the sample restriction by the father's salary greater than 50th percentile.

Table 5. Minimum wage effects on HAZ by Mother's salary

	COEFFICIENTS		
VARIABLES	Model 1	Model 2	Model 3
Provincial MW	0.005	0.003	0.002*
	(0.003)	(0.003)	(0.001)
Observations	332	628	3,577
R-squared	0.381	0.336	0.322
Provincial MW (t-1)	0.004	0.002	0.001
	(0.004)	(0.003)	(0.001)
Observations	332	628	3,574
R-squared	0.377	0.334	0.321
Provincial MW (t-2)	0.003	0.001	0.001
	(0.004)	(0.003)	(0.001)
Observations	331	627	3,571
R-squared	0.377	0.334	0.322

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The regressions control for child characteristics with state and time fixed effects. Model 1 shows the coefficients from the sample restriction by the mother's salary less than 25th percentile. Model 2 shows the coefficients from the sample restriction by the mother's salary less than 50th percentile. Model 3 shows the results from the sample restriction by the mother's salary greater than 50th percentile.

Table 6. Minimum wage effects on HAZ scores

	COEFFICIENTS							
VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Provincial MW	0.002**							
	(0.001)							
Provincial MW (t-1)		0.001						
		(0.001)						
Provincial MW (t-2)			0.001					
			(0.002)					
Log Provincial MW				0.449				
				(0.653)				
National MW					0.002*			
					(0.001)			
National MW (t-1)						0.002*		
						(0.001)		
National MW (t-2)							0.001	
							(0.000)	
Log National MW								1.208
								(0.791)
Mom's employment	-0.147	-0.147	-0.147	-0.147	-0.146	-0.150	-0.146	-0.146
	(0.107)	(0.107)	(0.106)	(0.107)	(0.107)	(0.107)	(0.106)	(0.106)
Mom's years of schooling	0.041***	0.042***	0.042***	0.041***	0.041***	0.041***	0.041***	0.041***
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Mom's age	0.057*	0.057*	0.057*	0.058*	0.057*	0.057*	0.057*	0.057*
	(0.032)	(0.031)	(0.032)	(0.031)	(0.031)	(0.031)	(0.032)	(0.031)
Mom's age squared	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Dad's employment	-0.589**	-0.587**	-0.582**	-0.600**	-0.608**	-0.595**	-0.599**	-0.608**
	(0.257)	(0.261)	(0.261)	(0.255)	(0.253)	(0.255)	(0.256)	(0.253)
Dad's years of schooling	0.022***	0.021***	0.021***	0.021***	0.022***	0.021***	0.021***	0.022***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Dad's age	-0.043	-0.044	-0.043	-0.044	-0.044	-0.044	-0.044	-0.043
	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)	(0.030)
Dad's age squared	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	4,005	4,003	4,001	4,005	4,008	4,008	4,008	4,008
R-squared	0.346	0.345	0.345	0.345	0.346	0.346	0.345	0.346

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at provincial level.

Table 7. Minimum wage effects on HAZ scores

	COEFFICIENTS							
VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Provincial MW	0.004***							
	(0.000)							
Provincial MW (t-1)		0.004***						
		(0.000)						
Provincial MW (t-2)			0.005***					
			(0.000)					
Log of Provincial MW				0.875***				
				(0.069)				
National MW					0.010***			
					(0.002)			
National MW (t-1)						0.007***		
						(0.001)		
National MW (t-2)							0.005***	
							(0.001)	
Log of National MW								7.290***
								(1.278)
Observations	4,228	4,225	4,221	4,228	4,233	4,233	4,233	4,233
R-squared	0.082	0.110	0.151	0.075	0.078	0.078	0.077	0.077

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The regressions control for province fixed effects, birth year fixed effect, child's characteristics, parental characteristics, and household-level characteristics. Standard errors are clustered at provincial level.

Table 8a. Minimum wage effects on HAZ scores

	COEFFICIENTS							
VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Provincial MW	0.002***							
	(0.000)							
Provincial MW (t-1)		0.003***						
		(0.000)						
Provincial MW (t-2)			0.005***					
			(0.000)					
Log of Provincial MW				0.503***				
				(0.149)				
National MW					0.008***			
					(0.001)			
National MW (t-1)						0.005***		
						(0.001)		
National MW (t-2)							0.003***	
							(0.001)	
Log of National MW								5.488***
								(1.383)
Observations	4,228	4,225	4,221	4,228	4,233	4,233	4,233	4,233
R-squared	0.099	0.117	0.151	0.099	0.120	0.107	0.098	0.116

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The regressions control for province fixed effects, birth year fixed effect, child's characteristics, parental characteristics, household-level characteristics, and provincial GRDP per capita in the child’s birth year as a measurement of community attributes. Standard errors are clustered at provincial level.

Table 8b. Minimum wage effects on HAZ scores

	COEFFICIENTS							
VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Provincial MW	0.003*** (0.000)							
Provincial MW (t-1)		0.004*** (0.000)						
Provincial MW (t-2)			0.005*** (0.000)					
Log of Provincial MW				0.647*** (0.154)				
National MW					0.008*** (0.002)			
National MW (t-1)						0.006*** (0.001)		
National MW (t-2)							0.004*** (0.001)	
Log of National MW								5.503*** (1.853)
Observations	4,228	4,225	4,221	4,228	4,233	4,233	4,233	4,233
R-squared	0.092	0.115	0.153	0.084	0.088	0.087	0.086	0.087

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The regressions control for province fixed effects, birth year fixed effect, child's characteristics, parental characteristics, household-level characteristics, and provincial unemployment rate from the year before the child's birth year as one of the community attributes. Standard errors are clustered at provincial level.

Table 9a. Minimum wage effects on HAZ scores by biological mothers

	COEFFICIENTS							
VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Provincial MW	0.003***							
	(0.000)							
Provincial MW (t-1)		0.003***						
		(0.000)						
Provincial MW (t-2)			0.006***					
			(0.001)					
Log of Provincial MW				0.583***				
				(0.103)				
National MW					0.009***			
					(0.001)			
National MW (t-1)						0.005***		
						(0.001)		
National MW (t-2)							0.003***	
							(0.001)	
Log of National MW								5.946***
								(0.798)
Observations	1,277	1,276	1,276	1,277	1,277	1,277	1,277	1,277
Number of mothers	690	689	689	690	690	690	690	690

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The regressions control for province fixed effects, birth year fixed effect, child's characteristics, parental characteristics, household-level characteristics, and provincial GRDP per capita in the child's birth year as a measurement of community attributes.

Table 9b. Minimum wage effects on HAZ scores by biological mothers

	COEFFICIENTS							
VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Provincial MW	0.003***							
	(0.000)							
Provincial MW (t-1)		0.003***						
		(0.000)						
Provincial MW (t-2)			0.005***					
			(0.000)					
Log of Provincial MW				0.624***				
				(0.114)				
National MW					0.008***			
					(0.001)			
National MW (t-1)						0.005***		
						(0.001)		
National MW (t-2)							0.003***	
							(0.001)	
Log of National MW								5.752***
								(0.951)
Observations	1,277	1,276	1,276	1,277	1,277	1,277	1,277	1,277
Number of mothers	690	689	689	690	690	690	690	690

Notes: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The regressions control for province fixed effects, birth year fixed effect, child's characteristics, parental characteristics, household-level characteristics, and provincial unemployment rate from the year before the child's birth year as one of the community attributes.

Figure 1

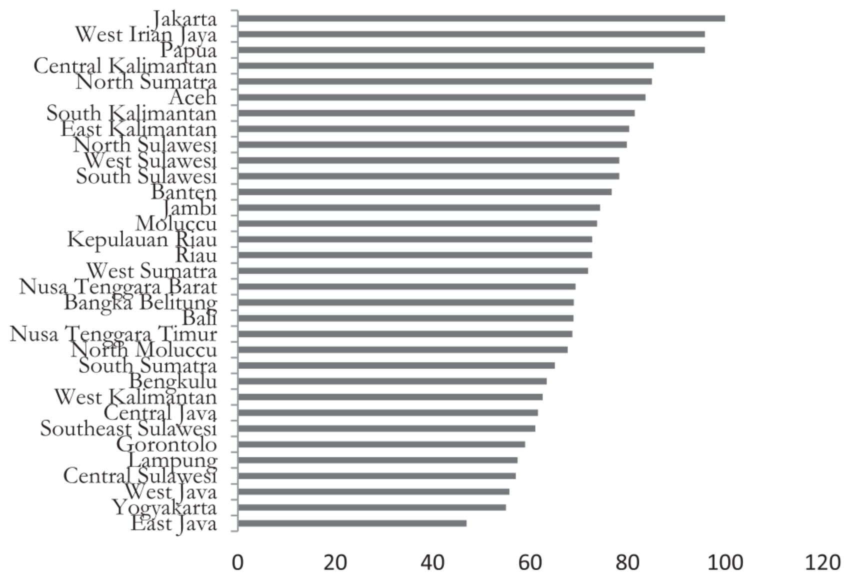


Fig. 1 Normalized real minimum wages across Indonesian provinces in 2006. Source: Indonesia Statistical Agency (BPS). Note: Real minimum wage in Jakarta normalized to 100

Figure 2

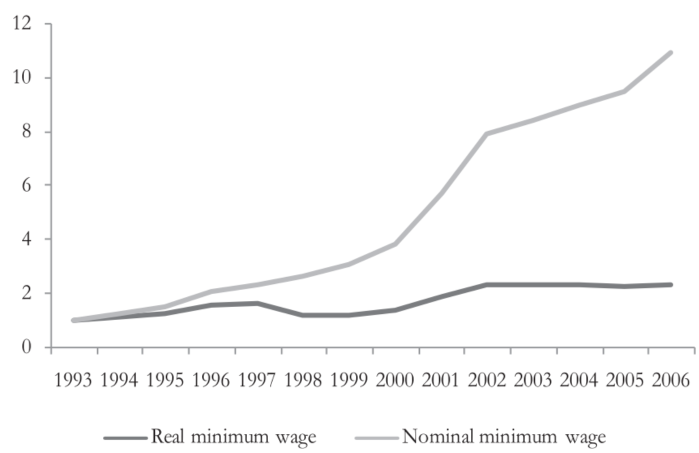


Fig. 2 Normalized nominal and real minimum wages in Jakarta, 1993–2006. Source: Indonesia Statistical Agency (BPS). Note: Nominal and real minimum wages in Jakarta in 1993 are normalized to 100

Figure 3

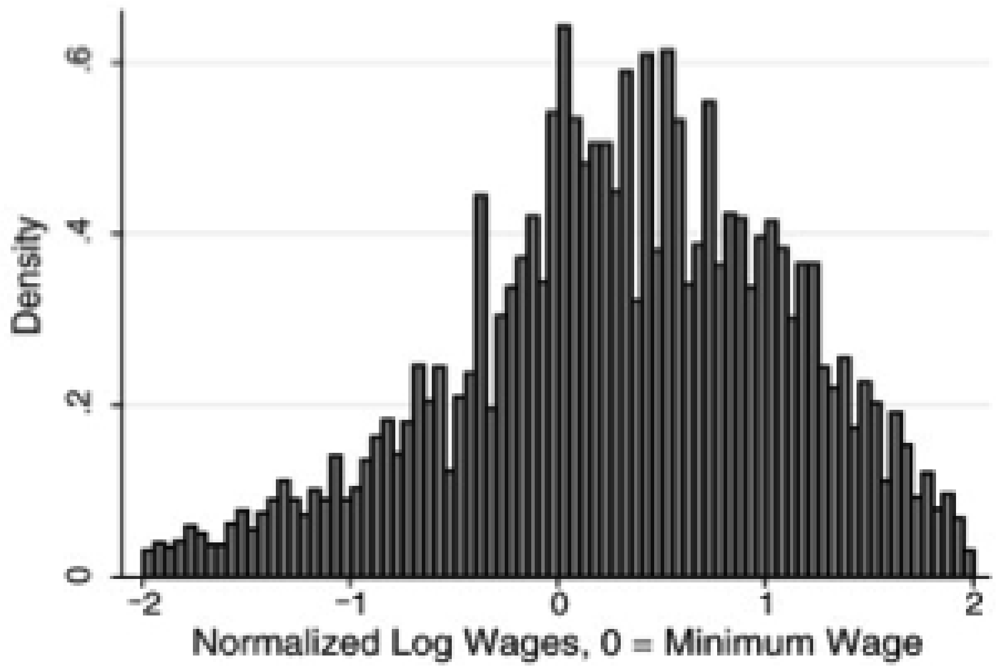


Figure 4

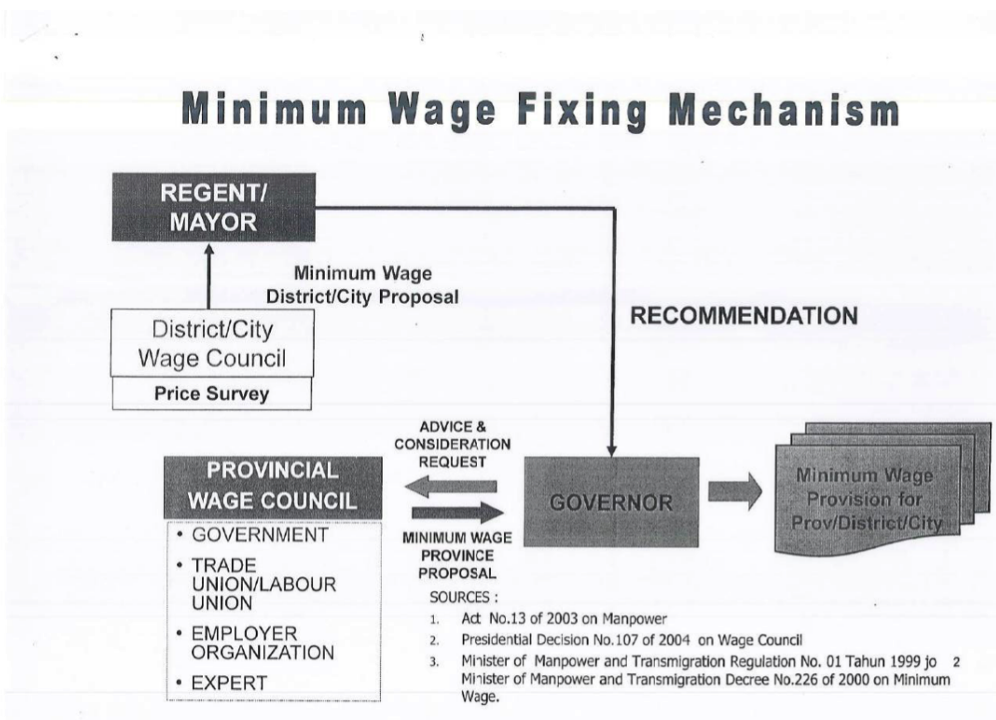
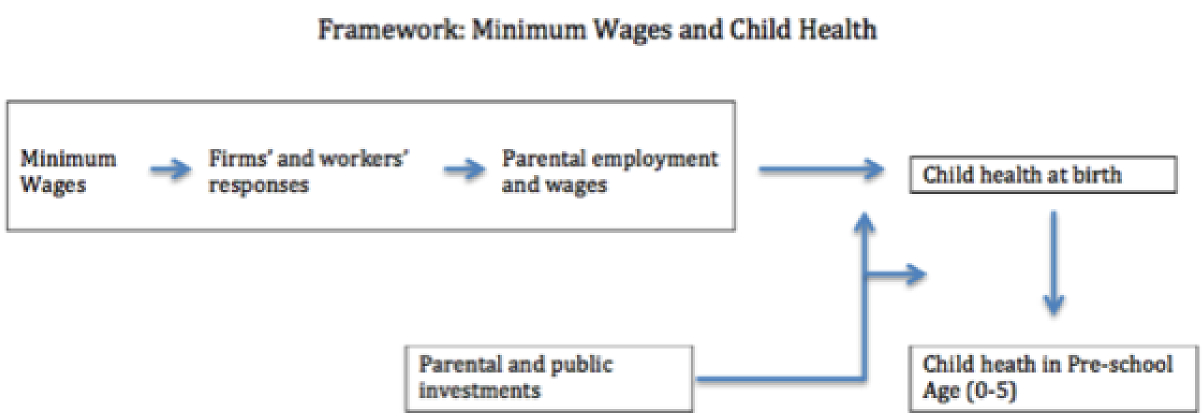


Figure 5



Framework: Minimum Wages and Child Health
Minimum Wages
Firms' and workers' responses
Parental employment and wages
Child health at birth
Parental and public investments
Child heath in Pre-school Age (0-5)

References

[1] Adair, Linda S., Caroline HD Fall, Clive Osmond, Aryeh D. Stein, Reynaldo Martorell, Manuel Ramirez-Zea, Harshpal Singh Sachdev et al. "Associations of linear growth and relative weight gain during early life with adult health and human capital in countries of low and middle income: findings from five birth cohort studies." The Lancet 382, no. 9891 (2013): 525-534.

[2] Alderman, Harold, John Hoddinott, and Bill Kinsey. "Long term consequences of early childhood malnutrition." Oxford economic papers 58, no. 3 (2006): 450-474.

[3] Almond, Douglas, and Janet Currie. "Killing me softly: The fetal origins hypothesis." The Journal of Economic Perspectives 25, no. 3 (2011): 153-172.

[4] Almond, Douglas, Janet Currie, and Valentina Duque. Childhood Circumstances and Adult Outcomes: Act II. No. w23017. National Bureau of Economic Research, 2017.

[5] Almond, Douglas, Hilary W. Hoynes, and Diane Whitmore Schanzenbach. "Inside the war on poverty: The impact of food stamps on birth outcomes." The Review of Economics and Statistics 93, no. 2 (2011): 387-403.

[6] Alatas, Vivi, and Lisa A. Cameron. "The impact of minimum wages on employment in a low-income country: a quasi-natural experiment in Indonesia." ILR Review 61, no. 2 (2008): 201-223.

[7] Baker Michael Stabile Mark , ? Determinants of Health in Childhood ,? in The Oxford Handbook of Health Economics , Glied SherrySmith Peter C. , eds. (New York : Oxford University Press , 2012).

[8] Banerjee, Rakesh, Majid Muhammad F. "Do parents neglect their sick babies?" Baker Institute Working Paper (2017)

[9] Barker, David James Purslove. "Fetal and infant origins of adult disease." British Medical Journal (1992).

[10] Barker, David J. "Fetal origins of coronary heart disease." BMJ: British Medical Journal 311, no. 6998 (1995): 171.

[11] Barker, David JP, Johan G. Eriksson, Tom ForsÃ©n, and Clive Osmond. "Fetal origins of adult disease: strength of effects and biological basis." International journal of epidemiology 31, no. 6 (2002): 1235-1239.

[12] Behrman, Jere R. and Mark R. Rosenzweig. ”Does Increasing Women's Schooling Raise the Schooling of the Next Generation?” American Economic Review 92, no. 1 (2002): 323-34.

[13] Behrman, Jere R., and Mark R. Rosenzweig. ”Returns to birthweight.” Review of Economics and statistics 86, no. 2 (2004): 586-601.

[14] Behrman, Jere R., Maria C. Calderon, Samuel H. Preston, John Hoddinott, Reynaldo Martorell, and Aryeh D. Stein. ”Nutritional supplementation in girls influences the growth of their children: prospective study in Guatemala.” The American journal of clinical nutrition 90, no. 5 (2009): 1372-1379.

[15] Behrman, Jere R., Robert A. Pollak, and Paul Taubman. ”Parental preferences and provision for progeny.” Journal of Political Economy 90, no. 1 (1982): 52-73.

[16] Behrman, Jere R. ”Nutrition, health, birth order and seasonality: Intrahousehold allocation among children in rural India.” Journal of Development Economics 28, no. 1 (1988): 43-62.

[17] Behrman, Jere R., Mark R. Rosenzweig, and Paul Taubman. ”Endowments and the allocation of schooling in the family and in the marriage market: the twins experiment.” Journal of political economy 102, no. 6 (1994): 1131-1174.

[18] Behrman, Jere R., Mark R. Rosenzweig, and Paul Taubman. ”Endowments and the allocation of schooling in the family and in the marriage market: the twins experiment.” Journal of political economy 102, no. 6 (1994): 1131-1174.

[19] Belman, Dale, and Paul J. Wolfson. What does the minimum wage do?. WE Upjohn Institute, 2014.

[20] Belman, Dale, Paul Wolfson, and Kritkorn Nawakitphaitoon. ”Who is affected by the minimum wage?.” Industrial Relations: A Journal of Economy and Society 54, no. 4 (2015): 582-621.

[21] Betcherman, Gordon. “Labor market institutions: A review of the literature.” World Bank Policy Research Working Paper No. 6276 (2012).

[22] Better Work Indonesia. “Legal Update #2, 2012: The Minimum Wage Issues in Indonesia.” Last modified December 13th, 2012. Accessed February 14th, 2016.

[23] Better Work Indonesia. “Legal Updates: Minimum Wages 2013”. Last modified April 12th, 2013. Accessed February 20th, 2016.

[24] Bhorat, Haroon. ”Compliance with minimum wage laws in developing countries.” IZA World of Labor (2014).

[25] Bhorat, Haroon, Ravi Kanbur, and Benjamin Stanwix. “Minimum Wages in Sub-Saharan Africa: A Primer.” The World Bank Research Observer 32, no. 1 (2017): 21-74.

[26] Bird, K. “Labour markets and regulation: international experience”, Presentation at the Conference on Indonesia?s Investment Climate sponsored the World Bank, Coordinating Ministry of Economic Affairs and Kadin (Indonesian Chamber of Commerce and Industry), Jakarta, November 2005. http://info.worldbank.org/etools/docs/library/205684/9%20Kelly%20Bird%20-%20Session%2010%20Labor.pdf

[27] Bird, Kelly, and Chris Manning. ”Minimum Wages and Poverty in a Developing Country: Simulations from Indonesia?s Household Survey.” (2005).

[28] Black, Robert E., Cesar G. Victora, Susan P. Walker, Zulfiqar A. Bhutta, Parul Christian, Mercedes De Onis, Majid Ezzati et al. ”Maternal and child undernutrition and overweight in low-income and middle-income countries.” The lancet 382, no. 9890 (2013): 427-451.

[29] Black, Maureen M., Susan P. Walker, Lia CH Fernald, Christopher T. Andersen, Ann M. DiGirolamo, Chunling Lu, Dana C. McCoy et al. ”Early childhood development coming of age: science through the life course.” The Lancet 389, no. 10064 (2017): 77-90.

[30] Card, David. ”Using regional variation in wages to measure the effects of the federal minimum wage.” ILR Review 46, no. 1 (1992): 22-37.

[31] Card, David, and Alan B. Krueger. ”Minimum wages and employment: a case study of the fast-food industry in New Jersey and Pennsylvania: reply.” The American Economic Review 90, no. 5 (2000): 1397-1420.

[32] Cesarini, David, Erik Lindqvist, Robert Ostling, and Bjorn Wallace. ”Wealth, health, and child development: Evidence from administrative data on Swedish lottery players.” The Quarterly Journal of Economics 131, no. 2 (2016): 687-738.

[33] Chandra, Amitabh, and Tom S. Vogl. “Rising up with shoe leather? A comment on Fair Society, Healthy Lives (the Marmot Review).” Social Science Medicine 71, no. 7 (2010): 1227-1230.

[34] Chun, Natalie, and Niny Khor. Minimum Wages and Changing Wage Inequality in Indonesia. No. 196. Asian Development Bank, 2010.

[35] Cunha, Flavio, James J. Heckman, Lance Lochner, and Dimitriy V. Masterov. "Interpreting the evidence on life cycle skill formation." Handbook of the Economics of Education 1 (2006): 697-812.

[36] Cunha, Flavio, James J. Heckman, and Susanne M. Schennach. "Estimating the technology of cognitive and noncognitive skill formation." Econometrica 78, no. 3 (2010): 883-931.

[37] Currie, Janet. "Healthy, wealthy, and wise: Is there a causal relationship between child health and human capital development?." Journal of Economic Literature 47, no. 1 (2009): 87-122.

[38] Currie, Janet, and Douglas Almond. "Human capital development before age five." Handbook of labor economics 4 (2011): 1315-1486.

[39] Currie, Janet, and Tom Vogl. "Early-life health and adult circumstance in developing countries." Annu. Rev. Econ. 5, no. 1 (2013): 1-36.

[40] Cutler David M. Lleras-Muney Adriana Vogl Tom , ? Socioeconomic Status and Health: Dimensions and Mechanisms ,? in The Oxford Handbook of Health Economics , Glied SherrySmith Peter C. , eds. (New York : Oxford University Press , 2012).

[41] David, H., Alan Manning, and Christopher L. Smith. "The contribution of the minimum wage to US wage inequality over three decades: a reassessment." American Economic Journal: Applied Economics 8, no. 1 (2016): 58-99.

[42] Deaton, Angus. "Policy implications of the gradient of health and wealth." Health affairs 21, no. 2 (2002): 13-30.

[43] De Onis, Mercedes, Monika BlÃ¶ssner, and Elaine Borghi. "Prevalence and trends of stunting among pre-school children, 1990â2020." Public health nutrition 15, no. 1 (2012): 142-148.

[44] Dube, Arindrajit, T. William Lester, and Michael Reich. "Minimum wage effects across state borders: Estimates using contiguous counties." The review of economics and statistics 92, no. 4 (2010): 945-964.

[45] Duc, Le Thuc and Jere R. Behrman. "Heterogeneity in Predictive Power of Early Childhood Nutritional Indicators for Mid-Childhood Outcomes: Evidence from Vietnam." Economics and Human Biology (2017).

[46] Elo, Irma T., and Samuel H. Preston. "Effects of early-life conditions on adult mortality: a review." Population index (1992): 186-212.

[47] Heckman, James J. "Skill formation and the economics of investing in disadvantaged children." Science 312, no. 5782 (2006): 1900-1902.

[48] Heijmans, Bastiaan T., Elmar W. Tobi, Aryeh D. Stein, Hein Putter, Gerard J. Blauw, Ezra S. Susser, P. Eline Slagboom, and L. H. Lumey. "Persistent epigenetic differences associated with prenatal exposure to famine in humans." Proceedings of the National Academy of Sciences 105, no. 44 (2008): 17046-17049.

[49] Hinke Kessler Scholder, Stephanie, George L. Wehby, Sarah Lewis, and Luisa Zuccolo. "Alcohol exposure in utero and child academic achievement." The Economic Journal 124, no. 576 (2014): 634-667.

[50] Hoddinott, John, Harold Alderman, Jere R. Behrman, Lawrence Haddad, and Susan Horton. "The Economic Rationale for Investing in Stunting Reduction." Maternal and Child Nutrition 9(Suppl. 2) (2013): 69-82. http://dx.doi.org/10.1111/mcn.12080

[51] Hoddinott, John, Jere R. Behrman, John A. Maluccio, Paul Melgar, Agnes R. Quisumbing, Manuel Ramirez-Zea, Aryeh D. Stein, Kathryn M. Yount, and Reynaldo Martorell. "Adult Consequences of Growth Failure in Early Childhood." The American Journal of Clinical Nutrition 98, no. 5 (2013): 1170-78.

[52] Hoddinott, John, John A. Maluccio, Jere R. Behrman, Rafael Flores, and Reynaldo Martorell. "Effect of a nutrition intervention during early childhood on economic productivity in Guatemalan adults." The Lancet 371, no. 9610 (2008): 411-416.

[53] Hohberg, Maike, and Jann Lay. "The impact of minimum wages on informal and formal labor market outcomes: evidence from Indonesia." IZA Journal of labor Development 4, no. 1 (2015): 14.

[54] Horn, Brady P., Johanna Catherine Maclean, and Michael R. Strain. "Do minimum wage increases influence worker health?." Economic Inquiry (2017).

[55] Islam, Iyantul, and Suahasil Nazara. Minimum wage and the welfare of Indonesian workers. Jakarta: ILO, 2000.

[56] Levine, David I. "Can wage increases pay for themselves? Tests with a productive function." The Economic Journal 102, no. 414 (1992): 1102-1115.

[57] Lu, Chunling, Maureen M. Black, and Linda M. Richter. "Risk of poor development in young children in low-income and middle-income countries: an estimation and analysis at the global, regional, and country level." The Lancet Global Health 4, no. 12 (2016): e916-e922.

[58] MaCurdy, Thomas. "How effective is the minimum wage at supporting the poor?." Journal of Political Economy 123, no. 2 (2015): 497-545..

[59] Majid, Muhammad Farhan, Jose M. Mendoza Rodriguez, Sam Harper, John Frank, and Arijit Nandi. "Do minimum wages improve early life health? Evidence from developing countries." Social Science Medicine 158 (2016): 105-113.

[60] Majid, Muhammad Farhan. "The persistent effects of in utero nutrition shocks over the life cycle: evidence from Ramadan fasting." Journal of Development Economics 117 (2015): 48-57.

[61] Majid, Muhammad F., Jere R. Behrman, Subha Mani. "The short and long-term distributional effects of in utero nutrition shocks over the life cycle: evidence from Ramadan fasting." Baker Institute for Public Policy. Mimeo, 2017

[62] Magruder, Jeremy R. "Can minimum wages cause a big push? Evidence from Indonesia." Journal of Development Economics 100, no. 1 (2013): 48-62.

[63] Maluccio, John A., John Hoddinott, Jere R. Behrman, Reynaldo Martorell, Agnes R. Quisumbing, and Aryeh D. Stein. "The impact of improving nutrition during early childhood on education among Guatemalan adults." The Economic Journal 119, no. 537 (2009): 734-763.

[64] Manning, Chris, and Kurnya Roesad. "The Manpower Law of 2003 and its implementing regulations: Genesis, key articles and potential impact." Bulletin of Indonesian Economical Studies 43, no. 1 (2007): 59-86. DOI: 10.1080/00074910701286396

[65] Meltzer, David O., and Zhuo Chen. "The impact of minimum wage rates on body weight in the United States." In Economic aspects of obesity, pp. 17-34. University of Chicago Press, 2011.

[66] Neumark, David, and William L. Wascher. Minimum wages. Cambridge, MA: MIT Press, 2010.

[67] Neumark, David, Mark Schweitzer, and William Wascher. "Minimum wage effects throughout the wage distribution." Journal of Human Resources 39, no. 2 (2004): 425-450.

[68] Neumark, David, and William Wascher. "Employment effects of minimum and subminimum wages: panel data on state minimum wage laws." ILR Review 46, no. 1 (1992): 55-81.

[69] National Institute of Child Health and Human Development. NICHD Research Priorities. Retrieved January 10, 2018, from: https://www.nichd.nih.gov/grants-contracts/research-areas/priorities.

[70] Ravelli, Anita CJ, Jan HP van der Meulen, R. P. J. Michels, Clive Osmond, David JP Barker, C. N. Hales, and Otto P. Bleker. "Glucose tolerance in adults after prenatal exposure to famine." The Lancet 351, no. 9097 (1998): 173-177.

[71] Richter, Linda M., Bernadette Daelmans, Joan Lombardi, Jody Heymann, Florencia Lopez Boo, Jere R. Behrman, Chunling Lu et al. "Investing in the foundation of sustainable development: pathways to scale up for early childhood development." The Lancet 389, no. 10064 (2017): 103-118.

[72] Rodriguez, Jose M.M, Kranz, Gabriella, Vincent, Ilona. Raub, Amy. Heymann, Jody, Nandi, Arijit. "Minimum Wage Policies To Support Women And Their Families In 121 Low-And Middle-Income Countries", Policy Report (2014), MachEquity, McGill University and World Policy Analysis Center, UCLA.

[73] Roseboom, Tessa J., Jan HP Van Der Meulen, Anita CJ Ravelli, Clive Osmond, David JP Barker, and Otto P. Bleker. "Effects of prenatal exposure to the Dutch famine on adult disease in later life: an overview." Molecular and cellular endocrinology 185, no. 1 (2001): 93-98.

[74] Schady, Norbert, Jere Behrman, Maria Caridad Araujo, Rodrigo Azuero, Raquel Bernal, David Bravo, Florencia Lopez-Boo et al. "Wealth gradients in early childhood cognitive development in five Latin American countries." Journal of Human Resources 50, no. 2 (2015): 446-463.

[75] Stein, Aryeh D., Henry S. Kahn, Andrew Rundle, Patricia A. Zybert, Karin van der Palâde Bruin, and L. H. Lumey. "Anthropometric measures in middle age after exposure to famine during gestation: evidence from the Dutch famine." The American journal of clinical nutrition 85, no. 3 (2007): 869-876.

[76] Stein, Aryeh D., Fernando C. Barros, Santosh K. Bhargava, Wei Hao, Bernardo L. Horta, Nanette Lee, Christopher W. Kuzawa et al. "Birth status, child growth, and adult outcomes in low-and middle-income countries." The Journal of pediatrics 163, no. 6 (2013): 1740-1746.

[77] UNICEF. "Improving child nutrition. The achievable imperative for global progress. 2013." New York: United Nations Childrenâs Fund, 2013.

[78] Wage Indicator Foundation. ?Minimum Wage in Indonesia ? FAQ?, accessed February 9th, 2016. http://www.wageindicator.org/main/salary/minimum-wage/indonesia/faqs-minimum-wages-in-indonesia

[79] Wehby, George, Dhaval Dave, and Robert Kaestner. Effects of the minimum wage on infant health. No. w22373. National Bureau of Economic Research, 2016.

[80] Widarti, Diah. Role of Minimum Wage in Informal Wage Determination in Indonesia. ILO, 2006.

[81] World Health Organization. WHO child growth standards: length/height for age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age, methods and development. World Health Organization, 2006.