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**Women's Empowerment and  
Child Mortality**

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# Women’s empowerment and child mortality<sup>‡</sup>

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## Abstract

This paper analyses effects of women’s empowerment on children’s health, in particular examining whether having more rights, and which rights, leads to improvements in the well-being of children, as reflected by child mortality rates. We distinguish between political rights, civil rights, and economic rights. In our sample of 134 countries over the period 1950-2018, the empowerment of women commonly contributes to a reduction in child mortality in the developed world, however less developed countries reveal striking differences across dimensions of empowerment. For example, while women’s participation in public administration or employment in the public sector is associated with reduced child mortality, the opposite effect is observed for economic rights such as the right to run a business or have access to banking; other rights show no significant association. Results suggest that strong institutions are needed to ensure rights are translated into better welfare.

**Keywords:** Women’s rights, empowerment, health, child mortality, institutions.

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# 1 Introduction

Gender inequality is one of the root causes of child mortality (UN, 2014). Women’s empowerment is often heralded as a core development objective and as the key to improving outcomes for the next generation, since women’s resources and opportunities shape those of their children (Heckert et al., 2019; Jones et al., 2019; World Bank, 2011; Duflo, 2003; Thomas, 1990). Promotion of gender equality is therefore seen as a potent means of improving human development in poor countries, and in particular, that empowering women should increase investment in children.

This paper examines the relation between women’s empowerment and child mortality. Does empowerment lead to a reduction in child mortality? While some evidence is suggestive of this (Besnier, 2020; Doku et al., 2020), an opposite effect may occur if, for example, the right to work, combined with poverty and lack of institutional support, forces women to spend less time on childcare (Makhlouf et al., 2017; Miller and Urdinola, 2010).<sup>1</sup> In this paper we cover, in a unified fashion, several dimensions of empowerment, distinguishing between rights, their realizations, and socio-economic contexts of empowerment and by doing so aim to show where a particular ‘empowerment’ is enough on its own or where further support from policymakers is required.

We focus on economic, political and civil rights and freedoms, covering legal protection and property rights, rights to work and earn money, political participation rights, among others. We therefore omit from the main analysis social (including right to health) and cultural (including right to education) rights.<sup>2</sup> While education and access to medical care are closely related to health, including child health (Sandiford et al., 1995; Diebolt and Perrin, 2013), our current interest is in a group of important rights that are less

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<sup>1</sup>In line with a more nuanced view, Hossain (2015) reports that women’s education and involvement in household decisions is negatively related to child mortality in Bangladesh, while employment increases mortality.

<sup>2</sup>This classification follows the International Covenant on Economic, Social and Cultural Rights (United Nations, 1966b), the Universal Declaration of Human Rights (United Nations, 1948) and the International Covenant on Civil and Political Rights (United Nations, 1966a).

commonly linked with health.<sup>3</sup> Recently, Burroway (2015) drew attention to land and property rights of women in developing countries, showing these negatively correlate with child mortality. Our objective is to examine whether a wide variety of women’s rights and their realizations help improve child health, and to what extent this relates to the socio-economic context. Of course, a focus on women’s rights is not new (e.g., Heaton et al., 2005; Koenen et al., 2006; Hossain, 2015; Heaton, 2015), with the literature showing *some* aspects of women’s empowerment may help improve child health. However, existing studies are to an extent disjoint, using different measures or aggregated indexes of rights on often non-overlapping sets of countries (the focus is usually on the developing world but country samples vary) and short time periods.<sup>4</sup> Moreover, studies like Makhoul et al. (2017), Jones et al. (2019), Tait et al. (2020), and Sha’ban et al. (2020) imply the effect of institutions, rights and various aspects of empowerment on child health may be very much contingent on the economic context; similarly, effects of the business dimension of women’s empowerment are contingent on economic conditions and national culture (Arnaboldi et al., 2020b,a). The above heterogeneity of samples, variation in measurements and short-termism impede obtaining an overarching perspective on the role the empowerment of women plays at different levels of economic development, and which aspects are most important for child health.

To offer such a perspective, we focus on both rights (declared) and their realizations (attained) in different economic conditions, considering in a disaggregated manner a wide range of rights for a large sample of 134 countries, including high income, and low and medium income countries, over almost seventy post-WWII years. For empowerment measures, we use data from the World Development Indicators (WDI) and the Varieties of Democracy project (V-Dem, VDEM, 2019); yet, unlike Besnier (2020), we employ, in addition to the aggregate index of political empowerment, five additional indexes for the dimensions of political, economic and social empowerment of women, as well as 22 underlying measures of various aspects of empowerment. We then estimate –

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<sup>3</sup>In a robustness check, later estimations include an index of access to public services, which includes social rights like access to security, education, and health.

<sup>4</sup>For a review, see Pratley (2016).

separately for each of these measures and controlling for standard macroeconomic and demographic factors, as well as urbanization, political corruption and health equality – the effect these aspects of empowerment have on child health. The latter is measured by the under-5 mortality rate from the global database of the UN Inter-agency Group for Child Mortality Estimation (UN IGME, You et al., 2015, 2010; Makhoul et al., 2017). Through this approach we obtain a common set of measures for a large sample of countries, enabling us to split the sample into low and medium income, and high-income, as well as into developing and developed countries, to address the hypothesized moderating role of socio-economic contexts. To the best of our knowledge, this is the first systematic comparison of women’s empowerment effects across these subsamples. We make a further contribution by extending the sample period back to 1950s, while other panel studies mainly start at 1990. Focusing on such a long period is important because the post-WWII period was crucial in terms of fostering women’s empowerment (e.g., Carmichael et al., 2014, highlight strong progress in reducing gender inequality in the past 60 years in most regions).<sup>5</sup>

Our primary result is that, on average, most considered measures of women’s empowerment reduce child mortality. This underscores the singular importance of women’s rights for children’s health. However, it is critical that while this result holds strongly for developed countries, the picture is more nuanced in a less developed country context. In low and medium income countries, while improvements in women’s political participation are associated with a reduction in child mortality, legal and civil rights show either nil or a mortality-increasing effect, and most economic rights are positively associated with child mortality (except for women’s access to state jobs). The latter finding is consonant with concerns raised in Miller and Urdinola (2010) and Makhoul et al. (2017) - the right to work, combined with economic hardship, long hours and consequent lack of childcare, may have an undesirable effect on child mortality; tellingly, it appears that having a state job, in contrast to working in the private sector, is free of this concern.

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<sup>5</sup>A popular view attributes the scale of empowerment changes, at least partially, to women’s increased labour force proportion during WWII - see McDermott (2018).

The same result holds if we split countries by criteria of economic development, instead of income per capita: the right to work is associated with increased child mortality in developing countries, except for employment in the state sector. Contrasting the almost uniformly significant mortality-reducing effect of *all* dimensions of empowerment in developed countries, these results emphasize the complex interaction between poverty and empowerment.<sup>6</sup>

The disaggregated perspective we take is enlightening on two levels. First, the many different measures of empowerment, classified into four groups of rights, typically produce consistent results within each group. It usefully follows that heterogeneity of empowerment measures is limited and confined to broader differences between the identified larger groups of rights. This gives an overarching structure to previous disjoint findings that focused on some specific rights or aggregated indexes. Second, along with the more straightforward dimensions of empowerment - including better access to health services and education - political empowerment appears of crucial importance in reducing child mortality; the likely mechanism is the ability of women to promote and support policies that protect child health. In contrast, in developing countries, individual economic freedoms have an opposite effect, unless jobs are in public administration. Taken as a whole, these observations emphasise the vital institutional role of the public sector as a transmission mechanism from women's empowerment to child health. This latter finding is novel and of crucial policy importance for less developed countries.

The UN 2030 Agenda for Sustainable Development (UN, 2015) stresses both the reduction in child mortality and the empowerment of women, in particular through rights to economic resources. Presently, a shocking 5 million children per year die globally within a year after birth (UN, 2021), with infant mortality rates in developing countries being up to 50 times higher than in the developed world.<sup>7</sup> Ultimately, our study demonstrates

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<sup>6</sup>Jones et al. (2019) come to a similar conclusion for child nutrition, suggesting that household resource constraints should be addressed in order to enable empowerment-based strategies to improve nutrition.

<sup>7</sup>World Bank estimates for 2019 give infant mortality of 1.7 and 2.0 per 1000 in San Marino and Iceland respectively, whereby the worst rates of 117 and 117.2 per 1000 are reported for Somalia and Nigeria.

the empowerment of women best goes hand in hand with the reduction of poverty and strengthening of institutions, when targeting vitally needed benefits for children and their health.

The rest of the paper is set out as follows. Section 2 further discusses the extant literature and, in that context, provides the hypotheses to be tested. Section 3 presents the data and methods, while Section 4 provides the empirical results and their interpretation. Finally, Section 5 concludes.

## **2 Literature Review and Hypotheses Development**

### **2.1 Civil rights**

We follow the International Covenant on Civil and Political Rights (United Nations, 1966a, Part III, Articles 6-27), which provides a separation between the two groups of rights in its very title. Although it does not offer explicit definitions to distinguish between the two, its structure helps identify civil rights as those referring to the general life and safety of a human-being, in contrast to political rights, which refer to the human-being's relation to the political life and administration in their country (see Section 2.2). The right to life, liberty, security, movement, justice, dignity, privacy, protection of family, as well as freedom from forced labor, torture, cruel treatment and discrimination are examples of civil rights (see Articles 6-17, 23-24, and 26-27 of the Covenant). In our study we focus, particularly, on women's freedom of domestic movement, freedom from forced labour, property rights, access to justice and access to public services.

As well as directly protecting health of mothers and children, empowerment of women through these rights may be beneficial indirectly. One potential mechanism is via increased self-esteem and bargaining power (Burroway, 2015), with women's ability to negotiate better conditions for themselves and their children contributing to improved child

well-being. This rests on the view, discussed in the previous section, that women are typically the primary care-takers and are more likely to invest resources in basic family needs (e.g., education, nutrition, and health). Using data for 75 developing countries for 2012, Burroway (2015) finds evidence that women’s land and property rights are associated with lower child mortality. While we cover property rights in Section 2.3 as relevant for economic activity, the argument of enhanced agency (derived from improved self-esteem and bargaining power) likely applies to civil rights.<sup>8</sup>

A consonant argument relies on women’s autonomy, which would increase through greater mobility, access to justice, and freedom from forced labor. Koenen et al. (2006) show that greater economic and social autonomy contributes to child well-being in the U.S. However, in developing world context, Mullany et al. (2005) and Thapa and Niehof (2013) find that greater autonomy for women reduced husbands’ participation in birth and health issues, suggesting an ambiguous effect on child health. Such evidence provides a *prima facie* rationale for why the nexus between women’s empowerment and child mortality may differ across levels of economic development.

## 2.2 Political rights

We classify rights covered by the International Covenant on Civil and Political Rights (United Nations, 1966a) as political if they do not fall under the definition of civil rights in Section 2.1. These include the right to freedom of thought, conscience and religion, to hold opinions and have freedom of expression, to enter associations and have peaceful assemblies, to vote and be elected, and to take part in public affairs (Articles 18-22, 25 of the Covenant). In what follows, we will distinguish between rights that refer to civil society participation, and those that refer to participation in political governance and public administration.

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<sup>8</sup>Of course, increased opportunity to bargain (as opposed to bargaining power) may not be beneficial to women and their children. Biasi and Sarsons (2021) find that the introduction of flexible pay for school teachers increased the gender wage gap: women engage less frequently in negotiations than men and even more so if they have to negotiate with a man. They suggest that unions might help ameliorate the wage gap.



### *2.3.1 Civil society participation*

Participation in civil society adds to women’s agency (Sundström et al., 2017). Within this dimension we include female suffrage, freedom of discussion of political issues for women and women’s representation in the print and broadcast media, women’s participation in civil society organisations (CSOs) and in the civil society overall, and women’s civil liberties. The key mechanism through which women’s empowerment in this context can aid child health, is by drawing attention and resources to child well-being via, for example, voting for relevant programs and parties. Indeed, extant research offers evidence of public spending on health being driven by female voters’ preferences (Miller, 2008; Koenen et al., 2006).

Other relevant work includes Boehmer and Williamson (1996), showing that the number of years women have had the right to vote commensurately reduces infant mortality rates in a sample of 96 less developed countries in 1990. Lott and Kenny (1999) find that women’s right to vote led to larger government spending and revenue in the U.S.<sup>9</sup> Miller (2008) relates U.S. state-level women’s suffrage laws introduced between 1869 and 1920 to shifts in the voting behavior of legislators, public health spending, and child mortality. This latter study stresses that the widening of suffrage brought the advances of the 19th century bacteriological revolution to children through immediate increases in public health spending and hygiene campaigns, leading to a significant fall in child mortality.

According to surveys of political attitudes, women are also more likely to support policies aimed at a reduction of gender inequities and improvements in social welfare (e.g., Gidengil, 1995; Pratto et al., 1997). These studies suggest women vote differently from men given (i) differences in risk aversion, which might imply women vote for insurance through government spending, (ii) differences in acquired skills, whereby women focus more on housekeeping and childcare, and need greater protection in case of a divorce, and (iii) differences in income, also dictating women might prefer greater protection

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<sup>9</sup>Incidentally, women’s suffrage also encouraged members of the House of Representatives, and the Senate, to vote more liberally (Lott and Kenny, 1999).

provided by the state.

Of course, aside from voting, attention to child well-being can be obtained by public discussion and other forms of activism. Doyle and Patel (2008) discuss the prominent role of civil society organizations (CSOs) in global health initiatives and promoting health interventions. Specifically, CSOs give voice to the concerns of people who otherwise happen to be marginalized in the political process. Given women's emphasis on child well-being, greater participation of women in CSOs could lead to more attention and funding directed at improving child health. As for public discussion, Wigley and Akkoyunlu-Wigley (2017) examine the impact of democracy and media freedom on child mortality in 168 countries over the period 1961-2011 period. They highlight the importance of media freedom in ensuring a more efficient allocation of resources to those in need through addressing two potential sources of imperfect information – the information available to the government and that available to citizens. Following this line of argument, we suggest that a greater proportion of female journalists coupled with their emphasis on child well-being should lead to both government and public being better informed about the rationale for child health policy interventions and influence the willingness and ability of the government to provide resources, which in turn should result in improved child mortality rates.

### *2.3.2 Political governance and public administration*

The political dimension of women empowerment represents women's right and participation in the political domain. Within this dimension we focus on such indicators as political power in hands of women, female heads of states and heads of government, lower chamber female legislators, lower chamber gender quota, and overall political participation of women. Much of the above argumentation on women's support of children-orientated policies applies if women are elected to government, law-making or public administration positions.

Indeed, extant research suggests increases in public spending on health may be driven

by women legislators (Koenen et al., 2006; Swiss, 2012; Homan, 2017; Quamruzzaman and Lange, 2016). In particular, Quamruzzaman and Lange (2016) examine the impact of female political representation in national parliaments on child health, using a set of low- and middle-income countries, over the period 2003 to 2012. They explore whether female political representatives are more likely to support policy benefiting child health, as they (i) experience gender inequities and are more likely to support policies that empower women, and (ii) bear the primary childcare responsibilities and are more concerned about policies that, directly or indirectly, benefit child health. Employing individual-level survey data on infant death and measles vaccination, they find that female political representation (measured by the percentage of seats in national parliaments held by women) benefits child health.

Other literature includes Koenen et al. (2006) showing that women's greater political participation (captured by an index including women's voter registration, women's voter turnout, women in elected office, and institutional resources available for women) is associated with a significantly lower percentage of low birthweight babies and lower teen birth rates (but not child mortality rates) in the U.S. in 2001. Homan (2017) finds that a higher proportion of women in state legislatures is associated with lower infant mortality rates in the U.S. from 1990 to 2012. Likewise, Boehmer and Williamson (1996) find that the percentage of parliamentary seats held by women is negatively associated with the infant mortality rate for a sample of 96 less developed countries in 1990. Swiss (2012) provides evidence, based on data from 102 developing countries from 1980 to 2005, that an increase in women's legislative representation improves child health, as measured by immunizations and child mortality rates.

An additional channel for women in government and public administration to positively influence child health is through the role-model effect (Quamruzzaman and Lange, 2016), whereby examples of women in the public square inspire other women to pursue similar roles. Moreover, Beaman et al. (2009) discuss that exposure to women policymakers weakens stereotypes about gender roles in the public and domestic spheres. Both

the ‘confidence’ and ‘stereotype-weakening’ effects can contribute to a greater role of women in public life and consequently, to the allocation of more resources towards child welfare.

## 2.3 Economic rights

We identify economic rights as those related to economic interactions. Again, this approach relies on official classifications such as the International Covenant on Economic, Social and Cultural Rights (United Nations, 1966b, Part III, Articles 6 - 15). Our focus is on property rights, access to state jobs and state business opportunities, access to financial services, such as the ability to open a bank account, ability to register a business, and labor market participation.

The economic aspect of women’s empowerment refers to women’s control over material resources (Pratley, 2016). Economic rights act directly by expanding the opportunities to earn income, which would have a positive effect on child health (e.g., Koenen et al., 2006). However, the well-being impact of this income channel may be countermanded by the effects of parents spending less time with children. In particular, there may again be differential effects between developing and developed countries, with (on average) greater poverty and less institutional support in the former, dictating that women who can work spend relatively less time with their children. In a single-country setting, Miller and Urdinola (2010) find that increased coffee prices encouraged parents to work more, leaving them less time to spend on relatively time-expensive health activities such as observing good hygiene, travelling to (perhaps distant) medical facilities and obtaining clean water.<sup>10</sup> In contrast and using multi-country approach, Quamruzzaman and Lange (2016) show that female labor force participation exerts a positive impact on child health.

This mixed empirical picture is likely a product of the complex environment of interrelationships affecting the economic rights-child health nexus. For example, larger extended

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<sup>10</sup>Indeed, Miller and Urdinola (2010) argue it is the relative price of health, rather than wealth, which is the more important determinant of mortality.

families in developing countries may mute the countermanding effect. Likewise, Makhoul et al. (2017) show countries with better institutions are able to ameliorate the effect of commodity price fluctuations on child mortality. Improved institutions also shown to reduce male infant mortality in Pongou et al. (2017). In contrast, the greater expense of professional childcare in developed countries may dampen the income channel. In a developed country context, a related strand of literature demonstrates the negative effects of having children on labor market outcomes, and in particular on careers, performance and earnings of women relative to men (Adda et al., 2017; Lundborg et al., 2017; Kleven et al., 2019, 2021).<sup>11</sup> These observations stress the trade-off between career and childcare. Interestingly, analysing survey data covering wage-employed and self-employed Americans, Gurley-Calvez et al. (2009) show that self-employed women work less and spend more time with children; the conclusion being that women are choosing self-employment to prioritise family over earnings. Finally, in a German context, Bauernschuster and Schlotter (2015) reveal that having access to public childcare increases maternal employment, further confirming the work-childcare trade-off.

## 2.4 Hypotheses

The above discussed child health effects of women’s empowerment through civil, political and economic rights are summarized in Table 1. Our first hypothesis originates from the discussion in subsection ?? that women place a greater weight on child health and welfare - specifically, we posit (**H1**): on average, women’s empowerment negatively affects the child mortality rate. Alongside this, the overall discussion in Section 2 frequently stresses potential differences between countries with high and low development, both economic and institutional. With this in mind, the hypothesis (**H1'**) is that the above aggregate effect is stronger (i.e., more negative) in developed and high-income countries than in developing and lower-income countries.

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<sup>11</sup>This literature operates with terms like child penalty (Kleven et al., 2019, 2021) or the cost of having children (Adda et al., 2017). Lundborg et al. (2017) demonstrate (using Danish data) that the causal effect of having children on earnings is negative, large, long-lasting, and driven by hourly earnings rather than by labor supply.

Table 1: Effects of women’s empowerment on child health (by dimension).

	Improves child health	Deteriorates child health
<b>Civil rights</b>	<ul style="list-style-type: none"> <li>• increased bargaining power</li> <li>• increased autonomy</li> </ul>	<ul style="list-style-type: none"> <li>• reduced male participation in birth and health issues</li> </ul>
<b>Political rights:</b> civil society	<ul style="list-style-type: none"> <li>• voice to promote allocation of resources</li> <li>• increased agency</li> </ul>	
<b>Political rights:</b> public administration	<ul style="list-style-type: none"> <li>• authority to allocate resources</li> <li>• role model</li> <li>• altering social norms / perceptions of women</li> </ul>	
<b>Economic rights</b>	<ul style="list-style-type: none"> <li>• control over material resources</li> <li>• increase in family resources</li> <li>• institutional support</li> </ul>	<ul style="list-style-type: none"> <li>• work-childcare tradeoff</li> <li>• lack of institutional support</li> </ul>

Our following hypotheses deal with the effects of specific groups of rights and their realizations. For example, given the discussion in subsection 2.1, the second hypothesis is posited as **(H2)**: stronger civil rights for women are negatively associated with the child mortality rate. Again, **(H2')**, the association is expected to be more negative in developed economies, as, for example, there may be more male participation in birth and health issues.

Subsection 2.2 implies two hypotheses. First, **(H3)**: stronger political rights for women, defined by their civil society participation, improve child health. Second, **(H4)**: stronger political rights of women, defined by their participation in public administration and government, improve child health. To underline again the difference between the two groups in terms of underlying mechanisms: while civil society participation offers an opportunity to voice child welfare issues and exert pressure, actual participation in public administration gives the power to allocate resources, offering more direct influence.

Finally, subsection 2.3 implies hypothesis **(H5)**: on average, stronger economic rights

reduce the child mortality rate. However, as with stronger civil rights, the effect of stronger economic rights is likely conditional on the level of development. Indeed, the countermanding impact of less parental time with children may even entirely outweigh any improvement in child health due to higher household income in developing countries, given greater poverty and less institutional support. In that case, we have (**H5'**) that stronger economic rights positively affect the child mortality rate in lower-income environments.

For convenience, the hypothesized effects of the rights and their realizations within each category are summarized in Table 2. As a preview, we also report here the estimated signs. In brief, our hypotheses are confirmed both at the level of the whole sample and reveal the striking difference between high income countries and the rest of the world in the directionality of estimated effects. Apart from directionality, our hypotheses also suggest differences in the magnitude of effects, which we present below in Section 4, along with the more detailed discussion of results.

### 3 Data and Methods

Our key objective is to estimate the impact of (various aspects of) women's empowerment on the child mortality rate. For the dependent variable, the under-5 mortality rate is perhaps most commonly used series in the relevant literature (e.g., Makhoul et al., 2017; Wigley, 2017) and we adopt the same practice. On the right-hand side, in addition to empowerment measures to which we return in a moment, controls include frequently employed variables such as GDP per capita, education, and demographic factors such as share of population under 5, share of population over 65 and population density (see, *inter alia*, Makhoul et al., 2017, and references therein). These are used in our benchmark regressions but in later robustness checks we also consider other factors such as urbanization, a health equality index and a political corruption index; these indices help capture the quality of institutions beyond that reflected in the developing/developed country divide.

Table 2: Determinants of under-5 mortality rate (expected vs estimated effect).

Aspects of empowerment	Expected effect	Estimated effect whole sample	Estimated effect low-to-middle income	Estimated effect high income
<b>Aggregate</b>				
Women political empowerment <b>index</b>	-	-	x	-
Exclusion by gender <b>index</b>	+	+	+	+
<b>Civil rights</b>				
Freedom of domestic movement	-	-	x	-
Freedom from forced labor	-	-	x	-
Access to justice	-	-	+	-
Access to public services	-	-	-	-
<b>Political rights: civil society</b>				
Female suffrage	-	x	x	-
Freedom of discussion	-	-	x	-
CSO participation	-	-	x	-
Civil liberties	-	-	x	-
Female journalists	-	-	x	-
Civil society participation <b>index</b>	-	-	x	-
<b>Political rights: public administration</b>				
~ Political power	-	-	-	-
~ HOS female	-	-	-	x
~ HOG female	-	-	-	x
~ Lower chamber female legislators	-	-	-	-
~ Lower chamber gender quota	-	-	-	-
<b>Political participation index</b>				
~ Political power	-	-	-	-
~ HOS female	-	-	-	x
~ HOG female	-	-	-	x
~ Lower chamber female legislators	-	-	-	-
~ Lower chamber gender quota	-	-	-	-
<b>Economic rights</b>				
Property rights	-/+	-	x	-
Access to state jobs	-/+	-	-	-
Access to state business opportunities	-/+	-	-	-
Access to banking	-/+	x	+	-
Ability to open business	-/+	x	+	-
~ Labor force female (%)	-/+	+	+	-
~ Labor force participation (% female 15+)	-/+	+	+	-
~ Female to male labor force (%)	-/+	+	+	-
Women Business & Law <b>index</b>	-/+	+	+	-

Note: "~" – measure of a realization of the right; "x" – insignificant effect; aggregate indexes highlighted in **bold**.



The empowerment measures are chosen to represent the earlier discussed dimensions of women’s empowerment as comprehensively as possible, subject to the usual constraint of data availability. Several measures similar to ours have been used in the context of child mortality research earlier, while others have not been used so far. For example, while Koenen et al. (2006) take account of access to certain public services such as medical care and education, and Boehmer and Williamson (1996) mention women’s autonomy in general, civil rights (and especially those beyond access to health and education) have not been examined before. With respect to civil society rights, female suffrage was covered by Miller (2008) for the U.S., and Boehmer and Williamson (1996) for developing countries, while other measures we use have lacked attention. As for the participation of women in public administration, previous literature only studied the percentage of female legislators: Koenen et al. (2006) and Homan (2017) for the U.S., Quamruzzaman and Lange (2016) and Boehmer and Williamson (1996) for less developed countries. Other measures that we use to represent this dimension of empowerment are new. Finally, out of economic rights we consider, only property rights (Burroway, 2015), business ownership (Koenen et al., 2006, for the U.S.), and labor market participation ((Koenen et al. (2006) for the U.S., and Boehmer and Williamson (1996), Swiss (2012), and Quamruzzaman and Lange (2016) for less developed countries) have been previously touched upon. As far as we know, our approach results in the largest collection of women’s empowerment measures employed in a paper, and offers an opportunity to directly judge on similarity of effects of different measures within each class of rights, differences between classes, and across samples of different economic development. Appendix A provides more details about variables, definitions and sources.

### **3.1 Data**

Data are compiled from several sources. For example, while the under-5 mortality rate is obtained from the United Nations Inter-Agency Group for Child Mortality Estimation (UN IGME), macroeconomic variables are from The Maddison Project Database,

which offers long-term comparative economic growth and income level data. Population composition data are from the UN Population division. Most empowerment measures come from the Varieties of Democracy (V-Dem) dataset VDEM (2019), with the exception of economic rights, where most measures are from World Development Indicators (WDI), the primary World Bank collection of development indicators based on officially recognized international sources.

The initial (unbalanced) panel contains data on 194 countries, but to obtain a balanced panel over the longest possible period (i.e., 1950-2018), our primary sample for analysis is reduced to 134 countries due to unavailability of some variables for some countries and subperiods, particularly the under-5 mortality rate, GDP per capita and education. This still obtains the largest panel employed to date to examine the child health - women's empowerment nexus.

Several of the hypotheses in subsection 2.4 emphasize the level of economic development as a moderating influence on the association between women's empowerment and child mortality. To allow for this we also create two subsamples: (i) high income countries and (ii) other countries (which includes low and middle income countries). The high income subsample includes 42, mainly developed countries, whilst the other subsample includes 92 countries, all classified as developing. The country list of the primary sample, as well as the high-income and low-to-middle income subsamples are in Appendix B.

Summary statistics for all variables are reported in Table 3. The two key aggregate measures of empowerment are the women political empowerment index (takes a higher value if women have the same civil liberties as men, are not prevented from participation in civil society organizations, and are represented in formal political positions) and exclusion by gender (takes a higher value if women, because of their gender, lack access to public services, state jobs, state business opportunities, if men dominate in political power and if women do not enjoy same civil liberties as men). The latter variable thus clearly captures a broader spectrum of activities beyond political life. Both range from 0 to 1, and in our sample take the mean values of 0.56 and 0.49 respectively.

Table 3: Summary statistics.

	Obs.	Mean	S.D	Min	Max
<b>Dependent variable</b>					
Under-5 mortality rate	10184	85.282	83.429	1.969	420.563
<b>Aggregate</b>					
Women political empowerment <b>index</b>	10969	0.562	0.246	0.035	0.976
Exclusion by gender <b>index</b>	11030	0.492	0.287	0.018	0.991
<b>Civil rights</b>					
Freedom of domestic movement	11251	0.406	1.421	-4.719	2.521
Freedom from forced labor	11251	0.577	1.227	-4.304	3.004
Access to justice	11251	0.306	1.461	-4.063	3.474
Access to public services	10948	0.087	1.370	-3.530	2.901
<b>Political rights: civil society</b>					
Female suffrage	11251	76.522	41.502	0.000	100.000
Freedom of discussion	11251	0.206	1.544	-3.586	3.322
CSO participation	11251	0.539	1.188	-3.628	2.519
Civil liberties	11251	0.562	0.288	0.000	0.982
~ Female journalists	11248	26.142	14.242	0.500	77.500
Civil society participation <b>index</b>	11251	0.535	0.264	0.009	0.962
<b>Political rights: public administration</b>					
~ Political power	11251	0.212	1.287	-2.840	3.720
~ HOS female	11194	0.041	0.199	0.000	1.000
~ HOG female	6440	0.030	0.171	0.000	1.000
~ Lower chamber female legislators	9577	10.798	10.676	0.000	63.750
~ Lower chamber gender quota	11141	0.288	0.926	0.000	4.000
Political participation <b>index</b>	10969	0.587	0.294	0.049	1.000
<b>Economic rights</b>					
Property rights	11251	0.540	1.410	-3.820	2.858
Access to state jobs	10941	0.539	1.336	-2.942	3.420
Access to state business opportunities	10915	0.098	1.348	-3.056	3.083
Access to banking	8500	0.893	0.309	0.000	1.000
Ability to open business	8500	0.905	0.293	0.000	1.000
~ Labor force female (%)	5119	40.309	9.746	7.678	56.031
~ Labor force participation (% female 15+)	5130	50.751	16.476	5.834	90.770
~ Female to male labor force (%)	5130	68.654	20.460	8.313	108.000
Women Business & Law <b>index</b>	5130	55.791	17.602	6.087	91.831
<b>Control variables</b>					
GDP pc	10600	9901.072	12648.52	0.000	156299.00
Education 15+	8880	5.886	3.492	0.040	13.610
Population under 5	11955	13.105	4.772	3.104	21.726
Population over 65	11955	6.171	4.346	0.686	28.003
Population density	11955	152.285	547.363	0.502	8291.919
Urban ratio	10282	48.560	24.591	2.077	100.000
Health equality	11251	0.150	1.570	-3.278	3.482
Political corruption <b>index</b>	11145	0.480	0.291	0.005	0.974

*Notes:* "~" – measure of a realization of the right; aggregate indexes highlighted in **bold**. Definitions of variables are in Appendix A.

## 3.2 Methods

We estimate the relationship between women’s empowerment measures and the child mortality rate using the following model:

$$M_{i,t}^{5-} = \beta_0 + \beta_1 W_{i,t} + \beta_2 X_{i,t} + \epsilon_{i,t} \quad (1)$$

where  $M_{i,t}^{5-}$  is the logarithm of under-5 mortality rate in country  $i$  at year  $t$ ,  $W_{i,t}$  is the logarithm of one of the 27 empowerment measures and  $X_{i,t}$  is the set of control variables, all per country  $i$  and year  $t$ . We include country fixed effects to capture time-invariant factors such as country size and geographical location, estimating model (1) for each empowerment factor separately to avoid potential multicollinearity. The fixed-effects regression is applied with Driscoll and Kraay (1998) standard errors that are robust to very general forms of cross-sectional and temporal dependence, as well as heteroscedasticity and autocorrelation. Of course, this approach addresses violations of the classical assumptions for the error term, but still assumes exogenous regressors. Thus, in later robustness tests, we follow Wigley (2017) by using the first lag of all regressors and also use an instrumental variables (IV) approach.

## 4 Empirical Results

For compactness, we only report the effects of the women’s empowerment measures and thus each upcoming results table represents 27 separate estimations of model (1) with controls included. Although we do not report effects of individual controls,<sup>12</sup> note the impact of our control variables is typically consistent with the literature. In particular, GDP per capita, seen as a key measure of development, has a negative and statistically significant effect, in line with other studies such as Pritchett and Summers (1996) and

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<sup>12</sup>Further results available on request from authors.

Wigley and Akkoyunlu-Wigley (2017). Education also has a negative and statistically significant effect, as expected, given education reduces child mortality in works like Gonzalez and Quast (2011) and Huebener (2019). In terms of demographic controls, the share of population under 5 has a positive impact whilst the share of population over 65 has a negative effect, with these two variables capturing the age of population (see Ruhm, 2000; Gonzalez and Quast, 2011). A higher proportion of the latter variable represents better health conditions, reducing child mortality. Finally, population density has a negative effect on child mortality given a greater scattering of people may increase the cost, as well as reduce the quality of providing public goods such as health care, education and sanitation (see Ross, 2006).

## 4.1 Benchmark results

Table 4 presents results for the whole sample, as well as for the two subsamples of low and middle income countries (LMIC) and high income countries (HIC) separately. Each line presents an estimate of  $\beta_1$  (in column "Coeff") in model (1) with the relevant explanatory variable,  $W_{i,t}$ , given in column "Aspects of empowerment". As noted in subsection 3.2, we employ a fixed-effect regression with the Driscoll-Kraay corrected standard errors. The dependent variable in all regressions is the logarithm of under-5 mortality rate, and explanatory variables are also in logarithms except for binary variables. Control variables include GDP per capita, education, share of population under 5, share of population over 65, and population density.

To begin, the results in Table 4 columns 2 and 3 show that **H1** is supported by the data. In particular, the statistically significant coefficients of -0.087 and 0.259 for the aggregate measures women political empowerment index and exclusion by gender index respectively, both demonstrate that, at a whole sample level, women's empowerment reduces child mortality. Results in these columns also demonstrate that **H2**, **H3** and **H4** are overwhelmingly supported and confirm that stronger civil, political (both civil society

and public administration) rights and realizations are negatively associated with the child mortality rate. However, it is worth noting that female suffrage is insignificant for the whole sample (differences between HIC and LMIC subsamples are discussed below). It is also important to consider that **H5** for economic rights and realizations is not always supported. In particular, while the sign and significance of property rights, access to state jobs, and access to state business opportunities indicate a child mortality reducing effect, this is not the case for access to banking and ability to open a business (both insignificant) and female labor force measures (significant and positive).

Table 4 also shows subsample results for LMIC (columns 5 and 6) and HIC (columns 8 and 9). **H1'** posits that improved empowerment reduces child mortality more in developed and high-income countries than in developing and lower-income countries. Again, the results clearly support this hypothesis with the women political empowerment index presenting coefficients of 0.019 (not significant) and -0.267, and exclusion by gender index showing 0.067 and 0.248 for LMIC and HIC respectively. This moderating effect of the level of economic development can be seen elsewhere; for example, hypothesis **H2'**, suggesting that the effect of stronger civil rights on child mortality fades in lower-income countries, is also supported. This can be observed in variables such as freedom of domestic movement, which is insignificant for LMIC but showing a significant (at the 1 percent level) coefficient of -7.597 for HIC.

The dichotomy between LMIC and HIC continues when examining political (civil society), political (civil society participation and public administration) and economic rights and realizations. Consider first that female suffrage is insignificant for LMIC but then presents a significant coefficient (at the 5 percent level) of -0.161 for HIC. The results for all other political (civil society) empowerment measures (e.g., freedom of discussion, CSO participation) demonstrate a similar pattern and suggest that such rights only have an effect when the level of economic development is high enough. On the other hand, stronger political (public administration) women's empowerment in LMIC typically reduces child mortality and sometimes with a greater effect than in HIC; for

example, when having a female Head of State (HOS) or Head of Government (HOG).

Turning to economic rights and realizations, earlier we posited (**H5'**) that stronger economic rights could even positively affect the child mortality rate in lower-income environments, if the effect of higher household income was outweighed by the impact of less parental time with children. Strikingly, (**H5'**) is supported for LMIC access to banking, ability to open a business and female labor force measures, that all present positive and significant (at the 1 percent level) coefficients. These can be contrasted with access to state jobs and access to state business opportunities, that exhibit strong child-mortality reducing effects in the LMIC-subsample, suggesting conditions of employment/contracts with state institutions favor the flexibility and provision that supports childcare. Finally, despite the mixed picture for LMIC, all the economic measures show greater empowerment in HIC improves child health.

Along with the classification of countries by income per capita, another widely used classification refers to the overall level of development. While the two classifications overlap to a large extent, the LMIC-HIC split only accounts for gross national income per capita, while the developed/developing classification (we use the World Economic Situation and Prospect, WESP, definition) focuses on economic growth rates, and as such also captures the development of the industrial (final product) sector and the human capital development, for example.<sup>13</sup> To pick up possible effects of industrial and human capital development, we now estimate (1), as above, separately for developed and developing countries.

Results in Table 5 are essentially the same as those in the previous estimates: most indicators (except for access to justice and HOG female) produce effects robust to the classification of countries.

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<sup>13</sup>WESP classifies all countries of the world into one of three broad categories: developed economies, economies in transition and developing economies. The composition of these analytical groupings is intended to reflect basic economic conditions (mainly economic growth).

Table 4: Women's empowerment: effects on under-5 mortality rate, 1950-2018.

Aspects of empowerment, $W_{i,t}$ in eq. (1)	Whole sample			LMIC subsample			HIC subsample		
	Coeff	t-stat	Obs./N	Coeff	t-stat	Obs./N	Coeff	t-stat	Obs./N
<b>Aggregate</b>									
Women political empowerment index	-0.087**	(-2.46)	7673/134	0.019	(0.51)	5148/92	-0.267***	(-3.96)	2525/42
Exclusion by gender index	0.259***	(13.64)	7798/134	0.067**	(2.57)	5207/92	0.248***	(13.58)	2591/42
<b>Civil rights</b>									
Freedom of domestic movement	-2.518**	(-2.36)	7798/134	1.940	(1.34)	5207/92	-7.597***	(-5.50)	2591/42
Freedom from forced labor	-3.640***	(-3.41)	7798/134	-0.199	(-0.15)	5207/92	-10.065***	(-7.01)	2591/42
Access to justice	-3.872***	(-4.04)	7798/134	2.742**	(2.04)	5207/92	-6.442***	(-4.75)	2591/42
Access to public services	-10.742***	(-6.44)	7735/133	-3.531*	(-1.91)	5144/91	-9.284***	(-6.63)	2591/42
<b>Political Rights: civil society</b>									
Female suffrage	-0.016	(-0.72)	7798/134	-0.015	(-0.64)	5207/92	-0.161**	(-2.55)	2591/42
Freedom of discussion	-2.679***	(-3.40)	7798/134	0.761	(0.85)	5207/92	-5.014***	(-6.65)	2591/42
CSO participation	-5.655***	(-4.08)	7798/134	0.730	(0.44)	5207/92	-9.437***	(-6.39)	2591/42
Civil liberties	-12.442***	(-10.86)	7798/134	-2.227	(-1.62)	5207/92	-14.307***	(-11.35)	2591/42
~ Female journalists	-0.205***	(-5.90)	7795/134	-0.052	(-1.49)	5204/92	-0.357***	(-11.22)	2591/42
Civil society participation index	-0.061**	(-2.16)	7798/134	0.003	(0.10)	5207/92	-0.110**	(-2.56)	2591/42
<b>Political Rights: public administration</b>									
~ Political power	-7.812***	(-5.57)	7798/134	0.063	(0.05)	5207/92	-11.628***	(-5.75)	2591/42
~ HOS female	-0.107***	(-4.74)	7744/134	-0.124***	(-4.26)	5207/92	-0.030	(-0.89)	2537/42
~ HOG female	-0.064***	(-3.33)	4529/112	-0.048**	(-2.06)	2531/76	-0.054	(-1.68)	1998/36
~ Lower chamber female legislators	-1.333***	(-9.55)	6939/134	-0.767***	(-3.98)	4459/92	-1.685***	(-9.52)	2480/42
~ Lower chamber gender quota	-0.034***	(-4.52)	7798/134	-0.027***	(-4.20)	5207/92	-0.076***	(-5.78)	2591/42
Political participation index	-0.053***	(-2.94)	7673/134	-0.005	(-0.25)	5148/92	-0.116***	(-3.07)	2525/42
<b>Economic rights</b>									
Property rights	-4.589***	(-3.29)	7798/134	1.364	(0.68)	5207/92	-13.739***	(-6.54)	2591/42
Access to state jobs	-12.826***	(-10.65)	7715/133	-3.788***	(-4.14)	5144/91	-16.340***	(-9.30)	2571/42
Access to state business opportunities	-13.216***	(-8.64)	7699/134	-5.679***	(-4.76)	5187/92	-16.221***	(-10.51)	2512/42
Access to banking	0.055	(1.49)	6112/132	0.131***	(8.46)	4162/90	-0.191**	(-2.11)	1950/42
Ability to open business	-0.009	(-0.25)	6112/132	0.047**	(2.43)	4162/90	-0.191**	(-2.11)	1950/42
~ Labor force female (%)	0.280***	(6.13)	3818/132	0.419***	(7.55)	2639/91	-0.229***	(-3.21)	1179/41
~ Labor force participation (% female 15+)	0.593***	(8.44)	3818/132	0.742***	(11.67)	2639/91	-0.484***	(-9.09)	1179/41
~ Female to male labor force (%)	0.382***	(6.82)	3818/132	0.639***	(12.10)	2639/91	-0.490***	(-13.08)	1179/41
Women Business & Law index	0.160***	(4.27)	3818/132	0.371***	(7.07)	2639/91	-0.376***	(-3.77)	1179/41

Notes: \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01. Obs./N = number of observations / number of countries in the sample.



Table 5: Women's empowerment: effects on under-5 mortality rate, 1950-2018 - developing vs developed countries.

Aspects of empowerment, $W_{i,t}$ in eq. (1)	Developing			Developed		
	Coeff	t-stat	Obs./N	Coeff	t-stat	Obs./N
<b>Aggregate</b>						
Women political empowerment <b>index</b>	0.000	0.000	5601/100	-0.322***	(-5.22)	2072/34
Exclusion by gender <b>index</b>	0.068***	-3.38	5724/100	0.295***	-12.68	2074/34
<b>Civil rights</b>						
Freedom of domestic movement	0.993	-0.69	5724/100	-2.172**	(-2.61)	2074/34
Freedom from forced labor	-0.892	(-0.79)	5724/100	-1.29	(-0.65)	2074/34
Access to justice	1.381	-1.04	5724/100	-5.135***	(-4.37)	2074/34
Access to public services	-3.095*	(-1.76)	5661/99	-17.488***	(-9.27)	2074/34
<b>Political Rights: civil society</b>						
Female suffrage	-0.032	(-1.50)	5724/100	-0.115	(-1.46)	2074/34
Freedom of discussion	0.103	-0.11	5724/100	-2.222**	(-2.38)	2074/34
CSO participation	0.471	-0.31	5724/100	-10.979***	(-7.65)	2074/34
Civil liberties	-3.299***	(-2.97)	5724/100	-14.710***	(-10.13)	2074/34
~ Female journalists	-0.053*	(-1.73)	5721/100	-0.387***	(-10.16)	2074/34
Civil society participation <b>index</b>	0.005	-0.18	5724/100	-0.191***	(-4.86)	2074/34
<b>Political Rights: public administration</b>						
~ Political power	0.359	0.28	5724/100	-14.967***	(-8.88)	2074/34
~ HOS female	-0.097***	(-3.93)	5709/100	-0.021	(-0.74)	2035/34
~ HOG female	-0.024	(-1.14)	2761/81	-0.036	(-1.36)	1768/31
~ Lower chamber female legislators	-0.815***	(-4.72)	4878/100	-1.466***	(-9.04)	2061/34
~ Lower chamber gender quota	-0.029***	(-3.53)	5724/100	-0.042***	(-3.30)	2074/34
Political participation <b>index</b>	-0.017	(-0.88)	5601/100	-0.260***	(-6.16)	2072/34
<b>Economic rights</b>						
Property rights	-0.206	(-0.12)	5724/100	-9.188***	(-7.83)	2074/34
Access to state jobs	-4.884***	(-5.02)	5661/99	-19.953***	(-11.78)	2054/34
Access to state business opportunities	-6.565***	(-5.62)	5665/100	-20.502***	(-7.85)	2034/34
Access to banking	0.113***	-5.6	4552/98	-0.241***	(-4.83)	1560/34
Ability to open business	0.027	-1.27	4552/98	-0.241***	(-4.83)	1560/34
~ Labor force female (%)	0.391***	-8.61	2842/98	-0.347***	(-3.45)	976/34
~ Labor force participation (% female 15+)	0.639***	-11.11	2842/98	-0.491***	(-3.62)	976/34
~ Female to male labor force (%)	0.591***	-13.28	2842/98	-0.445***	(-6.66)	976/34
Women Business & Law <b>index</b>	0.357***	-8.07	2842/98	-0.404***	(-3.47)	976/34

Notes: \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01. Obs./N = number of observations / number of countries in the sample.

## 4.2 Robustness

As a next step, we test (1) with additional controls: urban ratio, health equality index, and political corruption index, on top of our benchmark control variables. In doing so, we follow the literature suggesting that the quality of institutions helps control for those time-varying factors that might capture additional effects of political interventions beyond those already captured by interventions such as improvements in health and education and embedded in the traditional controls we use in (1) (see a discussion of institutional factors contained in Ross, 2006; Makhoul et al., 2017; Wigley and Akkoyunlu-Wigley, 2017, for example). In our analysis these additional institutional effects are captured by political corruption and urban population ratio variables. For the same purpose, we also employ the health equality index that reflects the availability of high quality basic healthcare to everyone.<sup>14</sup>

Table 6 reports results for the whole sample, and the LMIC and HIC subsamples. Adding institutional controls does not substantially change results for the whole sample (except for access to banking, which now has a weakly significant and positive effect), nor on the HIC subsample (where having a female HOG now shows a [weakly] significant child mortality reducing effect, whereby political power and female labor force become insignificant). The majority of changes occur in the LMIC subsample, which speaks in favor of the argument that institutions matter. Strikingly, controlling for institutions reveals a [weakly] significant child-mortality reducing effect of the aggregate women political empowerment index. Furthermore, most other changes reveal significant and higher-magnitude effects for variables (freedom from forced labor, female suffrage, civil liberties, number of female journalists, and political participation index) after controlling for institutions, and these effects are in the child-mortality reducing direction, or making the previously detected mortality-increasing effect insignificant (access to justice).<sup>15</sup> The

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<sup>14</sup>Other measures of the quality of healthcare are also used in the literature, such as government expenditure on the health sector and number of doctors per 1000 residents, however, the data on these variables is limited. The health equality index we use not only measures the quality of health services but also the distribution of these services.

<sup>15</sup>The latter result indicates, in particular, that the mortality-increasing effect of access to justice for

Table 6: Women's empowerment: effects on under-5 mortality rate, 1950-2018 - with added controls.

Aspects of empowerment, $W_{i,t}$ in eq. (1)	Full sample			LMIC subsample			HIC subsample		
	Coeff	t-stat	Obs./N	Coeff	t-stat	Obs./N	Coeff	t-stat	Obs./N
<b>Aggregate</b>									
Women political empowerment index	-0.144***	(-3.89)	7034/133	-0.054*	(-1.81)	4802/91	-0.340***	(-3.32)	2232/42
Exclusion by gender index	0.302***	-15.05	7118/133	0.149***	-4.67	4836/91	0.270***	-13.2	2282/42
<b>Civil rights</b>									
Freedom of domestic movement	-3.762***	(-3.50)	7118/133	0.337	-0.31	4836/91	-9.517***	(-5.61)	2282/42
Freedom from forced labor	-6.396***	(-7.31)	7118/133	-2.782***	(-2.87)	4836/91	-13.102***	(-10.44)	2282/42
Access to justice	-4.748***	(-3.61)	7118/133	0.375	-0.37	4836/91	-5.988***	(-3.23)	2282/42
Access to public services	-14.119***	(-5.98)	7059/132	-8.922***	(-3.44)	4777/90	-10.913***	(-5.04)	2282/42
<b>Political Rights: civil society</b>									
Female suffrage	-0.024	(-1.39)	7118/133	-0.033**	(-1.99)	4836/91	-0.264**	(-2.63)	2282/42
Freedom of discussion	-3.302***	(-4.22)	7118/133	-0.503	(-0.64)	4836/91	-4.978***	(-4.86)	2282/42
CSO participation	-6.762***	(-4.21)	7118/133	-1.489	(-0.94)	4836/91	-11.885***	(-5.82)	2282/42
Civil liberties	-14.465***	(-7.53)	7118/133	-5.942***	(-2.97)	4836/91	-15.013***	(-8.78)	2282/42
~ Female journalists	-0.272***	(-7.81)	7115/133	-0.132***	(-4.11)	4833/91	-0.389***	(-9.29)	2282/42
Civil society participation index	-0.089***	(-2.85)	7118/133	-0.034	(-1.21)	4836/91	-0.201***	(-3.31)	2282/42
<b>Political Rights: public administration</b>									
~ Political power	-9.009***	(-5.30)	7118/133	-2.580***	(-3.30)	4836/91	-12.219***	(-4.76)	2282/42
~ HOS female	-0.071***	(-3.48)	7082/133	-0.114***	(-3.40)	4836/91	-0.002	(-0.08)	2246/42
~ HOG female	-0.057***	(-2.93)	4121/111	-0.031	(-1.20)	2349/75	-0.054*	(-1.78)	1772/36
~ Lower chamber female legislators	-1.333***	(-9.12)	6356/133	-0.940***	(-5.14)	4169/91	-1.576***	(-7.77)	2187/42
~ Lower chamber gender quota	-0.040***	(-6.12)	7118/133	-0.035***	(-6.22)	4836/91	-0.068***	(-5.63)	2282/42
Political participation index	-0.073***	(-3.72)	7034/133	-0.054***	(-4.26)	4802/91	-0.106*	(-1.87)	2232/42
<b>Economic rights</b>									
Property rights	-7.727***	(-5.10)	7118/133	-2.284	(-1.30)	4836/91	-14.833***	(-6.79)	2282/42
Access to state jobs	-16.550***	(-11.77)	7049/132	-6.804***	(-6.28)	4777/90	-20.927***	(-12.83)	2272/42
Access to state business opportunities	-16.653***	(-8.99)	7048/133	-9.753***	(-5.21)	4826/91	-18.046***	(-8.13)	2222/42
Access to banking	0.064*	-1.76	6112/132	0.127***	-7.89	4162/90	-0.180*	(-1.83)	1950/42
Ability to open business	-0.006	(-0.16)	6112/132	0.044*	-1.94	4162/90	-0.180*	(-1.83)	1950/42
~ Labor force female (%)	0.246***	-6.73	3818/132	0.379***	-7.45	2639/91	-0.119	(-1.54)	1179/41
~ Labor force participation (% female 15+)	0.544***	-13.23	3818/132	0.693***	-14.42	2639/91	-0.304***	(-6.43)	1179/41
~ Female to male labor force (%)	0.353***	-10.54	3818/132	0.602***	-12.13	2639/91	-0.373***	(-10.54)	1179/41
Women Business & Law index	0.133***	-3.93	3818/132	0.331***	-6.66	2639/91	-0.251**	(-2.69)	1179/41

Notes: \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01. Obs./N = number of observations / number of countries in the sample.

not so good news is that observed mortality-increasing effects of most economic rights in the LMIC subsample are robust to the inclusion of additional controls. This is consistent with the work-childcare trade-off that we have identified as a key channel through which economic rights can adversely affect child health. Fighting corruption, urban life and health equality do not solve the problem of the work-childcare trade-off. Finally, in Appendix C we report further robustness checks, including using an IV approach to address any potential endogeneity.

## 5 Conclusions

Our objective is to investigate the effects of women’s empowerment on child mortality, complementing previous research that has mostly focused on the linkages between health rights, education rights and child welfare. Theoretical considerations suggest women’s empowerment may act towards reducing child mortality by adding extra income opportunity, confidence, within-family and extra-family bargaining power, political influence and by increasing public resources directed towards child health. Against these positive effects, the trade-off between childcare and the time spent on other activities (e.g., paid employment) may provide a negative association. We argue that the net effect of the two countermanding forces depends on the level of economic and institutional development of a country.

Employing a new international dataset with 27 women’s empowerment measures, empirical results overwhelmingly support the institutional view: most empowerment indicators help reduce child mortality in developed (high-income) countries, yet in the developing world many measures either show nil or an opposite effect. This novel conclusion derives from the comparison of the aforementioned effects on a comprehensive scale and at different levels of development, a combination missing from previous studies.

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women was mainly due to observations that lack good institutions. The role of institutions is further emphasized by the disappearance of the mortality-reducing effect of female heads of government, which is most likely because having a female HoG per se indicates strong institutions, hence controlling for the latter removes the effect of the former.

Our findings imply that the crucial fostering of women’s empowerment should go hand in hand with the development of institutions that provide, for example, public childcare services and other support for mothers. Moreover, a promising direction would be education directed at fathers and broader families to change current cultural norms and habits - the further empowerment of women, and the concomitant improvement in child health, would also include freedom from the pressures exerted by such informal institutions. More research is needed in this direction.

## References

- Adda, J., C. Dustmann, and K. Stevens (2017). The career costs of children. *Journal of Political Economy* 125(2), 293–337.
- Arnaboldi, F., B. Casu, E. Kalotychou, and A. Sarkisyan (2020a). Board diversity reforms: Do they matter for EU bank performance? *European Financial Management* 26(2), 416–454.
- Arnaboldi, F., B. Casu, E. Kalotychou, and A. Sarkisyan (2020b). The performance effects of board heterogeneity: What works for EU banks? *The European Journal of Finance* 26(10), 897–924.
- Bauernschuster, S. and M. Schlotter (2015). Public child care and mothers’ labor supply—evidence from two quasi-experiments. *Journal of Public Economics* 123, 1–16.
- Beaman, L., R. Chattopadhyay, E. Duflo, R. Pande, and P. Topalova (2009). Powerful women: Does exposure reduce bias? *The Quarterly Journal of Economics* 124(4), 1497–1540.
- Besnier, E. (2020). Women’s political empowerment and child health in the sustainable development era: A global empirical analysis (1990–2016). *Global Public Health*. doi.org/10.1080/17441692.2020.1849348.

- Biasi, B. and H. Sarsons (2021). Flexible wages, bargaining, and the gender gap. *The Quarterly Journal of Economics* 137(1), 215–266.
- Boehmer, U. and J. B. Williamson (1996). The impact of women’s status on infant mortality rate: A cross-national analysis. *Social Indicators Research* 37(3), 333–360.
- Burroway, R. (2015). Women’s rights save lives: A cross-national analysis of infant and child mortality and women’s access to land, property, and loans in developing countries. *Sociology of Development* 1(4), 418–441.
- Carmichael, S., S. Dili, and A. Rijpma (2014). *Gender inequality since 1820*. doi.org/10.1787/9789264214262-16-en.
- Diebolt, C. and F. Perrin (2013). From stagnation to sustained growth: The role of female empowerment. *American Economic Review* 103(3), 545–49.
- Doku, D. T., Z. A. Bhutta, and S. Neupane (2020). Associations of women’s empowerment with neonatal, infant and under-5 mortality in low-and/middle-income countries: Meta-analysis of individual participant data from 59 countries. *BMJ Global Health* 5(1), e001558.
- Doyle, C. and P. Patel (2008). Civil society organisations and global health initiatives: Problems of legitimacy. *Social Science & Medicine* 66(9), 1928–1938.
- Driscoll, J. C. and A. C. Kraay (1998). Consistent covariance matrix estimation with spatially dependent panel data. *Review of Economics and Statistics* 80(4), 549–560.
- Duflo, E. (2003). Grandmothers and granddaughters: Old-age pensions and intrahousehold allocation in South Africa. *The World Bank Economic Review* 17(1), 1–25.
- Gidengil, E. (1995). Economic man—social woman? The case of the gender gap in support for the Canada-United States free trade agreement. *Comparative Political Studies* 28(3), 384–408.
- Gonzalez, F. and T. Quast (2011). Macroeconomic changes and mortality in Mexico. *Empirical Economics* 40(2), 305–319.

- Gurley-Calvez, T., A. Biehl, and K. Harper (2009). Time-use patterns and women entrepreneurs. *American Economic Review* 99(2), 139–44.
- Heaton, T. B. (2015). Are improvements in child health due to increasing status of women in developing nations? *Biodemography and Social Biology* 61(3), 252–265.
- Heaton, T. B., R. Forste, J. P. Hoffmann, and D. Flake (2005). Cross-national variation in family influences on child health. *Social Science & Medicine* 60(1), 97–108.
- Heckert, J., D. K. Olney, and M. T. Ruel (2019). Is women’s empowerment a pathway to improving child nutrition outcomes in a nutrition-sensitive agriculture program? Evidence from a randomized controlled trial in Burkina Faso. *Social Science & Medicine* 233, 93–102.
- Homan, P. (2017). Political gender inequality and infant mortality in the United States, 1990–2012. *Social Science & Medicine* 182, 127–135.
- Hossain, B. (2015). Women empowerment and infant mortality in Bangladesh. *Applied Economics* 47(51), 5534–5547.
- Huebener, M. (2019). Life expectancy and parental education. *Social Science & Medicine* 232, 351–365.
- Jones, R., R. Haardörfer, U. Ramakrishnan, K. M. Yount, S. Miedema, and A. W. Girard (2019). Women’s empowerment and child nutrition: The role of intrinsic agency. *SSM-Population Health* 9, 100475.
- Kleven, H., C. Landais, and J. E. Sogaard (2019). Children and gender inequality: Evidence from Denmark. *American Economic Journal: Applied Economics* 11(4), 181–209.
- Kleven, H., C. Landais, and J. E. Sogaard (2021). Does biology drive child penalties? evidence from biological and adoptive families. *American Economic Review: Insights* 3(2), 183–98.

- Koenen, K. C., A. Lincoln, and A. Appleton (2006). Women’s status and child well-being: A state-level analysis. *Social Science & Medicine* 63(12), 2999–3012.
- Lewbel, A. (2012). Using heteroscedasticity to identify and estimate mismeasured and endogenous regressor models. *Journal of Business & Economic Statistics* 30(1), 67–80.
- Lott, Jr, J. R. and L. W. Kenny (1999). Did women’s suffrage change the size and scope of government? *Journal of Political Economy* 107(6), 1163–1198.
- Lundborg, P., E. Plug, and A. W. Rasmussen (2017). Can women have children and a career? IV evidence from IVF treatments. *American Economic Review* 107(6), 1611–37.
- Makhlouf, Y., N. M. Kellard, and D. Vinogradov (2017). Child mortality, commodity price volatility and the resource curse. *Social Science & Medicine* 178, 144–156.
- McDermott, A. (2018). How world war II empowered women. History stories, History Channel, <https://www.history.com/news/how-world-war-ii-empowered-women>.
- Miller, G. (2008). Women’s suffrage, political responsiveness, and child survival in American history. *The Quarterly Journal of Economics* 123(3), 1287–1327.
- Miller, G. and B. P. Urdinola (2010). Cyclical mortality, and the value of time: The case of coffee price fluctuations and child survival in Colombia. *Journal of Political Economy* 118(1), 113–155.
- Mullany, B. C., M. J. Hindin, and S. Becker (2005). Can women’s autonomy impede male involvement in pregnancy health in Katmandu, Nepal? *Social Science & Medicine* 61(9), 1993–2006.
- Pongou, R., B. Kuate Defo, and Z. Tsala Dimbuene (2017). Excess male infant mortality: The gene-institution interactions. *American Economic Review* 107(5), 541–45.
- Pratley, P. (2016). Associations between quantitative measures of women’s empowerment and access to care and health status for mothers and their children: A systematic review of evidence from the developing world. *Social Science & Medicine* 169, 119–131.



- Pratto, F., L. M. Stallworth, and J. Sidanius (1997). The gender gap: Differences in political attitudes and social dominance orientation. *British Journal of Social Psychology* 36(1), 49–68.
- Pritchett, L. and L. H. Summers (1996). Wealthier is healthier. *The Journal of Human Resources* 31(4), 841–868.
- Quamruzzaman, A. and M. Lange (2016). Female political representation and child health: Evidence from a multilevel analysis. *Social Science & Medicine* 171, 48–57.
- Ross, M. (2006). Is democracy good for the poor? *American Journal of Political Science* 50(4), 860–874.
- Ruhm, C. J. (2000). Are recessions good for your health? *The Quarterly Journal of Economics* 115(2), 617–650.
- Sandiford, P., J. Cassel, M. Montenegro, and G. Sanchez (1995). The impact of women’s literacy on child health and its interaction with access to health services. *Population Studies* 49(1), 5–17.
- Sha’ban, M., C. Girardone, and A. Sarkisyan (2020). Cross-country variation in financial inclusion: A global perspective. *The European Journal of Finance* 26(4-5), 319–340.
- Sundström, A., P. Paxton, Y.-t. Wang, and S. I. Lindberg (2017). Women’s political empowerment: A new global index, 1900–2012. *World Development* 94, 321–335.
- Swiss, L. (2012). The adoption of women and gender as development assistance priorities: An event history analysis of world polity effects. *International Sociology* 27(1), 96–119.
- Tait, C. A., A. Parnia, N. Zewge-Abubaker, W. H. Wong, H. Smith-Cannoy, and A. Siddiqi (2020). Did the UN convention on the rights of the child reduce child mortality around the world? An interrupted time series analysis. *BMC Public Health* 20, 1–9.
- Thapa, D. K. and A. Niehof (2013). Women’s autonomy and husbands’ involvement in maternal health care in Nepal. *Social Science & Medicine* 93, 1–10.

- Thomas, D. (1990). Intra-household resource allocation: An inferential approach. *Journal of Human Resources*, 635–664.
- UN (2014). Human rights-based approach to reduce and eliminate preventable mortality and morbidity of children under 5 years of age. Technical guidance, UN Office of the High Commissioner for Human Rights, World Health Organization. [www.ohchr.org/Documents/Issues/Women/WRGS/Health/TGApplicationHumanRights.pdf](http://www.ohchr.org/Documents/Issues/Women/WRGS/Health/TGApplicationHumanRights.pdf).
- UN (2015). Transforming our world: The 2030 agenda for sustainable development. Technical report, United Nations: New York, NY, USA.
- UN (2021). The sustainable development goals report. Technical report, United Nations: New York, NY, USA.
- United Nations (1948, December). *Universal Declaration of Human Rights*.
- United Nations (1966a, December). International covenant on civil and political rights. *Treaty Series 999*, 171.
- United Nations (1966b, December). International covenant on economic, social, and cultural rights. *Treaty Series 999*, 171.
- VDEM (2019). Varieties of democracy (codebook). Varieties of Democracy Institute, University of Gothenburg, Gothenburg.
- Wigley, S. (2017). The resource curse and child mortality, 1961–2011. *Social Science & Medicine* 176, 142–148.
- Wigley, S. and A. Akkoyunlu-Wigley (2017). The impact of democracy and media freedom on under-5 mortality, 1961–2011. *Social Science & Medicine* 190, 237–246.
- World Bank (2011). *World development report 2012: Gender equality and development*. The World Bank.
- You, D., L. Hug, S. Ejdemo, P. Idele, D. Hogan, C. Mathers, P. Gerland, J. R. New, L. Alkema, and United Nations Inter-agency Group for Child Mortality Estimation

(2015). Global, regional, and national levels and trends in under-5 mortality between 1990 and 2015, with scenario-based projections to 2030: A systematic analysis by the UN inter-agency group for child mortality estimation. *The Lancet* 386(10010), 2275–2286.

You, D., T. Wardlaw, P. Salama, and G. Jones (2010). Levels and trends in under-5 mortality, 1990–2008. *The Lancet* 375(9709), 100–103.

# Online Appendix

## A Variables and definitions

Table A1 provides the full list of variables, their definitions and sources of data used.

Table A1: List of variables and their definitions.

Variable	Definition	Source
<b>Dependent variable</b>		
Under-5 mortality rate	The probability of dying between birth and exact age 5, expressed per 1,000 live births.	IGME
<b>Aggregate measure of empowerment</b>		
Women political empowerment index	How politically empowered are women? The index is formed by taking the average of women's civil liberties index, women's civil society participation index, and women's political participation index.	V-Dem dataset
Exclusion by gender index	Index of (political) exclusion by gender. The index is formed by taking the point estimates from a Bayesian factor analysis model of power distributed by gender, equality in respect for civil liberties by gender, access to public services by gender, access to state jobs by gender, and access to state business opportunities by gender.	V-Dem dataset
<b>Civil rights</b>		
Freedom of domestic movement	Do women enjoy freedom of movement within the country? This indicator specifies the extent to which all women are able to move freely, in daytime and nighttime, in public thoroughfares, across regions within a country, and to establish permanent residency where they wish. Note that restrictions in movement might be imposed by the state and/or by informal norms and practices. Such restrictions sometimes fall on rural residents, on specific social groups, or on dissidents. This question does not assess the relative freedom of men and women, restrictions in movement that are placed on ordinary (non-political) criminals, or restrictions in movement that result from crime or unrest. Responses from 0: Virtually no women enjoy full freedom of movement to 4: Virtually all women enjoy full freedom of movement.	V-Dem dataset

Freedom from forced labor	Are adult women free from servitude and other kinds of forced labor? Involuntary servitude occurs when an adult is unable to quit a job s/he desires to leave – not by reason of economic necessity but rather by reason of employer’s coercion. This includes labor camps but not work or service which forms part of normal civic obligations such as conscription or employment in command economies. This question does not assess the relative freedom of men and women from forced labor. Responses from 0: Female servitude or other kinds of forced labor is widespread and accepted (perhaps even organized) by the state to 4: Female servitude or other kinds of forced labor is virtually non-existent.	V-Dem dataset
Access to justice	Do women enjoy equal, secure, and effective access to justice? This question specifies the extent to which women can bring cases before the courts without risk to their personal safety, trials are fair, and women have effective ability to seek redress if public authorities violate their rights, including the rights to counsel, defense, and appeal. This question does not assess the relative access to justice of men and women. Responses from 0: Secure and effective access to justice for women is non-existent to 4: Secure and effective access to justice for women is almost always observed.	V-Dem dataset
Access to public services	Is access to basic public services, such as order and security, primary education, clean water, and healthcare, distributed equally according to gender? Responses from 0: Extreme (Because of their gender, 75 percent (%) or more of women lack access to basic public services of good quality) to 4: Equal (Because of their gender, less than 5 percent (%) of women lack access to basic public services of good quality).	V-Dem dataset

### **Political rights: civil society**

Female suffrage	What is the approximate percentage of enfranchised female adults older than the minimal voting age?	V-Dem dataset
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Freedom of discussion	<p>Are women able to openly discuss political issues in private homes and in public spaces? Clarification: This indicator specifies the extent to which women are able to engage in private discussions, particularly on political issues, in private homes and public spaces (restaurants, public transportation, sports events, work, etc.) without fear of harassment by other members of the polity or the public authorities. We are interested in restrictions by the government and its agents but also cultural restrictions or customary laws that are enforced by other members of the polity, sometimes in informal ways. This question does assess the relative freedom of men and women. Thus, it is possible for a country to be assigned the lowest possible score even if men and women enjoy equal — and extremely low — rights to freedom of discussion.</p> <p>Responses: 0: Not respected. Hardly any freedom of expression exists for women. Women are subject to immediate and harsh intervention and harassment for expression of political opinion. 1: Weakly respected. Expressions of political opinions by women are frequently exposed to intervention and harassment. 2: Somewhat respected. Expressions of political opinions by women are occasionally exposed to intervention and harassment. 3: Mostly respected. There are minor restraints on the freedom of expression in the private sphere, predominantly limited to a few isolated cases or only linked to soft sanctions. But as a rule there is no intervention or harassment if women make political statements. 4: Fully respected. Freedom of speech by women in their homes and in public spaces is not restricted.</p>	V-Dem dataset
CSO participation	<p>Are women prevented from participating in civil society organizations (CSOs)? This question assesses both (A) whether women are prevented from participating in civil society organizations (CSOs) because of their gender and (B) whether CSOs pursuing women's interests are prevented from taking part in associational life. Responses: 0: Almost always. 1: Frequently. 2: About half the time. 3: Rarely. 4: Almost never.</p>	V-Dem dataset
Civil liberties	<p>Do women enjoy the same level of civil liberties as men? Responses from 0: Women enjoy much fewer civil liberties than men to 4: Women enjoy the same level of civil liberties as men.</p>	V-Dem dataset
Female journalists	<p>Percentage (%) of journalists in the print and broadcast media who are women.</p>	V-Dem dataset

Civil society participation index	Do women have the ability to express themselves and to form and participate in groups? Clarification: Women's civil society participation is understood to include open discussion of political issues, participation in civil society organizations, and representation in the ranks of journalists.	V-Dem dataset
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**Political rights: public administration**

Political power	Is political power distributed according to gender? Responses from 0: Men have a near-monopoly on political power to 4: Men and women have roughly equal political power.	V-Dem dataset
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HOS female	What is the gender of the head of state? If the head of state is a collective body, the gender of the person executing the most effective power over this body, or, if no such person exists, whether any persons in the body are female.	V-Dem dataset
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HOG female	What is the gender of the head of government? If the head of government is a collective body, the gender of the person executing the most effective power over this body, or, if no such person exists, whether any persons in the body are female.	V-Dem dataset
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Lower chamber female legislators	What percentage (%) of the lower (or unicameral) chamber of the legislature is female?	V-Dem dataset
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Lower chamber gender quota	Is there a national-level gender quota for the lower (or unicameral) chamber of the legislature?	V-Dem dataset
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Political participation index	Are women descriptively represented in formal political positions? The index is formed by taking the average of the indicators for lower chamber female legislators and power distributed by gender.	V-Dem dataset
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**Economic rights**

Property rights	Do women enjoy the right to private property?	V-Dem dataset
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Access to state jobs	Are state jobs equally open to qualified individuals regardless of gender? Responses: 0: Extreme. Because of their gender, 75 percent (%) or more of women, even if qualified, lack access to state jobs. 1: Unequal. Because of their gender, 25 percent (%) or more of women, even if qualified, lack access to state jobs. 2: Somewhat Equal. Because of their gender, 10 to 25 percent (%) of women, even if qualified, lack access to state jobs. 3: Relatively Equal. Because of their gender, 5 to 10 percent (%) of women, even if qualified, lack access to state jobs. 4: Equal. Because of their gender, less than 5 percent (%) of women, even if qualified, lack access to state jobs.	V-Dem dataset
Access to state business opportunities	Are state business opportunities equally available to qualified individuals or firms regardless of gender? Clarification: State business opportunities refer to the ability to compete for or receive a public procurement contract, to partner with the government in public-private partnerships, etc. Responses: 0: Extreme. Because of their gender, 75 percent (%) or more of women, even if qualified, lack access to state business opportunities. 1: Unequal. Because of their gender, 25 percent (%) or more of women, even if qualified, lack access to state business opportunities. 2: Somewhat Equal. Because of their gender, 10 to 25 percent (%) of women, even if qualified, lack access to state business opportunities. 3: Relatively Equal. Because of their gender, 5 to 10 percent (%) of women, even if qualified, lack access to state business opportunities. 4: Equal. Because of their gender, 5 percent (%) of women, even if qualified, lack access to state business opportunities.	V-Dem dataset
Access to banking	Dummy variable equal to 1 if a woman can open a bank account in the same way as a man and 0 otherwise.	WDI
Ability to open business	Dummy variable equal to 1 if a woman can register a business in the same way as a man and 0 otherwise.	WDI
Labor force female (%)	Female labor force (% of total labor force).	WDI
Labor force participation (% female 15+)	Female labor force participation rate (% of female population ages 15+).	WDI
Female to male labor force (%)	Ratio of female to male labor force participation rate.	WDI

Women Business & Law index	The index measures how laws and regulations affect women's economic opportunity. Overall scores are calculated by taking the average score of each of the eight areas (Going Places, Starting a Job, Getting Paid, Getting Married, Having Children, Running a Business, Managing Assets and Getting a Pension), with 100 representing the highest possible score.	WDI
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**Control variables**

GDP pc	GDP per capita.	Maddison Database, 2020	Project
Education 15+	The average years of education among citizens older than 15.	V-Dem dataset	
Population under 5	Ratio of population under age 5.	UN population division	
Population over 65	Ratio of population over age 65.	UN population division	
Population density	Population density (persons per square km).	UN population division	
Urban ratio	Urban population (% of total population).	WDI	
Health equality	Index measures the extent to which high quality basic healthcare is guaranteed to all, sufficient to enable them to exercise their basic political rights as adult citizens.	V-Dem dataset	
Political corruption index	The corruption index includes measures of six distinct types of corruption that cover both different areas and levels of the polity realm, distinguishing between executive, legislative and judicial corruption. Within the executive realm, the measures also distinguish between corruption mostly pertaining to bribery and corruption due to embezzlement. Finally, they differentiate between corruption in the highest echelons of the executive at the level of the rulers/cabinet on the one hand, and in the public sector at large on the other. The measures thus tap into several distinguished types of corruption: both 'petty' and 'grand'; both bribery and theft; both corruption aimed and influencing law making and that affecting implementation.	V-Dem dataset	

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## **B List of countries**

### **High income countries:**

Australia Austria Barbados Belgium Canada Chile Cyprus Czechia Denmark Estonia Finland France Germany Greece Hungary Iceland Ireland Israel Italy Japan Latvia Lithuania Mauritius Netherlands New Zealand Norway Panama Poland Portugal Republic of Korea Romania Saudi Arabia Seychelles Singapore Slovakia Spain Sweden Switzerland Trinidad and Tobago United Kingdom United States of America Uruguay

### **Low, lower-middle and middle income countries:**

Afghanistan Algeria Angola Argentina Armenia Azerbaijan Bangladesh Belarus Benin Bolivia Botswana Brazil Bulgaria Burkina Faso Burundi Cambodia Cameroon Central African Republic Chad China Colombia Congo Costa Rica Cuba Côte d'Ivoire Democratic People's Republic of Korea Democratic Republic of the Congo Dominican Republic Ecuador Egypt El Salvador Eswatini Gabon Gambia Georgia Ghana Guatemala Guinea Haiti Honduras India Iran Iraq Jamaica Jordan Kazakhstan Kenya Kyrgyzstan Lao People's Democratic Republic Lebanon Lesotho Liberia Libya Madagascar Malawi Malaysia Mali Mauritania Mexico Morocco Mozambique Myanmar Namibia Nepal Nicaragua Niger Nigeria Pakistan Paraguay Peru Philippines Republic of Moldova Russian Federation Rwanda Senegal Sierra Leone South Africa Sri Lanka Syrian Arab Republic Tajikistan Thailand Togo Tunisia Turkey Uganda Ukraine United Republic of Tanzania Uzbekistan Venezuela Vietnam Zambia Zimbabwe

## **C Robustness: lagged explanatory variables and instrumental variables regression model**

In order to allow for endogeneity, in a first step and as an additional robustness check, here we estimate (1) using first lags of all the independent variables. Table A2 reports results for the whole sample, as well as for the subsample of low, lower middle- and upper middle-income countries (LMIC) and the subsample of high-income countries (HIC). As a further step, Table A3 presents instrumental variables regression model using Lewbel's (Lewbel, 2012) method.

Table A2: Dimensions of women's empowerment: effects on under-5 mortality rate, 1950-2018 - with added controls.

Aspects of empowerment, $W_{i,t}$ in eq. (1)	Full sample			LMIC subsample			HIC subsample		
	Coeff	t-stat	Obs./N	Coeff	t-stat	Obs./N	Coeff	t-stat	Obs./N
<b>Aggregate</b>									
Women political empowerment <b>index</b>	-0.089**	(-2.40)	7738/134	0.016	-0.4	5204/92	-0.277***	(-4.06)	2534/42
Exclusion by gender <b>index</b>	0.257***	(-14.2)	7870/134	0.073***	-2.89	5268/92	0.252***	(-15.52)	2602/42
<b>Civil rights</b>									
Freedom of domestic movement	-2.636**	(-2.40)	7870/134	1.935	-1.29	5268/92	-7.991***	(-5.82)	2602/42
Freedom from forced labor	-3.508***	(-3.11)	7870/134	0.048	-0.04	5268/92	-10.404***	(-7.17)	2602/42
Access to justice	-3.834***	(-3.82)	7870/134	2.837**	-2.04	5268/92	-6.838***	(-5.07)	2602/42
Access to public services	-10.736***	(-6.48)	7806/133	-3.850**	(-2.05)	5204/91	-9.465***	(-6.73)	2602/42
<b>Political Rights: civil society</b>									
Female suffrage	-0.014	(-0.62)	7870/134	-0.012	(-0.51)	5268/92	-0.153**	(-2.58)	2602/42
Freedom of discussion	-2.743***	(-3.29)	7870/134	0.741	-0.79	5268/92	-5.220***	(-6.77)	2602/42
CSO participation	-5.767***	(-4.02)	7870/134	0.633	-0.37	5268/92	-10.148***	(-6.78)	2602/42
Civil liberties	-12.472***	(-11.04)	7870/134	-2.724*	(-1.93)	5268/92	-14.387***	(-12.56)	2602/42
~ Female journalists	-0.209***	(-5.83)	7867/134	-0.063*	(-1.71)	5265/92	-0.369***	(-11.67)	2602/42
Civil society participation <b>index</b>	-0.063**	(-2.13)	7870/134	0.001	-0.05	5268/92	-0.119***	(-2.78)	2602/42
<b>Political Rights: public administration</b>									
~ Political power	-7.817***	(-5.68)	7870/134	-0.205	(-0.16)	5268/92	-11.621***	(-5.94)	2560/42
~ HOS female	-0.109***	(-4.60)	7816/134	-0.130***	(-4.65)	5268/92	-0.032	(-0.92)	2548/42
~ HOG female	-0.060***	(-2.76)	4557/112	-0.038	(-1.35)	2555/76	-0.055	(-1.67)	2002/36
~ Lower chamber female legislators	-1.330***	(-10.02)	6994/134	-0.808***	(-4.42)	4505/92	-1.635***	(-9.44)	2489/42
~ Lower chamber gender quota	-0.035***	(-4.98)	7870/134	-0.029***	(-4.59)	5268/92	-0.072***	(-5.42)	2602/42
Political participation <b>index</b>	-0.054***	(-2.95)	7738/134	-0.009	(-0.40)	5204/92	-0.113***	(-2.95)	2534/42
<b>Economic rights</b>									
Property rights	-4.805***	(-3.26)	7870/134	1.145	-0.55	5268/92	-14.387***	(-7.17)	2602/42
Access to state jobs	-12.715***	(-10.71)	7786/133	-4.020***	(-4.41)	5204/91	-16.534***	(-9.99)	2582/42
Access to state business opportunities	-12.975***	(-8.82)	7770/134	-5.618***	(-4.76)	5248/92	-17.033***	(-10.94)	2522/42
Access to banking	0.064*	(-1.72)	6123/132	0.138***	-8.73	4169/90	-0.170*	(-2.02)	1954/42
Ability to open business	-0.006	(-0.17)	6123/132	0.049***	-2.77	4169/90	-0.170*	(-2.02)	1954/42
~ Labor force female (%)	0.312***	(-6.73)	3818/132	0.438***	-7.5	2639/91	-0.219***	(-2.95)	1179/41
~ Labor force participation (% female 15+)	0.624***	(-9.52)	3818/132	0.758***	-12	2639/91	-0.476***	(-8.82)	1179/41
~ Female to male labor force (%)	0.411***	(-7.86)	3818/132	0.647***	-11.94	2639/91	-0.459***	(-11.39)	1179/41
Women Business & Law <b>index</b>	0.193***	(-4.91)	3818/132	0.390***	-7.01	2639/91	-0.363***	(-3.59)	1179/41

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . Each line is a separate estimation of regression (1) whereby column "Aspects of empowerment" shows the key explanatory variable  $F$  for each respective regression and column "Coeff" - the estimate of  $\beta_1$ . Fixed effect estimator with the Driscoll-Kraay corrected standard errors that are robust to very general forms of cross-sectional and temporal dependence as well as to heteroscedasticity and autocorrelation. Dependent variable is under-5 mortality rate (log). All explanatory variables are in log except for binary. Control variables include GDP pc, education, share of population under 5, share of population over 65, population density. Obs./N = number of observations / number of countries in the sample.

Table A3: Dimensions of women's empowerment: effects on under-5 mortality rate, 1950-2018 - instrumental variables regression model using Lewbel's method.

Aspects of empowerment, $W_{i,t}$ in eq. (1)		Whole sample			LMIC subsample			HIC subsample		
	Coeff	t-stat	Obs/N	Coeff	t-stat	Obs/N	Coeff	t-stat	Obs/N	
<b>Aggregate</b>										
Women political empowerment <b>index</b>	-0.071	-2.196**	7673/134	-0.046	-1.418	5148/92	-0.251	-4.663***	2525/42	
Exclusion by gender <b>index</b>	0.122	5.106***	7798/134	-0.043	-1.093	5207/92	0.070	1.337	2591/42	
<b>Civil rights</b>										
Freedom of domestic movement	-2.861	-1.834*	7798/134	0.914	0.316	5207/92	-13.066	-12.419***	2591/42	
Freedom from forced labor	-15.029	-4.976***	7798/134	-1.726	-0.648	5207/92	-13.738	-6.357***	2591/42	
Access to justice	-1.942	-0.419	7798/134	7.703	1.378	5207/92	-13.033	-6.456***	2591/42	
Access to public services	-6.940	-2.015*	7735/133	-7.810	-1.587	5144/91	-20.194	-11.150***	2591/42	
<b>Political Rights: civil society</b>										
Female suffrage	-0.068	-2.469**	7798/134	0.016	0.594	5207/92	-0.426	-5.828***	2591/42	
Freedom of discussion	-0.979	-0.427	7798/134	14.554***	3.676	5207/92	-5.953	-3.347***	2591/42	
CSO participation	1.118	0.672	7798/134	2.563	0.761	5207/92	-29.179	-7.723***	2591/42	
Civil liberties	-1.378	-0.947	7798/134	-3.422	-1.574	5207/92	-18.477	-17.994***	2591/42	
~ Female journalists	-0.013	-0.628	7795/134	-0.159***	-6.131	5204/92	-0.032	-0.442	2591/42	
Civil society participation <b>index</b>	-0.042	-1.667	7798/134	-0.027	-0.825	5207/92	-0.313	-9.115***	2591/42	
<b>Political Rights: public administration</b>										
~ Political power	0.197	0.058	7798/134	-13.545**	-2.120	5207/92	-19.089	-4.369***	2591/42	
~ HOS female	-0.058	-2.609**	7744/134	-0.177***	-3.583	5207/92	0.082	3.196***	2537/42	
~ HOG female	0.053	0.867	4529/112	0.157***	3.886	2531/76	0.132	3.004***	1998/36	
~ HOG female	-1.513	-11.526***	6939/134	-1.446***	-8.164	4459/92	-2.498	-6.574***	2480/42	
~ Lower chamber gender quota	-0.084	-10.293***	7798/134	-0.052***	-6.630	5207/92	-0.066	-4.782***	2591/42	
Political participation <b>index</b>	-0.003	-0.142	7673/134	0.042	1.283	5148/92	-0.082	-2.045**	2525/42	
<b>Economic rights</b>										
Property rights	-1.850	-0.856	7798/134	4.713***	3.618	5207/92	-14.283	-7.398***	2591/42	
Access to state jobs	-7.915	-3.927***	7715/133	-19.248***	-8.854	5144/91	-14.262	-3.967***	2571/42	
Access to state business opportunities	-7.420	-3.153***	7699/134	-14.392***	-4.099	5187/92	-14.535	-4.563***	2512/42	
Access to banking	-0.036	-1.293	6112/132	0.044*	1.833	4162/90	-0.304	-3.113***	1950/42	
Ability to open business	-0.092	-3.226***	6112/132	0.057***	3.034	4162/90	-0.304	-3.113***	1950/42	
~ Labor force female (%)	0.102	7.934***	3818/132	0.199***	5.719	2639/91	-0.429	-8.233***	1179/41	
~ Labor force participation (% female 15+)	0.129	5.362***	3818/132	0.206***	4.703	2639/91	-0.504	-5.483***	1179/41	
~ Female to male labor force (%)	0.116	6.846***	3818/132	0.174***	4.889	2639/91	-0.553	-9.922***	1179/41	
Women Business & Law <b>index</b>	0.095	6.645***	3818/132	0.203***	5.844	2639/91	-0.496	-9.795***	1179/41	

Notes: \* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01. Each line is a separate estimation, whereby column "Aspects of empowerment" shows the key explanatory variable for each respective regression and column "Coeff" - the respective coefficient estimate. Dependent variable is under-5 mortality rate (log). All explanatory variables are in log except for binary. Control variables include GDP pc, education, share of population under 5, share of population over 65, population density. Obs./N = number of observations / number of countries in the sample.



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