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Valeriya Mechkova
Ruth Carlitz

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Please address comments and/or queries for information to:

V-Dem Institute

Department of Political Science

University of Gothenburg

Sprängkullsgatan 19, PO Box 711

SE 40530 Gothenburg

Sweden

E-mail: contact@v-dem.net

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Gendered Accountability: When and Why Do Women's Policy Priorities Get Implemented?*

Valeriya Mechkova

V-Dem Institute, Department of Political Science, University of Gothenburg

Ruth Carlitz

GLD, Department of Political Science, University of Gothenburg

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Abstract

The past two decades have seen dramatic increases in women occupying positions of political power. Such developments have been welcomed as a means of achieving better outcomes for women in their everyday lives. We interrogate this proposition, developing a “gendered accountability” framework to delineate conditions under which female representation should have its desired effects. Our empirical analysis applies this framework to sub-Saharan Africa, home to the largest increase in women’s political representation in recent years. We find that having more women in the legislature is robustly associated with reduced infant and child mortality as well as greater spending on health. The effect on infant mortality is magnified when women are more active in civil society, and constrained to countries that have gender quotas and a proportional electoral system. We do not, however, find consistent evidence that maternal mortality and access to clean water respond to female representation.

1 Introduction

The past two decades have seen dramatic increases in women occupying positions of political power. Such developments have been welcomed as means of achieving better outcomes for women in their everyday lives (Franceschet and Piscopo, 2008; Barnes and Burchard, 2013). While an emerging empirical literature lends support to this proposition (Bhalotra and Clots-Figueras, 2014; Chattopadhyay and Duflo, 2004; Swiss, Fallon and Burgos, 2012), there is also evidence that female representatives do not always promote or implement policies that benefit women (Wängnerud, 2009; Franceschet and Piscopo, 2008). In general, studies of how the election of female representatives affects policy outcomes that touch the everyday lives of citizens are few and far between (Wängnerud and Sundell, 2012). What has been published on the topic suggests that increased female representation is not a magic bullet, and that there is a need to understand the conditions under which it is likely to have its desired effects.

This paper aims to fill this gap in the literature in two ways. First, we examine variation across policy outcomes, in order to understand how increased female representation relates to the delivery of different public services that disproportionately benefit women. Second, we delineate societal and institutional conditions necessary for descriptive representation (greater proportions of women in the legislature) to generate substantive representation (improved policy outcomes for women). We build on Hannah Pitkin's (1967) influential conceptualization of representation and advance the concept of "gendered accountability," applying a principal-agent framework to understand when and how female citizens can effectively hold their (female) representatives to account to ensure that their interests are represented. We argue that the link between descriptive and substantive representation is stronger when female citizens are more actively engaged in politics and society. We also show how this link is conditioned by the institutional rules and procedures through which representatives are chosen.

Our empirical analysis looks across countries in sub-Saharan Africa, home to the world's largest increase in women's political representation in recent years and a context in which the propositions we make have not been studied in depth. Many African countries are also characterized by considerable gender inequality, which manifests in ways that public policy could address (Duflo, 2012). We examine three policy outcomes that disproportionately affect women and girls: maternal and infant mortality, and access to clean water. These outcomes also correspond to widely agreed upon international development priorities, lending our study concrete policy relevance.

We find that having more women in the legislature is robustly associated with lower numbers of infant and children deaths, and greater spending on healthcare. We conduct placebo tests to provide further confidence that this relationship is not spurious, or simply a matter of "all good things going together." Furthermore, we also find a statistically

significant interaction between female citizens' participation and the share of women in the legislature when it comes to reducing infant mortality, suggesting that female politicians are more likely to be held accountable for furthering women's policy priorities when female citizens are monitoring their actions. In addition, we examine how different dimensions of formal representation condition the degree to which gendered accountability is achieved. Specifically, we show that female descriptive representation only improves outcomes in countries that have gender quotas and some degree of proportionality in their electoral systems.

We find that access to clean water and maternal mortality demonstrate less consistent movement in response to increased female representation. We argue that this reflects barriers to policy implementation specific to these outcomes. These obstacles include limits to credit-claiming by politicians, divisions in the policy community, and a lack of salience to the broader public. Furthermore, our empirical results may represent an underestimate of the true impact on substantive representation if we consider substantive representation in more process-oriented terms (Franceschet and Piscopo, 2008). That is, female legislators may still be taking action on behalf of their female constituents (e.g., contributing to parliamentary debates or advancing legislation); however, such actions are not always translated into policies that achieve their intended effects.

More generally, we contribute to the systematic study of variation in the policy priority accorded to human development initiatives, a topic that has been understudied to date (Shiffman and Smith, 2007). Beyond policy priorities, the systematic study of policy implementation in the developing world has also received limited scholarly attention (Shiffman, 2007).

That there are few other cross-country studies of the relationship between women's political representation and policy outcomes benefiting women may reflect the challenge of causal inference that this type of analysis entails. For instance, women's representation tends to be correlated with voter preferences, (Bhalotra and Clots-Figueras, 2014) and there may be other country-specific factors affecting both the election of women and the enactment of policies that women are more likely to prefer. We account for such threats to causal inference to the best of our abilities by controlling for variables whose omission could bias our results and including country and year fixed effects. We also test a variety of model specifications, including system-GMM models that are well suited to deal with slow-moving variables and potential endogeneity.

This paper proceeds as follows. The next section outlines our theoretical framework, after which we describe our empirical strategy and data. We then present our results and discuss their implications as concerned to the present study and future research.

2 Gendered Accountability: Achieving Women’s Representation

Hannah Pitkin’s influential volume (1967) presents four main “views” or dimensions of representation. First, *formal representation* refers to the rules and procedures used to select representatives; *descriptive representation* captures the similarity (in terms of race, ethnicity, gender, etc.) between representatives and the people they purportedly represent; *symbolic representation* reflects the degree to which a representative “stands for” the represented; and *substantive representation* relates to the actions taken on behalf of, or in the interest of the represented. Pitkin presents an integrated notion of these views; however, most empirical work on representation has tended to examine one or two of them in isolation. One notable exception is Schwindt-Bayer and Mishler (2005), who develop an integrated model, in which formal representation strongly influences both descriptive and symbolic representation. Descriptive representation, in turn, increases the responsiveness of legislatures to women’s policy concerns and enhances perceptions of legitimacy (symbolic representation).

Our notion of “gendered accountability” takes a different point of departure. We apply a principal-agent framework to delineate conditions under which descriptive representation is most likely to lead to substantive representation. We argue that this link will be strengthened when female citizens are more actively engaged in politics and society (a consequence of symbolic representation). We also show how this link is conditioned by the institutional rules and procedures through which female representatives are chosen (aspects of formal representation).

Following Lindberg (2013, p.209), we employ a conceptualization of accountability that gets at the core meaning of the term as it has been used across disciplines. By this standard, accountability has five defining characteristics:

1. An agent or institution who is to give an account (A for agent);
2. An area, responsibilities, or domain subject to accountability (D for domain);
3. An agent or institution to whom A is to give account (P for principal);
4. The right of P to require A to inform and explain/justify decisions with regard to D; and
5. The right of P to sanction A if A fails to inform and/or explain/justify decisions with regard to D.

When applied to *gendered* accountability, this standard definition takes the following form. First, the relevant agents are women in positions of political power. The domain in question is policy areas that disproportionately affect women, while the principals are

female citizens. The nature and degree of answerability and sanctions varies in light of societal and institutional features that we describe in further detail below.

Our framework has two fundamental assumptions, which reinforce each other. First, we assume female agents are more likely to prioritize and implement policies that benefit women. This reflects the average tendency of female agents (and women in general) to have preferences that diverge from those of male agents (and men in general). Second, we assume that female principals will be more likely to hold female agents to account. We justify these assumptions below.

2.1 Substantive Representation and Divergent Preferences

The expectation that female politicians will better represent the concerns of female constituents requires that men and women diverge to some degree in terms of their policy preferences (Phillips, 1995). Empirical evidence from a range of contexts supports this assumption. In general, women tend to favor redistribution more than men, even controlling for political ideology (Alesina and Giuliano, 2011; Iversen and Rosenbluth, 2006; Finseraas, Jakobsson and Kotsadam, 2012). Scholars have also identified gender gaps with respect to partisan alignment (women tending to vote to the left of men) and voting behavior (Inglehart and Norris, 2000; Corder and Wolbrecht, 2016).

Relatively less scholarly attention has been paid to gender gaps in policy preferences in developing countries, but some recent work suggests that divergent preferences may be even more common in such cases, if qualitatively distinct from those of wealthier countries. For instance, women are consistently shown to have greater preferences for improved water provision in studies from Indonesia (Olken, 2010), India (Chattopadhyay and Duflo, 2004) and Pakistan Khan (2017). Looking across 27 African countries, Gottlieb, Grossman and Robinson (2016) find that women are significantly more likely to prioritize government investment in poverty alleviation, health and access to clean water. In contrast, men are more likely to prioritize the management of the economy, infrastructure, agriculture, violence, and social and political rights. Clayton, Josefsson, Mattes and Mozaffar (2018) find support for such differences and also present evidence for mass-elite policy congruence along gendered lines.

As for why such divergent preferences might arise, scholars highlight differences in the social structures in which men and women live, rather than attributes of individual men and women. For example, since women are often disproportionately involved in childcare, they tend to be more directly concerned with child health and nutrition. Moreover, much of the developing world is characterized by a sexual division of labor, with women bearing primary responsibility for collecting drinking water for their households. Even where women do not have this obligation, their childcare responsibilities can motivate a disproportionate concern for clean water, given the prevalence of waterborne diseases

Khan (2017). Therefore, we can expect women to support policies that will improve these outcomes.

Such divergent policy preferences can manifest in campaigns and party platforms, with female politicians campaigning more on issues that matter to women, and their election helping to ensure that such concerns are represented in government. However, we can still expect female politicians to better represent the interests of female voters even if they campaign on platforms that are not particularly gendered or on party tickets that promote broader interests. As Phillips (1995) points out, “representatives... have considerable autonomy, which is part of why it matters who those representatives are” (p. 44).’ As she argues, under a strict definition of representation, politicians only truly represent their constituents on the issues that were explicitly debated during the election campaign. On all other issues, they necessarily rely on their own judgement or prejudice. If we expect that women and men tend to differ on average in terms of their judgements and prejudices, female constituents should be better represented by female politicians even if those politicians do not campaign on “women’s” issues.

Indeed, there is evidence from a range of contexts that female representatives tend to prioritize the interests of female voters (Wängnerud, 2009; Franceschet and Piscopo, 2008; Clayton, Josefsson and Wang, 2017; Burnet, 2011). Considerably fewer studies have examined how female representation affects the *outcomes* of public policy. Notable exceptions include Bratton and Ray (2002), who find that female representation (measured in terms of the proportion of women in Norwegian municipal councils) is positively and significantly associated with the provision of child care. In addition, Wängnerud and Sundell (2012) find having more women in Swedish local councils promotes gender equality in terms of income, full- vs. part-time employment, and distribution of parental leave. These studies are also important in that they examine the conditions under which female representation affects policy outcomes. However, their focus on single countries in Scandinavia potentially limits their broader applicability, motivating the present study.

2.2 Symbolic Representation and Women’s Participation

Our assumption that female principals will be more likely to hold female agents to account relates to Pitkin’s notion of symbolic representation, as well as conceptualizations of accountability that go beyond the electoral sphere. Symbolic representation implies shifts in attitudes and habits. As such, having more women in positions of political power has the potential to break down widely held perceptions that politics is a man’s game, which in turn can improve women’s awareness and participation.

Indeed, political knowledge among women has been shown to be higher when more women hold elected office (Jones, 2014). There is also evidence that descriptive representation boosts political participation among women – whether it comes to women in

the legislature (Barnes and Burchard, 2013), village council (Chattopadhyay and Duflo, 2004), or cabinet (Liu and Banaszak, 2017).

Beyond being aware and interested in engaging in the political sphere, women must take action to further their interests if those interests are to be represented in a substantive manner. Relevant actions include voting as well as acting to enforce accountability in between elections, by making phone calls, attending meetings and demonstrations, writing letters, emails, or opinion pieces in newspapers, and mobilizing community and activist groups (Lindberg, 2013). The presence and actions of women's groups (or lack thereof) have been shown to play an important role when it comes to the enactment of policies advancing women's priorities (Htun and Weldon, 2010; Shiffman and Smith, 2007).

2.3 Formal Representation and Institutional Rules

Building on Pitkin (1967), we also expect that formal representation will condition the nature and degree of answerability and sanctions when it comes to achieving gendered accountability. In particular, we expect the following rules and procedures (institutions) to matter: gender quotas, type of electoral system, and the extent to which there is competition among political parties.

The adoption of gender quotas is the most prominent policy solution to ensure female representation in politics. Relevant provisions include reserved seats, which secure a certain number of places for women; party quotas, pledges by individual parties to aim for a particular proportion of women among their candidates; and legislative quotas, which require all parties to nominate a certain percentage of women to run on their tickets (Krook, 2006*b*).

Previous research has also shown that electoral systems with some degree of proportionality elect more women to parliament (Matland and Studlar, 1996). Whereas in majoritarian systems parties can only nominate one candidate per district, making female candidates compete against existing interests within a party that may be represented by men, proportional systems allow more flexibility to nominate women (Matland, 1998). These systems also provide less of an advantage to incumbents, reducing the barriers to entry for female politicians (Thames and Williams, 2010). Some scholars argue that proportionality should matter for substantive outcomes as well, since such systems tend to be characterized by higher levels of policy congruence between voters and governments (Schwindt-Bayer and Mishler, 2005).

Finally, democracies have more channels through which citizens can pressure their political representatives to deliver specific outcomes. Empirically, the literature has found a strong relationship between democracy and development (Wang, Mechkova and Andersson, 2018; Besley and Kudamatsu, 2006). Scholars have also connected democracy to improved women's rights (Lindberg, 2004), and found that democracies tend to out-

perform autocracies when it comes to electing women to national office (Kang and Kim, 2018). However, recent research also suggests that authoritarian regimes have the incentive to coopt women, and use the provision of women’s rights, including political rights and political representation, as a coalition building strategy (Donno and Kreft, 2018). A comparative case study of democratic Botswana and autocratic Rwanda suggests that democracy is not a necessary pre-condition for the adoption of gender quotas or having more women in parliament and that other factors may be more important in determining both outcomes (Bauer and Burnet, 2013). When evaluating these diverse views, we argue that the absence of opposition parties could constrain the extent to which women in parliament can influence development outcomes, and therefore our analysis primarily distinguishes between one-party and multi-party states.

2.4 Gendered Accountability in Africa

Our theoretical framework is informed primarily by studies of Western Europe and the United States. One may rightly ask what traction theories developed in the West will have in sub-Saharan Africa, a region characterized by a distinct political history and institutions. That said, there are reasons to believe that certain assumptions are in fact more credible in the African context than in settings characterized by more institutionalized politics. Our theory currently has no role for political parties, which can play an important role when it comes to selecting women to run for political office and supporting their successful campaigns (Kunovich and Paxton, 2005; Cowell-Meyers, 2016). However, political parties in Africa tend to be less important when it comes to aggregating societal interests and serving as vehicle for candidates to advance those interests.¹ Rather, African parties frequently serve as vehicles for ethnic identity or personal interests (Elischer, 2013).² This grants representatives in most African political systems considerably more autonomy than their counterparts in more consolidated party systems. As noted above, it is precisely this autonomy that makes representatives’ personal characteristics (e.g., gender) important when it comes to promoting policies that serve the interests of their constituents.³

Relatedly, non-electoral forms of political participation are particularly important in many African countries, where elections often fail to serve as a source of accountability

¹In 2017, Sub-Saharan countries scored an average of 0.48 on the V-Dem *Party Institutionalization Index*, which ranges from 0-1 (low to high). This is significantly lower than the average score for OECD countries of 0.91. The two regions’ scores have remained more or less constant since 2000.

²It is important to note that this tendency is not universal (Lindberg and Morrison, 2008; Bratton, Bhavnani and Chen, 2012).

³In the previous section, we argue that electoral systems that reduce the importance of personal characteristics (PR systems) are more likely to lead to women winning elections (Thames and Williams, 2010). Our contention here is distinct: once elected, women in African legislatures may have more opportunities to act in accordance with their personal experiences than their counterparts in more institutionalized party systems.

due to a lack of programmatic parties and open and informed public debate (Joshi and Houtzager, 2012). Rather, what may matter more in such contexts is the extent to which civil society and media actors constrain government, either by enhancing the efforts of other accountability actors or by exerting direct pressure Goetz and Jenkins (2005); Mechkova, Lührmann and Lindberg (2018).

Moreover, as discussed above, gender is a key determinant in explaining variation in the interests of voters in many African countries. This is largely due to gender roles being highly circumscribed, particularly when it comes to family division of labor. For instance, Graham, Hirai and Kim (2016) find that adult females are the primary collectors of water across 24 sub-Saharan African countries. Additionally, across all countries, female children were more likely to be responsible for water collection than male children. Kes and Swaminathan (2006) analyze time-use surveys in five African countries, finding that women devote substantially more time to care and domestic activities than men, and considerably less time to market activities. Such divisions in household labor have significant consequences outside the home. For instance, Gottlieb, Grossman and Robinson (2016) find that fewer than 10 percent of women report having a job that pays a cash income in a number of African countries. Furthermore, across all countries included in Round 7 (2016/2018) of the Afrobarometer, women are on average less likely to have formal schooling than men.

3 Empirical Strategy and Data

We test our gendered accountability framework by systematically analyzing variation in the extent to which women’s policy priorities are implemented with a series of cross-national, time-series regressions. We first consider how descriptive representation, operationalized as the proportion of women in the legislature, relates to the achievement of three distinct policy outcomes that women prioritize. Second, we investigate the conditions under which this relationship holds – specifically, whether it is enhanced when women participate in civil society and the media, and when civil society organizations advance women’s issues. Finally, we examine how gendered accountability is conditioned by gender quotas, type of electoral system, and the extent to which political opposition is possible.

The following sections describe the data and methods we use to measure our outcome variables, main explanatory variables, and potential confounding variables. Table A1 in the Appendix presents descriptive statistics for all variables, presented in the order in which we discuss them, along with coverage, data sources, and variable construction.

3.1 Dependent Variables

Figure 1 shows the development of our three dependent variables over time in sub-Saharan Africa. The graphs depict a clear trend of improvement. Instances of maternal and infant deaths have been substantially reduced in recent years. In addition, more people have gained access to improved sources of water. Note, however, that these trends mask significant variation across countries. For instance, the lowest rate of maternal mortality observed in our data is 35 deaths per 100,000 cases in Mauritius in 2002, while the highest rate is 2,900 in Sierra Leone in 1994. There is also large variation in terms of success in the reduction of maternal deaths. For example, both Cape Verde and Rwanda have reduced maternal mortality by over 75 percent between 1990 and 2015, achieving the target set by the MDGs. Other countries like Nigeria and Sierra Leona failed to do so. In fact, in Nigeria deaths associated with giving birth were estimated to account for over 19 percent of all maternal deaths worldwide in 2015 (58,000 cases), while Sierra Leone is estimated to have the highest maternal mortality rate in the world in 2015 with 1,360 deaths (against a target of 450 deaths per 100,000 live births if the MDGs were to be achieved) (Chou, Inoue, Mathers, Moller, Oestergaard, Say, Mills, Suzuki and Wilmoth, 2012)⁴

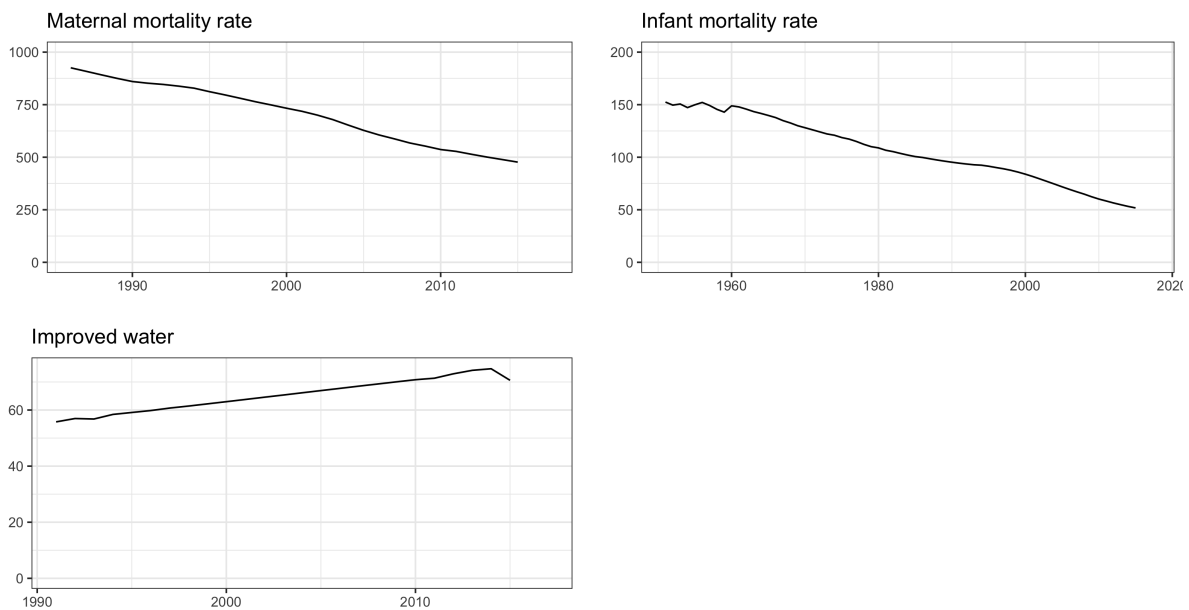


Figure 1: Trends in infant and maternal mortality, and population with improved access to water

⁴In the subsequent analysis the data for maternal and infant mortality are transformed by their natural logarithm, consistent with previous research on the topic, as the distribution of these variables is left-skewed and there is a general downward trend in mortality in many countries in recent decades. In addition, there is a theoretical argument for the logged transformation since improvements in mortality rates are easier to achieve when the rate is higher.

3.2 Main Explanatory Variable: Women in Parliament

We operationalize descriptive representation as the percentage of women in parliament. The presence of women in this critical political institution could affect development outcomes in several ways: for example, women parliamentarians could put women’s issues on the political agenda, argue for the adoption of policies that address these issues, or allocate more money from the budget for specific programs that benefit women. There is ample evidence that many of the women who have joined the ranks of African parliaments have taken just such actions (Bauer and Burnet, 2013; Devlin and Elgie, 2008; Johnson and Josefsson, 2016; Yoon, 2011; Wang, 2013).

As noted above, sub-Saharan Africa has experienced a dramatic increase in descriptive representation over the past two decades. However, as with progress toward our outcomes of interest, the region is also characterized by considerable variation. For instance, Rwanda leads the region with a 63.8% of women in parliament in 2016. At the lower end, the share of women in Nigeria’s and Swaziland’s parliament was 6% in 2016.⁵

3.3 Women’s Participation

As outlined above, we expect gendered accountability to be stronger when female citizens (the principals in our framework), are active in pressuring female politicians (their agents) to implement their priorities. They may do this directly or through civil society organizations or the media. As proxy for this mechanism we use a latent variable that captures the possibility for women to put pressure on their representatives in between elections – a composite indicator from the V-Dem data set, the *Women civil society participation index*, which captures three related aspects: the extent to which women are free to openly discuss political issues, the extent to which they can form and participate in civil society organizations, and whether they are represented in the ranks of journalists (Coppedge et al 2018).

3.4 Institutional Rules and Procedures

Our theoretical framework also anticipates that certain institutional conditions should affect the realization of gendered accountability. Specifically, we consider the existence of gender quotas and whether there is mechanism to enforce these in practice, the type of electoral system (proportional, majoritarian, or mixed), and the extent to which there is competition among political parties. The data for these three variables comes from the V-Dem data set (Coppedge et al 2018).

⁵As this variable is also left-skewed, we also test the robustness of our findings by using a log transformation.

3.5 Endogeneity and Other potential determinants

Since the data we are using in the analysis is observational, it is difficult to disentangle causality in the relationship we are studying. We follow best practices from previous research to address the two main causes for endogeneity concerns: reversed causality and omitted variable bias.

Reversed causality could be an issue in our analysis to the extent that high mortality rates could drive voters to choose female candidates in elections, as citizens might believe that female candidates are in better position to address such issues. To mitigate that issue, our main models use 5-year lags of the independent variables. This lag structure also reflects the fact that our outcome variables are likely to change slowly as the implementation of any policy is time-consuming, e.g. a new training program for doctors and nurses, building new health or education facilities, or providing better equipment to existing ones. It is also reasonable to expect that the response to increased female representation would not be immediate. Voters need time to evaluate politicians' performance in order to exercise accountability and "throw the rascals out" if need be. We therefore employ a lag that corresponds to the election cycle in many countries.⁶ We also estimate system-GMM models with 5-year average panels, which are designed to address endogeneity concerns and to analyze relationships with slow-changing variables.

In addition to our explanatory variables, we expect variation in progress toward achieving women's policy priorities to reflect a number of other country-specific factors. We control for what we see as most likely to cause omitted variable bias: reliance on foreign aid, income per capita, share of urban population, corruption, larger societal changes affecting both social norms and political will, and conflict. The rationale for each variable is given below.

We also estimate parsimonious models as robustness checks in order to address any potential worries for post-treatment bias from including some of these controls. For instance, foreign aid is partly endogenous to institutional features and politics more broadly, and potentially to gender representation more specifically. There are also studies suggesting that female politicians engage less in corrupt activities, so corruption may also be partially post-treatment.

3.5.1 Foreign Aid

In the context we study, our outcomes of interest are likely to be affected by external as well as domestic factors. For instance, in his study of Guatemala, Honduras, India, Indonesia, and Nigeria, Shiffman (2007) notes the importance of transnational influence in shaping domestic political priority to reduce maternal mortality – particularly in terms of norm promotion and resource provision (those agencies' provision of financial and

⁶This is fairly standard in the literature on this topic (Bratton and Ray, 2002).

technical resources). Indeed, foreign aid to maternal, newborn, and child health accounts for a substantial proportion of overall public spending in many developing countries. African countries have been the overwhelming beneficiaries of such aid. For example, in Ethiopia, outside sources accounted for nearly half of all reproductive and maternal health expenditures between 2004 and 2011 (Countdown to 2015, N.d.). At the same time, in recent decades global norms about gender equality in public office have shifted dramatically, leading, among other things, to the introduction of gender quotas (Krook, 2006a). The presence of donors and international aid could be one reason why countries decide to be more inclusive of women in governance.

3.5.2 Democracy

In addition, we include a measure for democracy as a confounding variable in our models. As outlined in the theory section, we expect that regime type would affect both the development outcomes we are looking at, as well as the number of women elected in positions of power but also the extent to which they would be able to make a difference once in office. We use V-Dem's *Free and Fair Elections Index*, which captures the extent to which elections in a country are free and fair. We prefer this relatively narrow proxy for regime type since more comprehensive measures also capture the extent of freedom of discussion and freedom of association, aspects that are potentially correlated with the *Women's civil society participation index*.

3.5.3 Income per Capita

More affluent countries tend to devote a greater share of resources to health and education. This may mean that greater availability of resources facilitates allocating a greater share to these purposes, or that countries with better supported health and education systems have a stronger human capital base and thus are more successful economically. Budget deficits and the debt crisis have also had a constraining effect on health and education expenditures, in contrast to their effect on social security expenditures (Huber, Mustillo and Stephens, 2008).

3.5.4 Corruption

Previous research has also pointed out that good governance determines social well-being (Lewis, 2006; Rothstein, 2011) since corruption and abuse of power can weaken politicians' incentives to improve population health and lead to the under-provision of public goods (Diamond, 2007; Rothstein, 2011). At the same time, rampant corruption can restrict women's access to political parties and public sector jobs (Stockemer, 2011; Rothstein and Teorell, 2008). Female candidates frequently lack access to male-dominated clientelistic networks, which can be decisive to being elected (Randall and Svåsand, 2002).

To account for the influence of corruption, we use V-Dem’s *Political Corruption Index*, a comprehensive measure that taps into both petty and grand corruption as well as bribery and theft and practices aimed at influencing law making and that affecting implementation (Coppedge et al 2018).

3.5.5 Shifts in global social norms

Additionally, in order to account for shifts in global social norms of the type that have led to the adoption of quotas (and potentially influence our dependent variables) we follow recent work (Kang and Kim, 2018) and consider the year 1995 as a milestone date, as this was when the Fourth World Conference on Women was held in Beijing, China. This conference resulted in a major declaration calling for the inclusion of women in public life at all levels, encouraging governments to promote gender balance in decision making posts. Similarly, the regression analysis accounts for before and after the year 2000, when the Millennium Development Goals (MDGs) were adopted. The MDGs played a key role in promoting the reduction of maternal and child mortality, as well as improved access to sanitation and water. These two events also mark significant shifts in the priorities of international donors, which could affect both our dependent and independent variables. We therefore estimate models with year fixed effects to capture any time trends in relevant and unmeasured confounders. We also estimate more parsimonious models with dummy variables for the 1995 and 2000 only, given their expected outside impact on the areas we are studying.

3.5.6 Conflict

The presence of international or domestic conflict is another factor that affects both socio-economic outcomes as well as the number of women in parliament, given that men are more likely to die in battle. Indeed, long-standing armed conflict has been shown to substantially increase women’s political representation in sub-Saharan Africa, beyond what can be explained by electoral institutions and democratization alone Hughes and Tripp (2015).

4 Results

Figure 2 presents scatter plots with our main dependent and independent variables, showing at first glance the expected direction of the relationship between our main variables of interest. That is, countries with higher levels of women in parliament tend to have lower infant and maternal mortality, and better access to clean water.

In order to interrogate this relationship more rigorously, Table 1 depicts the results of regression analysis based on an ordinary least square estimator, which specifies an

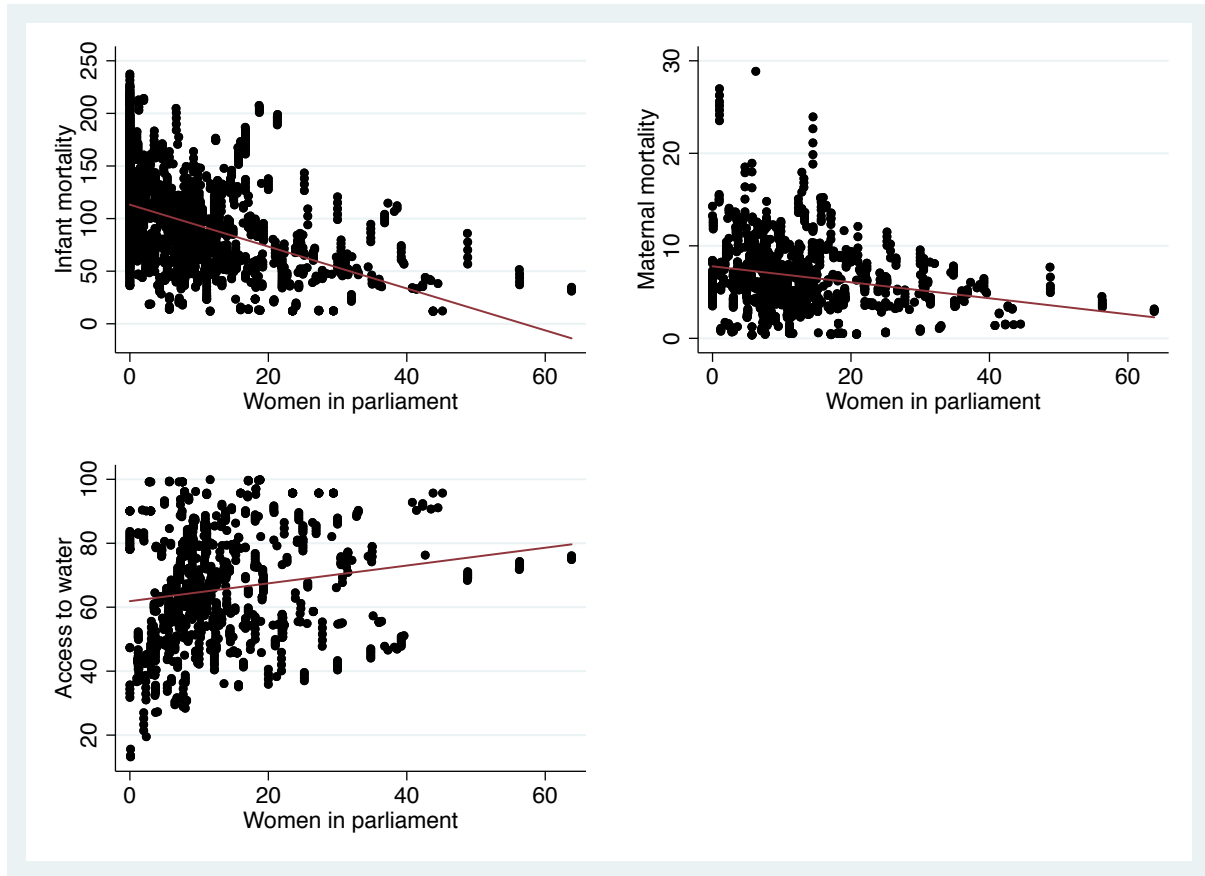


Figure 2: Scatter plot between main dependent and independent variables.

additive linear relationship. For each outcome variable we estimate two models. The first set (Models 1, 3, and 5) include a lagged dependent variable on the right-hand side to account for dynamic effects and autocorrelation in the residuals, Keele and Kelly (2005)⁷ as well as panel-corrected standard errors (Beck and Katz, 1995). A lagged dependent variable also models that the current values of the dependent variable depend on its past realizations; this also helps to control for any potential omitted variable affecting past outcomes. In this set of models the independent variables are lagged by five years.⁸

The second specification (Models 2, 4, and 6) includes country and year-fixed effects, which account for stable country factors as well as global trends in the evolution of both women’s political representation and the various development policy outcomes. We also include as a control variable a average of the dependent variable in sub-Saharan Africa which takes into account regional characteristics such as disease epidemics or the introduction of medical treatments specific to the region and time.

⁷That is, in time series data it is almost always the case that the residual at one point in time of observation is correlated with other residuals. This is especially important with slow-moving and trended dependent variables such as mortality rates.

⁸The dependent variable on the right-hand side is also lagged by five years. This means that the models explain the difference in the dependent variable between the time women got elected and five years later. The results are robust to alternative lag structures, using 1, 2, 3, 4, and 6 years. Results for 1-year lags reported in the Appendix.

Table 1: Regression results with share of women in parliament as main explanatory variable

	(1)	(2)	(3)	(4)	(5)	(6)
	Infant mortality	Infant mortality	Maternal mortality	Maternal mortality	Access to water	Access to water
Women in parl.	-0.0049*** (0.0005)	-0.0033** (0.0014)	-0.0035*** (0.0006)	0.0010 (0.0039)	0.0347*** (0.0442)	0.0175 (0.0153)
GDP per capita	0.0160** (0.0069)	0.0648* (0.0330)	0.0217** (0.0093)	-0.0003 (0.0499)	0.7151*** (0.000)	0.9332 (0.7184)
International aid	-0.0018 (0.0036)	0.0010 (0.0053)	0.0075 (0.0094)	0.0211 (0.0201)	0.7429*** (0.000)	-0.0511 (0.0861)
Democracy	-0.1364*** (0.0140)	-0.0566 (0.0523)	-0.0122 (0.0240)	0.0617 (0.0505)	3.7786*** (0.000)	-0.3922 (0.6374)
Urban population	0.0088*** (0.0028)	-0.0653 (0.0838)	0.0175** (0.0077)	-0.2026 (0.2153)	-0.8152** (0.000)	-2.3892** (1.1175)
Corruption	-0.1376*** (0.0130)	-0.1875** (0.0856)	-0.0043 (0.0238)	-0.0655 (0.1210)	3.0880*** (0.000)	-2.0624* (1.0401)
LDV	0.9686*** (0.0107)		0.9975*** (0.0219)		0.9156*** (0.000)	
Regional average DV		-37.0555*** (2.3274)		-33.1715*** (2.4375)		-38.2334*** (1.0993)
<i>N</i>	1408	1408	946	946	718	718
<i>R</i> ²	0.957	0.909	0.948	0.789	0.977	0.978
Lag	5 years	5 years	5 years	5 years	5 years	5 years
Model	PCSE	Two-way FE	PCSE	Two-way FE	PCSE	Two-way FE

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 1 depicts a significant negative association between descriptive representation and infant and maternal mortality, and access to clean water in the first set of models. That is, a greater proportion of women in parliament is associated with lower numbers of infant and maternal deaths, as well as access to clean water, accounting for past values of the dependent variable and important covariates such as aid, democracy, corruption, urbanization and wealth. This statistically significant result also holds in the second, stricter specification of the model with two-way fixed effects for infant mortality only. This means that the effect of women's representation on infant mortality is independent from time-trends that could affect both development and women's representation (such as global norm changes or major historical events) and slowly changing country-specific characteristics (such as geography or social norms), and when accounting for general trends in the dependent variable by including the average score for the region on the right-hand side of the equation for this regression. The results are not robust when we consider maternal mortality and access to clean water as outcome variables in the second set of models which include two-way fixed effects.

We next proceed to interpret the substantive size of the effects for infant mortality - the variable for which we consistently find statistically significant results. (Since the dependent variable is logged, it is difficult to interpret the effect sizes in the regression table.) We use the software Clarify(King, Tomz and Wittenberg, 2000) to estimate the

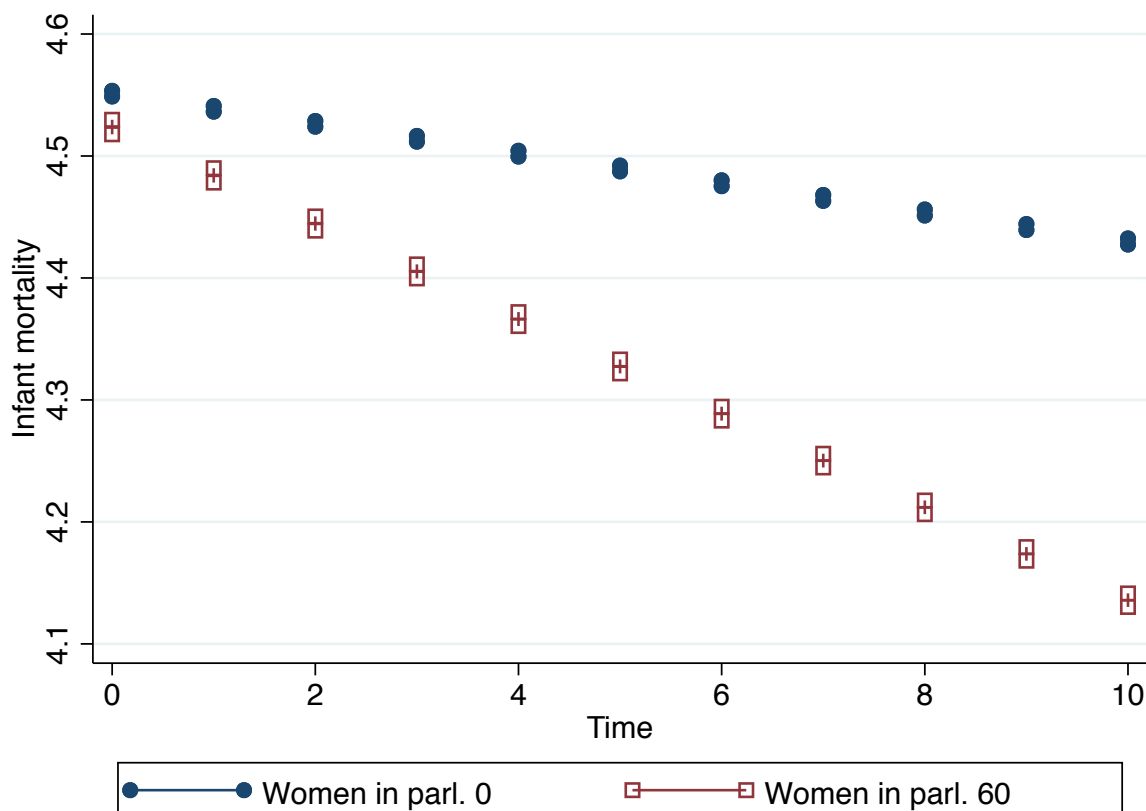


Figure 3: Predicted values of infant mortality by levels of women in parliament.

predicted values over time of infant mortality when the proportion of women in parliament is at different levels. Figure 3 shows the predicted values for mortality with uncertainty estimates around them, as calculated by the dynamic model in Table 1, for two scenarios: when the percentage of women in parliament is 0 (blue dots) and when the share is 60 (historically, maximum value for Africa, shown in red squares), while all other variables are held at their mean. Importantly, the effect on infant mortality of having more women in parliament increases substantially over time, compared to no women in parliament. When transformed back to the original values mortality rates at time period ten when there are no women in parliament are estimated to be around 75 deaths per 1,000 (Ivory Coast in 2011), and around 55 deaths (Ghana in 2007) when women in parliament are at their maximum value.

Finally, the results for the control variables mostly go in line with existing research and theoretical expectations. Higher GDP per capita, more foreign aid, stronger democratic institutions, and less corruption tend to be associated with improved outcomes. The share of urban population shows less consistent results as a predictor of the dependent variables. In some models, however, the coefficient for democracy has an opposite sign to the one we expect (e.g. in Model 4 in Table 1), that is, higher levels of democracy is

associated with greater number of maternal deaths.⁹

4.1 Robustness checks

In the following two sub-sections we test the robustness of our findings both by employing other estimation strategies, and by looking at alternative dependent variables, including some that serve as placebo tests.

4.1.1 Alternative model specifications

The literature on panel data analysis does not give a clear answer to the question of which models best fit the complex two-dimensional data structure of countries over time. Therefore, we compare the results from different models for the three dependent variables of interest. Tables A2, A3, and A4 in the Appendix show the following six alternative estimations of the main models presented in the previous section:

1. A parsimonious model, which does not have international aid, democracy and corruption on the right-hand side, as these might cause post-treatment bias. This model explores within-country variation, accounting for country-specific omitted factors in the model specifications.
2. Year fixed effects added to the previous model.
3. Country fixed effects with one-year lags of the independent variables, which should be compared with the 5-year lags in our main models. The dependent variable is differenced by one year, which is a common strategy when the data is highly trended.¹⁰
4. Full model with all control variables, country and year fixed effects but with one year lag for the regional average in the dependent variable (as opposed to five years as in our main models).
5. Full model with all control variables but with country-fixed effects only. This should be compared to our main model which also has year-fixed effects.

⁹A possible explanation for this result is that the relationship might not be linear since for the countries with the lowest and highest levels of democracy the number of women in parliament might be less relevant for policy outcomes. That is, for example, in closed autocracies parliamentarians might not have the *de facto* power to influence policy outcomes. By contrast, in fully developed democracies, the accountability relationship between members of parliament and their constituents could be utilized equally well no matter if the member of parliament is a man or a woman.

¹⁰Dickey-Fuller tests for unit roots in panel data also suggest that all three dependent variables are stationary with a trend. The residuals in the fixed-effects models also contain unit root but not after differencing the data.

6. System-GMM estimator, which is appropriate in cases where the dependent variable is slow changing, and affected by its own past values. The system GMM estimator also mitigates problems stemming from the fact that the independent variables might not be strictly exogenous, and are therefore correlated with past or present realizations of the error term (Arellano and Bover, 1995; Blundell and Bond, 1998) As advised by the literature, we estimate these models on five-year average panels.¹¹

According to these models the share of women in parliament remains a significant predictor of infant mortality at the statistical significance at level 0.01 or 0.1 no matter the model specification. However, the results for the other two dependent variables are less consistent. For example, in the system-GMM model the share of women in parliament is significantly associated with maternal mortality but this is not the case in the more simple country-fixed effects model. Since we do not know what the true data generating process is for these variables, we cannot say that we find stable evidence for significant association between women in parliament and maternal mortality or access to clean water.

Another challenge to our empirical analysis is that there are many country-years for which there are no women in parliament. To explore this, we re-estimate the main regression by transforming the main independent variable into a binary one - where 0 corresponds to no women in parliament, and 1 to having one or more female legislators. Table A5 in the Appendix shows that the coefficients for this binary variable is not statistically significant on its own (Model 1), and the significant results hold for the continuous variable when we control for the presence of women (Model 2). This finding goes in line with evidence from previous studies that for the presence of women to matter in substantive terms, the number of women is important and introducing just a small share of seats for women might not make a difference Dahlerup (2006); Grey (2006).

Next, we proceed to estimate models with several other factors that might affect our outcome variables. We test the robustness of our results when we include a dummy variable for the year before and after key events that we would expect to change the development of our variables of interest, namely, the introduction of the MDGs and the Beijing conference on women. The results shown in Table A8 in the Appendix remain largely unchanged with a statistically significant relationship for infant mortality but not for maternal mortality and access to clean water. The same goes when we control for international and internal armed conflict, as shown in Table A9 in the Appendix.

Finally, we test an alternative specification for the dependent variable by using child mortality (under-5 death rates) rather than infant mortality. Table A6 in the Appendix shows that the results hold for child mortality as the dependent variable.

¹¹More detailed discussion of this model and its specification can be found in the Appendix.

4.1.2 Placebo Test

To further interrogate whether there is something specific about our main dependent variables of interest and women in politics, we also test whether greater presence of women in parliament is associated with another key development outcome – electrification. In this way we aim to test the notion that all good things go together – that a given country is improving on all developmental aspects. We choose electrification as a placebo outcome variable since our theory would not predict an association between more women in parliament and improved infrastructure, given that the latter is a development outcome that men are more likely to prioritize (Gottlieb, Grossman and Robinson, 2016). We proxy for electrification with night-light data.

This test also allows us to discount an alternative mechanism for the association between female representation and improvement in policy areas that matter to women – that women are in general more trustworthy and public-spirited than men and should be more effective in reducing corruption (Dollar, Fisman and Gatti, 2001). Given that, as mentioned above, corruption has been found to be associated with the under-provision of public goods, this could represent an alternative channel through which women could promote improved service delivery. If this channel is operating, then we should expect to see improved outcomes across all types of public goods – not only those that women tend to prioritize.

Table A7 depicts the results of our placebo test. We do not see a significant association between the share of women in parliament and electrification, giving us greater confidence that the preceding empirical results serve to corroborate our theory.

In sum, our results suggest that a greater proportion of women in parliament is associated with lower numbers of infant and children deaths and these results hold across different model specifications. We do not find stable evidence for maternal deaths and access to clean water.

4.2 Resource Mobilization for Women’s Policy Priorities

Progress towards the outcomes we study can require both policy changes and shifting public spending priorities. In order to reduce infant mortality in sub-Saharan Africa, governments need to spend considerable resources on programs such as malaria control, immunizations, and reproductive healthcare. Since we hypothesize that women will prioritize such health-related outcomes, then the composition of the budget in legislatures featuring large numbers of women should be characterized by an increased share of public resources for health.

Model 1 in Table 2 depicts the results of regression analysis with the percentage of public health expenditures (as share of GDP per capita) as main outcome variable. In addition, we estimate a model where military expenditure is the dependent variable

(Model 2). This model serves as another placebo test – we would not expect the number of women in parliament to have a significant association with military expenditure. The results suggest that having more women in parliament is positively associated with greater public expenditures for health (2.5 percentage points on average), while the association with the military expenditure is negative.¹²

Table 2: Regressions of resource mobilization on female representation

	(1) Health expenditure	(2) Military expenditure
Women in parl.	0.025** (0.012)	-0.030*** (0.011)
GDP per capita	-0.629* (0.365)	0.027 (0.316)
International aid	0.171*** (0.059)	-0.098 (0.143)
Democracy	-0.337 (0.740)	-2.212** (0.844)
Urban population	1.321** (0.620)	0.391 (0.312)
Corruption	0.344 (1.119)	-3.810* (2.092)
<i>N</i>	634	1072
<i>R</i> ²	0.192	0.092
Country FE	Yes	Yes

Independent variables lagged with 1 year.

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.3 Impact of Women’s Participation

According to our gendered accountability framework, the influence of women in the legislature will be enhanced when female citizens are taking action to hold their representatives to account. Such actions may be direct or take place through civil society organizations and the media. We therefore estimate an interaction effect between descriptive representation and the degree of female participation. Model 1 in Table A10 in the Appendix presents our regression estimates. All models employ country and year fixed-effects, and five-year lags of the independent variables.

We find a statistically significant interaction between women’s participation and the share of women in parliament when it comes to reducing infant mortality. That is, we find evidence that the effect of each of these two variables depends on the levels of the other. We do not find support for the same interaction effect on maternal mortality and access to water with women’s participation.

¹²The models on the budget expenditures do not include year-fixed effects due to the relatively short time coverage - the data for health expenditure is available only from 1995 to 2014.

Figure 4 depicts the effects from our regression analysis. On the left hand side of the figure, we present the conditional effect of women in parliament on infant mortality at different levels of women’s participation. The negative effect on infant mortality of having more women in parliament is stronger for countries with higher participation of women in civil society and media. The effect becomes significant around 0.4 on this 0-to-1 measure, or contexts in which the space for civil society and media is not completely restricted.

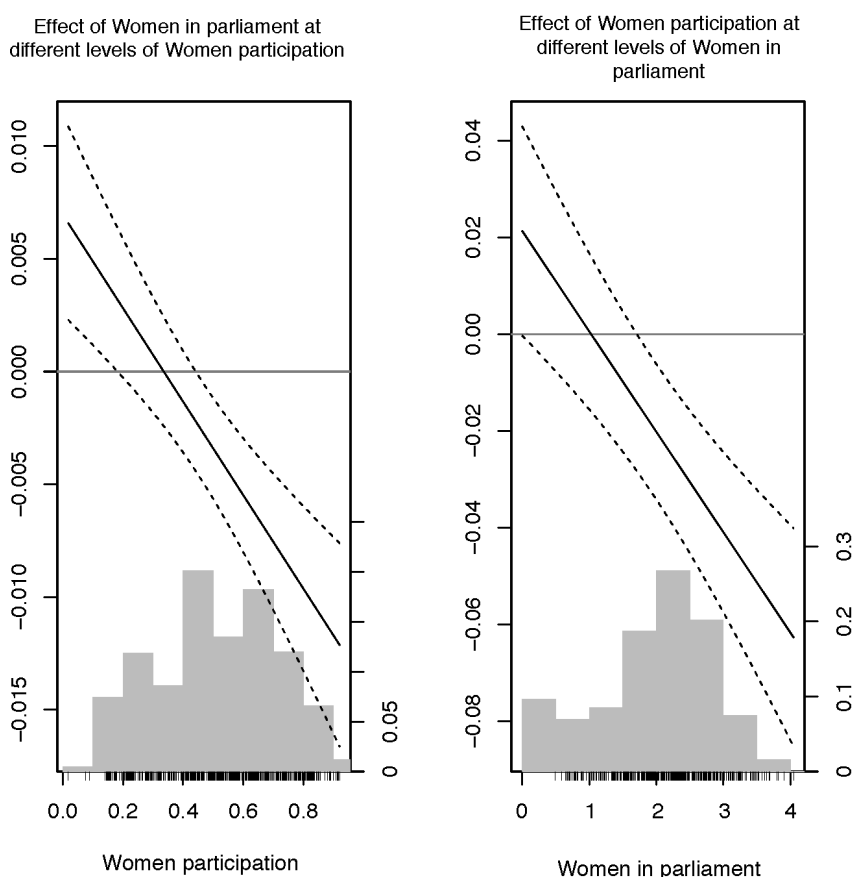


Figure 4: Interaction of share of women in legislature and women’s civil society participation (DV = Infant Mortality)

The right-hand panel shows that the effect of women’s participation on infant mortality becomes statistically significant only after the proportion of women in parliament reaches a certain level (around the mean values).¹³ This suggests that representation in political institutions is important for achieving improved development outcomes, in order for women’s participation to meaningfully influence policy outcomes.

¹³Note that in this analysis we use the logged values of women in parliament but the results do not change when using the non-transformed version.

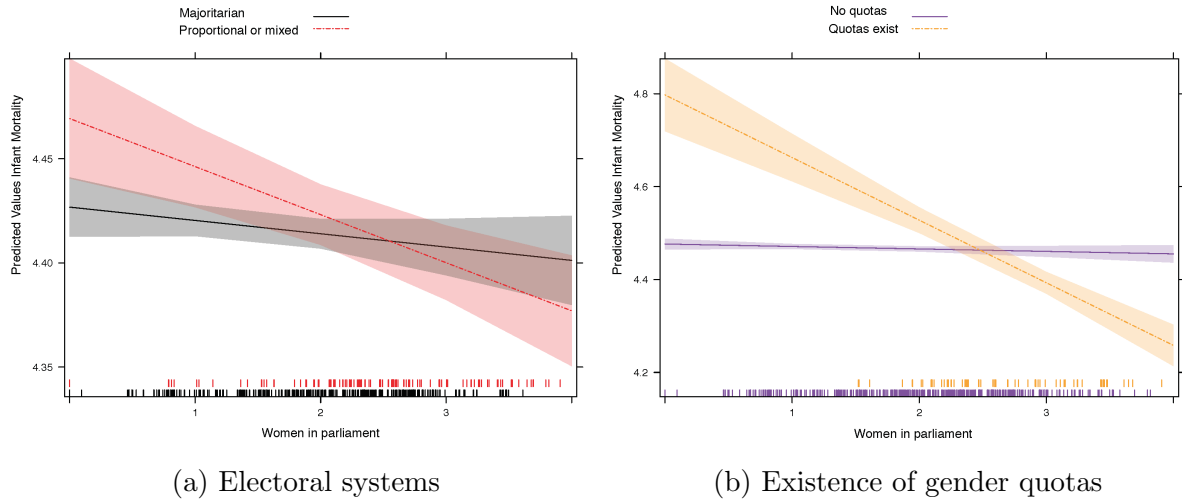


Figure 5: The effect on infant mortality of the interaction between share of women in parliament (logged) and formal representation

4.4 Gendered Accountability and Formal Representation

Our theoretical framework also anticipates that the rules and procedures to select representatives are important conditions affecting the realization of gendered accountability. Specifically, we consider gender quotas, type of electoral system, and the extent to which there is competition among political parties.

Table A11 in the Appendix summarizes the findings from the regression analysis of interaction terms between share of women in parliament and the existence of quotas, type of electoral system, and barriers to forming a party. We find statistically significant interactions between descriptive representation and some of the institutions of formal representation. In particular, the effect of having more women in power is stronger when there is a quota system in place, and the electoral system is not simply majoritarian.

Figure 5 shows the relationship between infant mortality and the interaction between the share of women in parliament and two institutions of formal representation. In Figure 5a, we compare the influence of having more women in parliament on mortality rates when the electoral system is majoritarian (shown in solid black line) and when there is some proportional element (red dashed line). In Figure 5b, we see the effect for countries with electoral quotas (orange dashed line) and for countries without quotas (purple solid line). In both cases the results go in line with our theoretical expectations: there is a strong negative effect on mortality in countries with proportional or mixed electoral systems and for those that have adopted quotas.

The results are less clear when we consider the extent to which there is competition among political parties. Figure 6 shows that countries with multi-party systems (green dashed line) tend to have lower infant mortality rates than in countries with closed systems (blue solid line) but the difference is not substantially large and is not statistically

significant at the highest numbers of women in parliament.¹⁴ This implies that having more women in parliament is significantly associated with lower death rates even in autocracies. However, when we divide the sample into one- and multi-party states and re-estimate the same models we do see a difference between the different types of regimes. (These results are shown in Table A12 in the Appendix.) We see that the coefficients for infant mortality hold only when party competition is allowed. In countries where it is virtually impossible to form opposition parties, we do not observe a significant association between women in parliament and any of the development outcomes we are considering. By contrast, when some political opposition is allowed, the significant and negative association between women political representation and infant mortality remains. These conflicting results between the split sample and interaction regressions suggest that the difference in the significance of the results in the former estimation strategy could be driven by other covariates (for example, income or corruption could be highly correlated both with democracy and mortality).

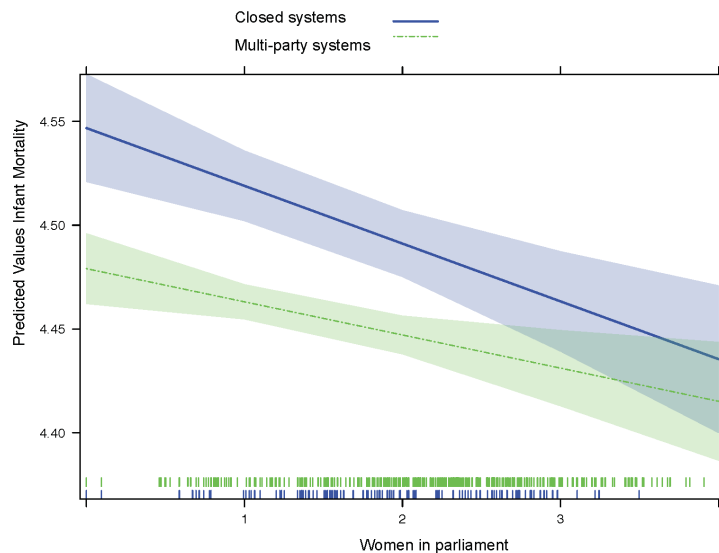


Figure 6: Interaction of share of women in legislature (logged) and barriers to forming political parties (DV = Infant Mortality)

5 Discussion

The results presented above suggest a nuanced relationship between descriptive and substantive representation. First, we show that the link is most robust for explaining reductions in infant and child mortality, whereas having more women in the legislature is not clearly associated with reducing maternal mortality improving access to clean water.

¹⁴Note that the interaction term in the regression analysis is not statistically significant, although the components are significant on their own.

This calls into question the implications of previous studies based on select policy outcomes, and more generally confirms Kramon and Posner (2013), who caution that “the outcome one studies affects the answer one gets.”

Why does gendered accountability appear to be present for some outcomes but not others? Electoral accountability for basic service provision is most likely to occur in policy areas where voters can verify whether the promise has been kept (Harding and Stasavage, 2013). The implementation of a given policy is therefore likely to be characterized by greater political will when user benefits can be more clearly attributed to political intervention, and when interventions are more visible (Batley and McLoughlin, 2015). Following Mani and Mukand (2007), we may understand the relative visibility of different public goods as the degree to which citizens can assess government effort based on observed outcomes. Differences in visibility reflect both the ease with which one can observe or measure public goods outcomes, as well as a public good’s “complexity” – the factors other than government effort that affect the outcome. One important aspect affecting complexity is the degree to which service provision depends on factors beyond the intentions and actions of members of parliament and the executive. In the context we study, water provision is a complex outcome, given that it has been decentralized in most African countries, with further responsibilities devolved to water users (Carlitz, 2017). As such, it can be difficult for central government politicians to claim credit for improved access to clean water. This relationship is further complicated by the degree of foreign aid to the water sector.

Even when politicians can realistically claim credit for implementing a given policy, they may be less inclined to do so when the appropriate policy solution is not clear, or when the issue is not one seen as a priority of the broader public. Pertinent to the present study, safe motherhood’s relatively low priority in many countries has been argued to reflect divisions in the policy community regarding the appropriate intervention strategy, the fact that maternal deaths are not as common as those caused by other high-burden disorders (HIV/AIDS, malaria), and the difficulty of accurately measuring maternal mortality (Shiffman and Smith, 2007). Furthermore, interventions to avert maternal health are frequently not as simple as those for some other development priorities. For example, Tanzania’s dramatic decline in child mortality between 1995-2007 (a 35% reduction, nearly twice the regional average during that period) has been attributed to increased coverage of key malaria control interventions like the use of bed nets and access to first-line antimalarial drugs (Croke, 2012). Maternal mortality has been seen as more intractable.

Beyond highlighting differences across policy outcomes, our results also delineate societal and institutional conditions under which female politicians will be more inclined to take action to the further the interests of female voters. First, we show that the influence of women in parliament is strengthened in countries where women participate relatively

more in civil society. This can put increased pressure on female representatives to act in female citizens' interest. These quantitative results go in line with qualitative evidence from the countries in our sample. For instance, in post-genocide Rwanda, prior to the adoption of gender quotas, women civil society organizations (CSOs) joined forces with the few women MPs in the transitional national assembly to lobby for changes to exclusionary inheritance laws. In addition, women CSOs played an important role in that country to successfully lobby for the adoption of gender quotas (Bauer and Burnet, 2013). In Uganda, the strength of women's organizations and the relationships between civil society actors and pro-women MPs are seen as essential for the successful advancement of legislation benefiting women (Wang, 2013).

Finally, we demonstrate the importance of particular electoral institutions – namely gender quotas and proportional representation – when it comes to strengthening the link between descriptive and substantive representation. It is also important to note that our empirical results may represent an underestimate of this link. In many cases, descriptive representation may lead to substantive representation in more process-oriented terms, such as introducing and/or supporting bills that address women's issues, networking with female constituents or women's organizations, or advancing women's issues within committees or party delegations (Franceschet and Piscopo, 2008). There are a number of examples of such process-oriented developments in the context we study. For example, in Rwanda, Tanzania, and Uganda, cross-party coalitions of female Parliamentarians have formed as women have increased their presence in the national legislature and have played an important role to coordinate the development of shared legislative agendas and facilitate lobbying (Devlin and Elgie, 2008; Johnson and Josefsson, 2016; Yoon, 2011).

While such process-oriented developments are necessary for laws and policies to be enacted that ultimately influence the outcomes we study, they are no guarantee that such outcomes will be realized. The gap between policy and implementation is an oft-cited challenge across sectors in many African countries. Such gaps can stem from a given policy outcome not being perceived as a public problem, failures to seize existing windows of opportunity, and a lack of policy entrepreneurs. Ridde (2009) This implies that gendered accountability may be most likely to succeed when it aims at promoting policies that are not exclusively the domain of women. Such an interpretation is supported by our results, since infant mortality is arguably an issue that touches other people beyond the women who serve as primary caretakers for infants and children.

6 Conclusion

Our analysis shows that increasing descriptive representation can have meaningful implications for the realization of policy goals that matter to women, particularly when female citizens are politically aware and engaged. These findings are highly policy-relevant given

that all of the outcomes we study correspond to internationally agreed upon development targets – specifically, indicators used to assess countries’ progress toward achieving the Millennium Development Goals (MDGs), and their successors, the Sustainable Development Goals (SDGs). The present study therefore allows us to take stock of countries’ achievements of a number of the MDGs, and also the likelihood that these countries will meet various SDGs. This is important given that many countries, particularly in Africa, did not meet the reductions in infant and maternal mortality targeted in the MDGs.

Our analysis also suggests that the link between descriptive and substantive representation is not automatic, and that not all “women’s issues” are equally achievable as a result of having more women elected to public office. Further research is needed to better understand the constraints that female politicians confront when it comes to effective advocacy on behalf of their female constituents. One issue may be the nature of women representatives’ contributions to parliamentary debates. For instance, scholars have shown that women elected to reserved seats in the Ugandan parliament are significantly less likely to be recognized in plenary debates over time as compared to their male and female colleagues in open seats (Clayton, Josefsson and Wang, 2014). Therefore, further work is needed to understand how speaking in parliament corresponds to policy implementation. In order to understand additional constraints, ethnographic work along the lines of Bauer and Burnet (2013)’s study of female MPs in Rwanda would be enlightening. Systematic surveys of politicians that allow for meaningful comparison across gender would also add to our knowledge base. To date, such surveys have been exceedingly rare in the African context. However, given that descriptive representation of women in Africa is now on par with the global average, it is high time that we gain a better understanding of the experiences and challenges these legislators face.

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7 Appendix

Table A1: Descriptive Statistics

Statistic	N	Mean	St. Dev.	Min	Max	Source	Time Coverage
Dependent variables							
Maternal mortality (log)	1,462	6.374	0.708	3.568	7.973	WHO	1985-2015
Infant mortality (log)	3,009	4.525	0.516	2.459	5.469	Gapminder	1950-2015
Population using improved water	1,121	64.473	18.417	13.200	99.900	WDI	1990-2015
Public health expenditure	935	2.493	1.287	0.045	9.087	WDI	1995-2014
Public military expenditure	1,783	2.299	2.727	0.00003	39.607	WDI	1960-2014
Mortality rate, under 5	2,333	154.004	78.604	13.7	442.4	WDI	1960-2014
Nighttime lights	1,034	1.585	2.228	0.010	17.385	DMSP	1992-2013
Main explanatory variables							
Women in parliament	2,982	7.126	9.450	0.000	63.800	V-Dem	1900-2017
Women civil society	5,500	0.312	0.236	0.013	0.924	V-Dem	1900-2017
Intervening variables							
Gender quotas	17,391	0.164	0.715	0	4	V-Dem	1900-2017
Electoral systems	2,371	0.221	0.415	0	1	V-Dem	1900-2017
Barriers to political parties	5,490	1.772	1.462	0	4	V-Dem	1900-2017
Other determinants							
GDP per capita (log)	2,807	6.932	0.636	5.315	10.001	Maddison	1900-2010
Urban Population (log)	4,802	12.329	2.032	7.167	18.182	Clio-Infra	1950-2015
Free and fair elections	5,248	0.193	0.190	0.009	0.859	V-Dem	1900-2017
Foreign aid	2,069	19.396	1.438	10.069	23.404	AidData	1962-2013
Corruption	5,477	0.486	0.233	0.065	0.969	V-Dem	1900-2017
Violent conflict	5,477	0.486	0.233	0.065	0.969	V-Dem	1900-2017

The data on maternal mortality, coming from the World Health Organization (Alkema, Chou, Hogan, Zhang, Moller, Gemmill, Fat, Boerma, Temmerman, Mathers et al. (2016)) is reported in terms of deaths per 100,000 live births in a year. Infant mortality is measured as the number of deaths prior to the age of 1 per 1,000 live births. We accessed the data through the V-Dem data set, which draws on Gapminder (Gapminder (N.d.)), with additional data imputed from Clio-Infra (Clio-Infra (2014)). Missing data within a time-series is interpolated and imputed by employing linear models. The infant mortality data stretches back to 1900 but in our analysis we only use data after 1950 due to limitations in the time coverage of the explanatory variables. In addition, Gapminder notes that historic estimates on mortality prior to 1950 are generally less accurate.

We use the World Development Indicators database for the percentage of the population using improved water supplies (Kaufmann, Kraay and Mastruzzi (2010)). “Improved” sources include: piped water on premises (piped household water connection located inside the user’s dwelling, plot or yard), and other improved drinking water sources (public taps or standpipes, tube wells or boreholes, protected dug wells, protected springs, and rainwater collection). The underlying source for this data is WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation.¹⁵

We use a measure of the sum of commitments received from donors and international organizations. The source is AidData (Tierney, Nielson, Hawkins, Roberts, Findley, Powers, Parks, Wilson and Hicks (2011)) (accessed through QoG database). Data for donors is available since 1962, and for international organizations only since 1947, and the end of the time series is 2013.

Our data on GDP is measured on a per capita basis from the Maddison-Project Bolt and Zanden (2014), and was accessed through the V-Dem data set.

We incorporate data on gender quotas from V-Dem. The variable we use captures both voluntary quotas and reserved seats in the legislature.¹⁶

We proxy for electrification with night-light data from the United States Air Force Defense Meteorological Satellite Program (DMSP) Nighttime Lights Time Series.¹⁷ MinMin, Gaba, Sarr and Agalassou (2013) validates the measure to show that it is correlated with access to electrification – electrified villages appear brighter in satellite imagery because of the presence of streetlights, and brightness increases with the number of streetlights. Thus, we consider night lights to be a good proxy for infrastructure building. Following Alesina (Alesina, Michalopoulos and Papaioannou (2016)) we use the average light values from all pixels within each spatial unit of analysis divided by the population to arrive at

¹⁵<https://washdata.org/>

¹⁶The variable ranges from 0-4, with the scores corresponding to the following: 0: No national level gender quota; 1: Yes, a statutory gender quota for all parties without sanctions for noncompliance; 2: Yes, statutory gender quota for all parties with weak sanctions for noncompliance; 3: Yes, statutory gender quota for all parties with strong sanctions for noncompliance; 4: Yes, there are reserved seats in the legislature for women.

¹⁷<https://ngdc.noaa.gov/eog/dmsp/downloadV4composites.html>

the measure we use in the regression analysis.

We use the V-Dem variable *Barriers to parties* to distinguish between highly closed regimes, where opposition parties are not allowed or it is virtually impossible for parties not affiliated with the government to form (categories 0, 1 and 2), and regimes where meaningful opposition is possible (categories 3 and 4). The data on barriers to parties, quality of elections, the political corruption index and women's civil society participation comes from the V-Dem data set, aggregating coding from more than 3,200 experts. Pemstein, Marquardt, Tzelgov, Wang, Krusell and Miri (2018)

Table A2: Robustness checks for Infant mortality as outcome variable

	Dependent variable: Infant mortality					
	(1)	(2)	(3)	(4)	(5)	(6)
Women in parl.	-0.012*** (0.004)	-0.005* (0.003)	-0.001*** (0.000)	-0.001*** (0.000)	-0.005* (0.003)	-0.001* (0.001)
GDP per capita	-0.022 (0.069)	-0.054 (0.047)	0.007 (0.006)	0.016** (0.008)	-0.035 (0.041)	0.003 (0.009)
Urban population	-0.255*** (0.023)	0.066 (0.085)	0.005 (0.004)	-0.009 (0.018)	-0.033 (0.069)	0.000 (0.001)
International aid			0.000 (0.001)	0.001 (0.001)	0.005 (0.009)	
Democracy			-0.018* (0.011)	0.002 (0.013)	-0.136* (0.078)	-0.002 (0.023)
Corruption			-0.044*** (0.015)	-0.020 (0.016)	-0.259 (0.189)	
Regional average DV1				-46.495*** (0.362)		
Regional average DV5		-20.907*** (7.318)			0.838*** (0.152)	
LDV						0.986*** (0.012)
<i>N</i>	1966	1901	1408	1411	1408	442
<i>R</i> ²	0.758	0.877	0.129	0.994	0.753	
Lag	5 years	5 years	1 year	5 years	5 years	5-year-panels
Model	Parsimonious	Parsimonious	Differenced DV			System-GMM
Model	Country FE	Two-way FE	Country FE	Two-way FE	Country FE	
N of instruments						65
Hansen J-test p-value						0.963
AR(2) test p-value						0.004

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A3: Robustness checks for Maternal mortality as outcome variable

	Dependent variable: Maternal mortality					
	(1)	(2)	(3)	(4)	(5)	(6)
Women in parl.	0.000 (0.005)	0.003 (0.005)	-0.001*** (0.000)	-0.000 (0.000)	0.001 (0.006)	-0.002** (0.001)
GDP per capita	-0.220** (0.082)	-0.003 (0.053)	0.007 (0.006)	0.014** (0.007)	-0.201*** (0.061)	0.011 (0.011)
Urban population	-0.501*** (0.070)	-0.281 (0.242)	0.005 (0.004)	-0.010 (0.031)	-0.502* (0.260)	0.014** (0.006)
International aid			0.000 (0.001)	0.008** (0.004)	-0.006 (0.027)	
Democracy			-0.018* (0.011)	0.010 (0.012)	0.011 (0.099)	-0.002 (0.036)
Corruption			-0.044*** (0.015)	-0.025 (0.021)	0.150 (0.188)	
Regional Average DV1				-45.653*** (0.476)		
Regional Average DV5		-31.983*** (2.169)			0.172 (0.434)	
LDV						0.990*** (0.023)
<i>N</i>	1125	954	1408	1079	946	224
<i>R</i> ²	0.606	0.780	0.129	0.989	0.592	
Lag	5 years	5 years	1 year	5 years	5 years	5-year-panels
Model	Parsimonious	Parsimonious	Differenced DV			System-GMM
Model	Country FE	Two-way FE	Country FE	Two-way FE	Country FE	
Number of instruments						42
Hansen J-test p-value						0.000
AR(2) test p-value						0.001

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A4: Robustness checks for Access to water as outcome variable

	Dependent variable: Access to water					
	(1)	(2)	(3)	(4)	(5)	(6)
Women in parl.	-0.072 (0.084)	0.019 (0.015)	-0.001 (0.003)	-0.031 (0.026)	-0.089 (0.062)	0.014 (0.017)
GDP per capita	2.184 (2.901)	1.059 (0.718)	-0.090 (0.134)	2.119** (0.945)	4.102 (2.719)	-0.305 (0.287)
Democracy	6.060* (3.331)		0.264* (0.146)	0.287 (0.898)	0.323 (3.089)	-0.709 (0.671)
Urban population	17.094*** (2.502)	-2.883** (1.146)	0.161* (0.089)	0.610 (1.731)	5.719 (6.281)	-0.321* (0.192)
International aid			0.013 (0.016)	0.074 (0.112)	0.541* (0.314)	
Corruption			-0.263 (0.214)	-1.406 (1.991)	0.181 (6.819)	
Regional Average DV1				-30.666*** (2.690)		
Regional Average DV5		-38.089*** (1.049)			0.718** (0.336)	
LDV						1.006*** (0.011)
<i>N</i>	893	719	755	853	718	183
<i>R</i> ²	0.625	0.977	0.064	0.931	0.668	
Lag	5 years	5 years	1 year	5 years	5 years	5-year-panels
Model	Parsimonious	Parsimonious	Differenced DV			System-GMM
Model	Country FE	Two-way FE	Country FE	Two-way FE	Country FE	
Number of instruments						40
Hansen J-test p-value						0.001
AR(2) test p-value						0.582

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A5: Regression results Controlling for no women in parliament

	(1)	(2)
	Infant mortality	Infant mortality
Binary, Women in par.	0.0360 (0.0241)	0.0185 (0.0261)
Women in parl.		-0.0028** (0.0013)
Regional Average DV	-37.2404*** (2.1805)	-37.2905*** (2.3797)
GDP per capita	0.0567* (0.0290)	0.0614* (0.0322)
International aid	-0.0037 (0.0054)	0.0018 (0.0050)
Democracy	-0.0820* (0.0424)	-0.0689 (0.0524)
Urban population	-0.1019 (0.0810)	-0.0691 (0.0848)
Corruption	-0.1679* (0.0853)	-0.2130** (0.0883)
N	1457	1304
R^2	0.906	0.908

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A6: Regression results for Share of women in parliament and Under-5 Mortality

	Dependent variable: Child mortality	
	(1)	(2)
Women in parl.	-0.371** (0.161)	-0.317* (0.173)
GDP per capita	11.050** (5.182)	7.803* (4.379)
International aid	0.052 (0.982)	-0.430 (0.756)
Democracy	-3.992 (7.645)	-4.764 (7.399)
Urban population	-8.755 (13.294)	-16.548 (11.160)
Corruption	-33.687** (12.997)	-32.404** (12.296)
LDV	0.815*** (0.050)	
Regional Average DV		
<i>N</i>	1370	-29.841*** (1.720)
<i>R</i> ²	0.910	1370
Model	Two-way FE	0.914
Lag	5 years	Two-way FE 5 years

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A7: Regression results for Share of women in parliament and Night lights

	(1)
Women in parl.	0.000 (0.000)
LDV	0.420*** (0.059)
GDP per capita	-0.012 (0.008)
International aid	0.003** (0.002)
Democracy	0.018 (0.014)
Urban population	0.012 (0.007)
Corruption	0.000 (0.012)
International conflict	-0.002 (0.002)
Internal conflict	0.003 (0.003)
<i>N</i>	405
<i>R</i> ²	0.310
Country FE	Yes
Lags	1 year

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A8: Regression results for Share of women in parliament and control for societal changes.

	(1) Infant mortality	(2) Infant mortality	(3) Maternal mortality	(4) Maternal mortality	(5) Access to water	(6) Access to water
Women in parl.	-0.0052* (0.0031)	-0.0053* (0.0031)	0.0017 (0.0055)	0.0015 (0.0056)	-0.0892 (0.0616)	-0.0897 (0.0621)
Regional average	0.8508*** (0.1515)	0.7669*** (0.1402)	0.1781 (0.4313)	0.2035 (0.4143)	0.7178** (0.3360)	0.7228** (0.3353)
GDP per capita	-0.0243 (0.0434)	-0.0369 (0.0395)	-0.1914*** (0.0676)	-0.1975*** (0.0638)	4.1019 (2.7191)	4.0897 (2.7618)
International aid	0.0081 (0.0088)	0.0001 (0.0097)	-0.0032 (0.0262)	-0.0041 (0.0272)	0.5412* (0.3137)	0.5354 (0.3212)
Democracy	-0.1602* (0.0814)	-0.1088 (0.0769)	-0.0055 (0.0960)	0.0016 (0.0935)	0.3233 (3.0887)	0.3361 (3.0862)
Urban population	-0.0663 (0.0776)	-0.0161 (0.0677)	-0.5417* (0.2701)	-0.5356* (0.2807)	5.7185 (6.2813)	5.7390 (6.3097)
Corruption	-0.2718 (0.1858)	-0.2240 (0.1925)	0.1435 (0.1866)	0.1390 (0.1933)	0.1813 (6.8190)	0.2239 (7.0069)
Beijing	0.0500 (0.0314)		0.0445 (0.0403)		0.0000 (.)	
MDG		-0.0630** (0.0311)		0.0364 (0.0479)		-0.0762 (0.4968)
<i>N</i>	1408	1408	946	946	718	718
<i>R</i> ²	0.755	0.758	0.595	0.594	0.668	0.668
Lag	5 years	5 years	5 years	5 years	5 years	5 years
Model	Country FE	Country FE	Country FE	Country FE	Country FE	Country FE

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A9: Regression results for Share of women in parliament and control for International and Domestic Armed Conflict.

	(1)	(2)	(3)
	Infant mortality	Maternal mortality	Access to water
Women in parl.	-0.0037** (0.0014)	0.0035 (0.0050)	0.0198 (0.0193)
Regional average	-36.3795*** (3.8332)	-37.5618*** (5.4856)	-37.8076*** (2.0061)
GDP per capita	0.0145 (0.0307)	0.0187 (0.0530)	0.3671 (0.7415)
International aid	0.0126*** (0.0045)	0.0491** (0.0179)	0.0307 (0.1029)
Democracy	0.0152 (0.0507)	0.1254 (0.0750)	0.2509 (0.8533)
Urban population	-0.1025 (0.1109)	-0.3116 (0.2578)	-2.2188 (1.4016)
Corruption	-0.0439 (0.0964)	0.0334 (0.1696)	-2.7077** (1.2370)
International conflict	-0.0919** (0.0380)	0.0568 (0.0427)	0.2357 (0.3073)
Internal conflict	0.0256 (0.0295)	0.0561 (0.0503)	-0.4805 (0.7656)
<i>N</i>	773	513	374
<i>R</i> ²	0.907	0.773	0.980
Lag	5 years	5 years	5 years
Model	Two-way FE	Two-way FE	Two-way FE

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A10: Regression results for interaction between women in parliament and women civil society participation.

	(1)	(2)	(3)	(4)	(5)	(6)
	Infant mortality	Infant mortality	Maternal mortality	Maternal mortality	Access to water	Access to water
Women participation	-0.152* (0.083)	0.046 (0.111)	0.285 (0.225)	0.396* (0.210)	1.771* (1.042)	-0.690 (3.430)
Women in par. × Participation		0.027 (0.022)		0.019 (0.038)		-0.315 (0.740)
		-0.084* (0.047)		-0.035 (0.095)		0.851 (1.368)
Regional Average DV	-36.605*** (2.137)	-36.774*** (2.193)	-33.298*** (2.234)	-32.768*** (2.390)	-37.355*** (1.106)	-37.934*** (1.041)
GDP per capita	0.050 (0.030)	0.061* (0.035)	0.038 (0.058)	0.022 (0.054)	1.112 (0.681)	0.979 (0.691)
International aid	-0.001 (0.006)	0.002 (0.005)	0.012 (0.013)	0.013 (0.014)	-0.064 (0.068)	-0.081 (0.082)
Democracy	-0.054 (0.043)	-0.045 (0.053)	0.063 (0.042)	0.034 (0.049)	-0.364 (0.533)	-0.426 (0.653)
Urban population	-0.100 (0.072)	-0.061 (0.088)	-0.236 (0.216)	-0.244 (0.241)	-2.333** (1.136)	-2.630** (1.120)
Corruption	-0.144** (0.071)	-0.193** (0.083)	-0.055 (0.118)	-0.060 (0.118)	-1.990** (0.903)	-1.999** (0.894)
<i>N</i>	1694	1408	1064	946	791	718
<i>R</i> ²	0.909	0.910	0.798	0.799	0.978	0.978
Lag	5 years	5 years	5 years	5 years	5 years	5 years
Model	Country FE	Country FE	Country FE	Country FE	Country FE	Country FE

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A11: Regression results for Interaction terms between Share of women in parliament and Formal Representation (DV= Infant mortality)

	(1)	(2)	(3)
Women in parl. (log)	-0.005 (0.004)	-0.006 (0.004)	-0.013** (0.005)
Gender quotas	0.321*** (0.040)		
Electoral systems		0.043*** (0.015)	
Barriers to parties			-0.025** (0.011)
Women in parl. × Quotas	-0.130*** (0.014)		
Women in parl. × El. systems		-0.017*** (0.006)	
Women in parl. × Barriers			0.003 (0.005)
Clean elections	-0.061*** (0.014)	-0.029* (0.017)	-0.026* (0.014)
GDP per capita	0.026*** (0.008)	0.037*** (0.009)	0.023*** (0.008)
Corruption	-0.093*** (0.022)	-0.140*** (0.022)	
LDV	0.766*** (0.014)	0.762*** (0.018)	0.773*** (0.015)
Constant	0.998*** (0.133)	0.958*** (0.144)	0.933*** (0.136)
Observations	1,953	1,564	1,954
R ²	0.969	0.977	0.967
Adjusted R ²	0.966	0.975	0.965
Two-way FE	Yes	Yes	Yes
Lags	5 years	5 years	5 years

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A12: Regression results for the effect of women in parliament on infant mortality, split sample to one- and multi-party state (DV= Infant mortality)

	(1)	(2)
	One-party	Multi-party
Women in parl.	-0.004 (0.003)	-0.003** (0.002)
Regional Average DV	-28.660*** (6.396)	-36.560*** (2.805)
GDP per capita	-0.143** (0.062)	0.099** (0.048)
International aid	-0.022*** (0.008)	0.005 (0.005)
Urban population	0.026 (0.094)	-0.054 (0.082)
Corruption	0.090 (0.153)	-0.120 (0.117)
<i>N</i>	382	1029
<i>R</i> ²	0.716	0.919

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$