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POLITICAL EMPOWERMENT OF WOMEN AND HUMAN DEVELOPMENT INDEX IN THE STATES OF MEXICO

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Abstract. Based on the critical mass theory, this article analyzes the effect of political empowerment of women in legislatures and mayoralties of the federal states of Mexico over the Sub-national Human Development Index [SHDI]. Using a balanced panel data composed by 352 observations during the 2010-2020 period, the results show that the critical mass of 30% of women in State legislatures increases health and education sub-indexes. Similarly, the critical mass of 20% of women as majors has a favorable impact on the SHDI and their standard of living and education components. These results highlight that political empowerment of women enhance economic and social development in the context of an emerging country and make a call to legislators in gender issues.

Key Words: political empowerment of women; human development; critical mass theory; sustainability; Mexico.

EMPODERAMIENTO POLÍTICO DE LAS MUJERES Y EL ÍNDICE DE DESARROLLO HUMANO EN LOS ESTADOS DE MÉXICO

Resumen. Basado en la teoría de la masa crítica, este artículo analiza el efecto del empoderamiento de las mujeres en legislaturas y alcaldías en Subíndice de Desarrollo Humano (SDH) de los estados de México. Usando un panel balanceado compuesto por 352 observaciones durante el periodo 2010-2020, los resultados muestran que la masa crítica de 30% de mujeres en las legislaturas de los estados incrementa los subíndices de salud y educación. De manera similar, la masa crítica de 20% de mujeres como alcaldes tiene un impacto favorable en el SHD y en sus componentes de nivel de vida y educación. Estos resultados destacan que el empoderamiento político de las mujeres mejora el desarrollo económico y social en el contexto de una economía emergente y hacen un llamado a los legisladores en temas de género.

Palabras clave: empoderamiento político de las mujeres; desarrollo humano; teoría de la masa crítica; sustentabilidad; México.

Clasificación JEL: O15; J16; N46.

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1. INTRODUCTION

Even though women represent half the electorate, and despite having obtained the right to vote and increased their participation in the labor market in most countries, they continue to be under-represented in leadership political positions. The historical domination of politics and leadership positions by men has meant that the idea of what constitutes a politician or a political leader, has traditionally been shaped by stereotypically masculine traits (Johnson and Williams, 2020). According to the United Nations' worldwide report "The World's Women 2015", the women's parliamentary reached 22% in 2015, showing an increase of 10% compared to the rate registered in 1997, which was only 12%. By contrast, the number of women who held positions of heads of State or Governor was 19, only 7 more positions compared to 1995 (United Nations, 2015). Although, the inclusion of women in national parliaments has increased worldwide, their representation is one woman for every five men, while women represent 30% of the electoral candidates to occupy positions in legislatures. According to Inter-Parliamentary Union (2018), the average proportion of women in legislatures has doubled during the quota era, from 12% in 1997 to 24% in 2018; while the participation of women in the national courts has increased from 6% in 1994 to 18% in 2015 (Verge and Lombardo, 2019).

The global adoption gender quotas on electoral process have transformed the composition of legislatures. Quotas are regulations that aim to ensure that a minimum number or proportion of political candidates or representatives is women (Bush and Zetterberg, 2021). Previous studies have shown that gender quotas policies in leadership political positions influence government priorities in historically feminized areas (Clayton and Zetterberg, 2018). According to Tusalem (2022) the female representation in legislatures is correlated with having better public goods provision in the context of tangible public services that are important to women constituents. Nasser (2018) argues that female quotas in political positions increases government expenditures towards public health, social development rate in aspects such as childcare, equal pay, parental leave, pensions, reproductive rights and protection against gender violence. Similarly, Beaman *et al.* (2009) and Opstrup and Villadsen (2015) associate female participation in leadership positions with a greater public spending oriented towards social development and innovative orientation and with a higher financial performance in municipal management.

Despite gender quotas adoption in political positions in Mexico, women's situation is unfavorable, making it necessary to advance for gender parity as

a permanent measure (Corona-Nakamura and Salgado, 2020). Women still face institutional, structural and cultural barriers. For instance, the effects of the electoral system and the district magnitude, the candidate nominations of political parties, the availability of positive action strategies and gender quotas are seen as institutional factors that influence the chance of success of women in the election process. In the structural dimension, the influence of the social system determines the eligibility and capacity of women for political positions, while the cultural factors are related to political culture, religion and the persistence of traditional towards women in politics may have an influence in the level of participation and representation of women in elections and political positions (Sumbas, 2019).

Using a balanced data panel composed by 352 observations during the 2010-2020 period and controlled by fixed effects of year and region, this article aims to analyze the effect of political participation of women in legislatures and mayoralties of the 31 federal states of Mexico and Mexico City over the Sub-national Human Development Index (SHDI), and their components: education, health and standard of living. The results show that the critical mass of 30% of women in the state legislatures increases the health and education sub-indexes. As for mayoralties, the critical mass of 20% of women has a favorable impact on the SHDI and their standard of living and education components. Additional robustness analysis shows that a critical mass of 40% of women in state legislatures and mayoralties increases the SHDI and the standard of living dimension.

This research addresses a gap in the international literature responding to a growing interest in gender parity in political positions and its influence on social outcomes (Park, 2017). First, there is a need for more empirical studies on the representation of women in local government, raising a need to extend our knowledge and critique the suppositions about women and local politics. Most published studies on women's political representation focus on the national level; very few address gender participation at the local level (Pini and McDonald, 2011). The Mexican case is still understudied in terms of women's roles in local-level participation and their critical role in human development promotion. Second, this research tests whether political ideology and expertise of females in legislative and mayoralty positions affect human development indicators. Although prior research has shown the benefits of women's political representation, yet gendered barriers remain, requiring further theorizing and data collection to identify how the institutional context may interact with gender norms to shape women's influence in decision-making spaces. The critical mass theory proposes that women are unlikely

to have a major impact on political outcomes unless they constitute a “large minority” of elected representatives (Dahlerup, 1988). In other words, a substantial increase in elected women has the potential to transform the political agenda (Krook, 2015).

Third, this research approaches the association between political empowerment of women in legislatures and mayoralties, and the level of human development performance at a sub-national level in Mexico, a context characterized by low rates of human development and high poverty and inequality framework. Finally, the article has important theoretical contributions and practical implications for those responsible for designing and implementing public policies and regulations. A critical mass of 20–40% of women in leadership positions may favor the human development performance at a sub-national level (Swiss *et al.*, 2012).

The article is structured as follows: section 2 develops the theoretical background and the study hypotheses. Section 3 describes data, measures and employed empirical methods. Section 4 reports and discusses the findings. It concludes with a discussion of the implications and limitations of the research.

2. THEORETICAL DEVELOPMENT

Female participation in political positions

The proportion of women in national parliaments and mayoralties in Latin America shows a significant increase from 1998 to 2020. From 11.4% in 1998 to 31.3% in 2020 in national parliaments, and from 5.3% in 1998 to 15.5% in 2018 in mayoralties (Economic Commission for Latin America and the Caribbean [ECLAC, 2021]). The countries that reach a greater representation of women in national parliaments in 2020 are Mexico (48.2%), Nicaragua (47.2%), Bolivia (46.2%), Costa Rica (45.6%) and Argentina (40.9%). The countries with the lowest female representation in legislatures are Brazil (14.6%), Paraguay (16.2%), Colombia (18.3%), Guatemala (19.4%), and Honduras (21.1%).

Among the factors that have increased women’s participation in political positions are the adoption of gender quotas, the inclusion of women in political parties, equal access to resources in electoral campaigns, and differences in gender in political interests and knowledge (Clayton and Zetterberg, 2018). In 2015, 74 countries implemented legislation aimed at promoting gender quotas for local governments and national parliaments. Today more than 130 countries worldwide have modified constitutions, electoral laws, or party rules

to mandate that a certain proportion of women be included as candidates or legislators (Hughes *et al.*, 2019). These countries have reached a higher proportion of women (26%) compared to those that have not adopted a quota system (16%) (United Nations, 2015).

Women's participation in political positions in Mexico has increased exponentially in recent years, especially in the legislative branch. When the first woman took office as legislator in 1954, the increase in their participation has been gradual and constant in the national parliament (Zabludovsky, 2015). However, for almost four decades, their presence remained at very low levels. The female deputies began to increase, from 23.5% in 2005 to 48.2% in 2020. With regard to female representation in the Senate, Mexico reached 21.1% in 2003, while in 2020 it was 49.2%. Finally, the positions of municipal presidents held by women have increased from 3.5% in 1995 to 21.6% in 2019. However, there is still a gap to reach the 50-50-gender parity. The increase of women representation in the public sector is the result of the Federal Electoral Code reforms on gender approved in 2002, 2008 and 2012, which force political parties to a gender quota in positions of popular representation. With the constitutional reform on gender parity, published on June 6, 2019, in the *Official Gazette of the Federation*, the female representation in the executive, legislative and judicial powers (at federal and local levels) has increased.

Human development level in Mexico

Human rights are essential for the protection of human dignity in the context of the global neoliberal democratic order (Richards, 2005). Public spending on human development strategies in Mexico has evolved during the course of the 20th century (Scott, 2011). Mexico evolved from a country of 13.6 million inhabitants, with an illiteracy rate of 80%, an infant mortality rate of 25% and a life expectancy at birth of 30 years, into a country of more than 100 million inhabitants, with a 10% illiteracy rate, less than 2% infant mortality rate and a life expectancy at birth above 75 years. According to data from the Human Development Index (HDI), the country as a whole has continuously increased its level of human development between 2010 and 2015, observing a positive change in the HDI in 93% of Mexican municipalities. The health index is the dimension that contributes the most to the equal opportunities process, followed by education and standard of living (United Nations Development Program [UNDP], 2019). However, a high development gap persists between the states and municipalities, even more pronounced in the latter.

Hypotheses development

A large amount of social psychology literature shows gender differences in terms of specializations, linguistic capabilities, predisposition towards stress, and general behavior. For instance, Hamidullah *et al.* (2015) and Fox and Schuhmann (1999) suggest that women place more emphasis on values such as caring, interconnectedness, and responsibility in the form of equity, whereas men focus more on rules, individualism and justice in the form of equality and impartiality. Suzuki and Avellaneda (2018) suggest that decision-making in political positions is impacted by different life experiences and preferences of men and women (*e.g.*, women are less willing to take financial risks). González and Virdis (2022) affirm that female labor force is affected by non-economic factors such as social, cultural and legal norms.

The “glass ceiling” is a metaphor used by Nora Frenkiel in *Adweek* in March 1984 to describe the invisible obstacles that women face after they attain mid-management positions. Women advance to the top of middle management but are unable to pass through this barrier (Schwanke, 2013). The key points in the glass ceiling approach are: 1) the discrimination against women, proved by the statistics of unequal access to the top; this reflects traditional stereotypes and prejudices against women in authority; 2) this discrimination is irrational and leads to an underuse of women’s talent and conflicts with rational administration; and 3) it can be overcome by organizational measures that remove the barriers to women’s advancement, such as eliminating prejudice and enforcing equal employment opportunities to promotion (Connell, 2006).

Prior research suggests that women adopt different leadership styles to promote greater participation, democracy, and inclusive communication (Lawless, 2015). Women are concerned about the well-being of others and are oriented towards interest groups, while they are also more sensitive to social and ethical issues (Al-Shaer and Zaman, 2016). Therefore, they are more likely to get involved in strategic issues that affect society and social responsibility (Manita *et al.*, 2018). Recently, Park and Liang (2019) found that female representation in legislatures and executive branches, improves equity and social outcomes, such as educational attainment, labor force participation, and gender equality. A recent study made by Tusalem (2022), concludes that female representation in legislatures leads to better infrastructure development and improves citizens life quality.

The social role theory identifies several reasons why one should expect more oriented women towards achieving substantive policy results and, particularly, welfare-enhancing outcomes for their communities (Lapuente and Suzuki,

2021). According to Cortis *et al.* (2022) and Briano-Turrent (2022), female leaders are frequently theorized as more likely to affect change, by eroding homo-social hiring and decision-making, to positively impact on organizational equity practices and outcomes.

Krishnan and Park (2005) identify three benefits of integrating women in political positions. First, women are better leaders compared to men in settings that involve a high degree of social interaction. Second, women face more challenges and barriers to breaking the “glass ceiling” in leadership positions, so they could count on greater preparation and experience when being nominated for these positions. Third, the cognitive style of women tends to emphasize harmony and social responsibility, which can motivate a dynamic and productive environment.

The participation of women in local governments decisions (as majors) is a first approach to the needs and priorities of local policies and the budgets allocation (United Nations Statistics Division, 2015). From the economic point of view, the municipality constitutes a production unit that utilizes resources to supply products that satisfy society’s needs (Herrera-Catalán and Fracke, 2007). The representation of women in state legislatures and mayoralties constitutes a first step towards promoting gender diversity, which is associated with policy changes and greater budget efficiency (Hicks *et al.*, 2016).

According to Bolzendahl and Brooks (2007), gender parity in state legislatures generates an increase in the social spending aimed at the community’s well-being, which translates into higher Gross Domestic Product (GDP) per capita and lower unemployment rates. Similarly, Swiss *et al.* (2012) argue that an increase in the female representation in legislatures significantly improves child health in developing countries. Giles-Sims *et al.* (2012) found a positive relationship between women’s participation in legislatures and support for policies aimed at older adults. Nasser (2018) argues that women’s participation in the public sector in Arab countries motivates a higher rate of social development in aspects such as childcare, equal pay, parental leave, pensions, reproductive rights and protection against gender violence. Another study in 13 countries in Asia and Oceania found that mayoralties run by women were more focused on social aspects such as medical services, poverty alleviation and community development, showing a more inclusive, collaborative leadership style, consultative and people-oriented (United Nations, 2005). Clayton and Zetterberg (2018), show that an increase in women’s parliamentary representation is followed by increased government expenditures towards public health.

The gender variable significantly influences on different domains of social policy, such as human development performance (Brady and Lee, 2014). The indicators of social expenditure proposed by the Organisation for Economic Cooperation and Development (OECD) include benefits and services for the elderly and disabled, sickness benefits and family services, support programs for unemployment, health, housing and other contingencies (Bolzendahl and Brooks, 2007). Park (2017) addresses three strategic areas of public policy in which women are most interested in strengthening: medical care, daycare and education. According to what has been previously discussed, the first hypothesis is specified as follows:

Hypothesis 1. Women's representation in state legislatures and mayoralities positively impacts on the SHDI and their components in the federal states of Mexico.

The concept of "critical mass" came to the fore in political science after Dahlerup's 1988 article publication "From a small to a large minority: Women in Scandinavian politics". Kanter (1977) had proposed a typology of four group types in order to investigate the effect of changing group dynamics on organizational culture. From her work, two group types have emerged as the most important in critical mass debates—the skewed group, where the minority constituted a maximum of 15% and are "tokens," and the tilted group, in which the minority has between 15 and 40% membership and is "becoming strong enough to begin to influence the culture of the group" (Grey, 2006, p. 494).

Critical mass theory states that the gender balance in legislative bodies could favor results in the public sector, since the representation of the minority group is significant. Feeney *et al.* (2018) indicate that proportional representation of socially and culturally different people in a group is critical to shaping interaction dynamics and decision-making, and that underrepresentation of women in decision-making positions furthers the cycle of problems associated with tokenism. Saint-Germain (1989) suggests that the influence of women in decision-making is greater when their percentage of representation is at least 15%. According to Grey (2006), a 15% representation of women in legislative bodies affects changes in the political agenda, although with 40% participation, the introduction of new public policies is more feasible.

Along the same lines, Crowley (2006) suggests 15% as a symbolic level and shows that those states with legislative representation of women above this level promote greater equal rights in the United States. Giles-Sims *et al.* (2012) argue that with a critical mass of 20% of female representation in legislatures, policies focused on older adults are favored. Swiss *et al.* (2012) state

that the critical mass is achieved with 30% representation of women legislators. On the contrary, Park (2017) finds 22 OECD countries with a critical mass of 10% of women representation where public spending on health, daycare and education showed an increase. A substantive representation of women in the legislative branch has been favorably associated with gender-specific policy issues, as well as the interests and needs of citizens, such as childcare support, work-family balance, social security, reproduction and health and gender parity (Gerrity *et al.*, 2007). According to the previous discussion, we expect:

Hypothesis 2. When the state legislatures and mayoralties reach a critical mass level of women (20 to 40%), the SHDI and their components are increased in the federal states of Mexico.

3. MATERIALS AND METHODS

This research focuses on analyzing the 31 federal states in Mexico and Mexico City from 2010 to 2020. The final sample is composed by 352 observations, that is, 11 observations per state.¹ To account for unobserved heterogeneity, a fixed-effects estimation was adopted, which is often used in observational data contexts² (Park and Liang, 2019).

To analyze the relationship between gender diversity in state legislatures and mayoralties and the SHDI, the variables are classified into three groups: 1) women representation in political positions, 2) the SHDI composed the global HDI, education sub-index, health sub-index, and standard of living sub-index (UNDP, 2019); and 3) control variables (Appendix A shows the variables definition and measurement). The econometric model is below:

$$\begin{aligned} Hum_Development_{i,t} = & \alpha_0 + \alpha_1 GenderLeg_{i,t} + \alpha_2 GenderMayor_{i,t} \\ & + \alpha_3 (Control_{i,t}) + \mu_{i,t} \end{aligned} \quad (1)$$

Where:

Hum_Development global HDI and its components: education sub-index [expected years of schooling and average years of schooling], health

1 The study variables were obtained from different official sources in Mexico, such as INMUJERES (2019), INEGI (2019) and Global Data Lab (2020).

2 The Hausman test indicates that the value of Chi² is less than 0.05, so it is appropriate to use the fixed effects estimator.

sub-index [life expectancy], and standard of living sub-index [GNI per capita] in a given year t (Global Data Lab, 2020). The SHDI is an average of the sub-national values of three dimensions: education, health and standard of living; which includes indicators from household surveys and census datasets. For the health dimension, life expectancy at birth acts as an indicator. For standard of living, (the log of) gross national income per capita is used – measured with Purchasing Power Parities [PPP] in 2011 US\$. The educational dimension is measured with the expected years of schooling, that is, the future level of education of the population. Like the original HDI, the SHDI takes values between 0 and 1 [the lowest possible value is 0 and the maximal level is 1] (Smits and Permanyer, 2019).

GenderLeg, percentage of women in state legislatures in a given year t , a dichotomous variable that takes the value of 1 if at least 20, 30 or 40% of women are in legislatures in a given year t and 0 otherwise.

GenderMayor, percentage of women elected as mayors in a given year t , a dichotomous variable that takes the value of 1 if at least 20, 30 or 40% of women mayors are elected in a given year t and 0 otherwise.

Control, public debt ratio, GDP growth, population size, region, and year of study.

$\mu_{i,t}$ is the error term.

4. RESULTS AND DISCUSSION

Descriptive analysis

Table 1 shows the descriptive statistics for the study variables for the years 2010 and 2020. The mean value of the participation of women in the state legislatures is 24% in 2010 and 49% in 2020, which meant an increase of 25%, while the presence of women as elected mayors reached an average of 5% in 2010 and 28% in 2020 (23% increase). The critical mass (20%) of women in state legislatures and mayoralties registers 71.88 and 3.13%, respectively in 2010, and 100 and 90.62% in 2020. The critical mass (30%) of women in legislatures and mayoralties registered 25 and 0% in 2010, while in 2020 it registered 100 and 37.5%, respectively. The critical mass (40%) of women in state legislatures and mayoralties reached 0% in 2010; there is however a significant increase in 2020 (93.75 and 9.38% in legislatures and mayoralties, respectively).

Table 1. Descriptive statistics of the study variables

Variable/Year	2010					2020				
	%	Mean	Max	Min	Std Desv	%	Mean	Max	Min	Std Desv
% Women in legislatures		0.24	0.38	0.07	0.08		0.49	0.7	0.37	0.07
Critical mass of women (20%) in legislatures	71.88					100.00				
Critical mass of women (30%) in legislatures	25.00					100.00				
40% critical mass of women in legislatures	0.00					93.75				
% Women as mayors		0.05	0.20	0.00	0.05		0.28	0.60	0.11	0.10
Critical mass of women(20%) as mayors	3.13					90.62				
Critical mass of women (30%) as mayors	0.00					37.50				
Critical mass of women (40%) as mayors	0.00					9.38				
Human development index		0.74	0.81	0.65	0.04		0.77	0.83	0.69	0.03
Health sub-index		0.86	0.90	0.80	0.02		0.85	0.88	0.82	0.02
Standard of living sub-index		0.77	0.83	0.65	0.05		0.75	0.80	0.67	0.04
Education sub-index		0.62	0.76	0.51	0.05		0.70	0.84	0.59	0.05
Population size (millions)		3.53	15.00	0.58	2.91		4.14	1.81	0.78	3.41
Public debt		0.02	0.05	0.00	0.01		0.03	0.08	0.00	0.02
Economic growth		0.05	0.12	-0.02	0.03		-0.08	0.05	-0.29	0.06
GNI per capita		9.78	10.19	9.00	0.33		9.65	9.96	9.07	0.24

Source: own elaboration.

The SHDI shows an increase from 0.74 to 0.77; as well as the education sub-index 0.62 *vs.* 0.70. By contrast, health index and standard of living index showed a decrease: 0.86 *vs.* 0.85 and 0.77 *vs.* 0.75, respectively. The population in millions of inhabitants has increased in 2020, 3.53 *vs.* 4.14. Regarding the percentage of economic growth, the average is 0.0 in 2010 and -0.08 in 2020 while GNI per capita has decreased, 9.78 *vs.* 9.65. The public debt ratio has increased from 0.02 in 2010 to 0.03 in 2020.

Table 2 describes the participation of women in legislatures and mayoralties and the SHDI by federal state in Mexico. In 2020, the federal states that evidence a higher women representation in legislatures are Morelos (70%), Chiapas (65%), Coahuila (56%), Colima (56%), Campeche (54%), Hidalgo (53%), Querétaro (52%), and Tabasco (51%); the SHDI shows higher rates in states with higher women representation in legislatures. The states with lower participation of women are Nayarit (37%), Michoacán (40%), Durango (40%) and Jalisco (44%). Most of the federal states have already reached gender parity in legislatures by 2020. Regarding the mayoralties held by women, an increase of 23% is observed in 2020 *vs.* 2010, which suggests that women have increase their presence to fill these positions. Although no state has achieved 50-50 parity in mayoralties, some states are close to reaching the goal: Tabasco (47%), Baja California (60%), Baja California Sur (40%), Quintana Roo (36%), Tamaulipas (37%) and Coahuila (37%). The federal states with the lowest rates of women occupying mayoralties are Tlaxcala (12%), Oaxaca (11%), Morelos (15%), Colima (20%), Hidalgo (20%) and Guerrero (21%). Baja California and Baja California Sur reached the highest female participation as mayors, 60 and 40%, respectively; and their SHDI accounts the highest indexes in the federal states (0.80).

Table 2. Women participation (%) in legislatures and mayoralties

<i>Federal state</i>	<i>2010</i>			<i>2020</i>		
	<i>% women in legislatures</i>	<i>% women as mayors</i>	<i>SHDI</i>	<i>% women in legislatures</i>	<i>% women as mayors</i>	<i>SHDI</i>
Aguascalientes	0.07	0.00	0.77	0.48	0.27	0.79
Baja California	0.28	0.00	0.78	0.48	0.60	0.80
Baja California Sur	0.33	0.20	0.77	0.57	0.40	0.80
Campeche	0.34	0.18	0.75	0.54	0.27	0.76
Chiapas	0.35	0.01	0.77	0.65	0.28	0.79

Federal state	2010			2020		
	% women in legislatures	% women as mayors	SHDI	% women in legislatures	% women as mayors	SHDI
Chihuahua	0.09	0.04	0.76	0.45	0.27	0.78
Ciudad de México	0.24	0.06	0.81	0.50	0.25	0.83
Coahuila	0.24	0.03	0.65	0.56	0.37	0.69
Colima	0.20	0.00	0.77	0.56	0.20	0.78
Durango	0.23	0.00	0.74	0.40	0.33	0.76
Estado de México	0.20	0.04	0.75	0.49	0.38	0.78
Guanajuato	0.28	0.11	0.72	0.50	0.28	0.75
Guerrero	0.17	0.05	0.66	0.39	0.21	0.71
Hidalgo	0.27	0.05	0.72	0.53	0.20	0.75
Jalisco	0.21	0.08	0.76	0.44	0.23	0.78
Michoacán	0.13	0.05	0.71	0.40	0.22	0.74
Morelos	0.25	0.00	0.75	0.70	0.15	0.77
Nayarit	0.07	0.05	0.73	0.37	0.25	0.77
Nuevo León	0.26	0.04	0.78	0.50	0.18	0.80
Oaxaca	0.38	0.03	0.67	0.50	0.11	0.70
Puebla	0.29	0.03	0.71	0.44	0.22	0.73
Querétaro	0.16	0.00	0.75	0.52	0.33	0.78
Quintana Roo	0.24	0.00	0.76	0.48	0.36	0.77
San Luis Potosí	0.22	0.07	0.73	0.44	0.28	0.75
Sinaloa	0.18	0.11	0.77	0.45	0.33	0.79
Sonora	0.18	0.03	0.78	0.42	0.33	0.79
Tabasco	0.20	0.00	0.75	0.51	0.47	0.76
Tamaulipas	0.31	0.05	0.77	0.50	0.37	0.79
Tlaxcala	0.24	0.08	0.73	0.56	0.12	0.76
Veracruz	0.30	0.08	0.70	0.50	0.26	0.74
Yucatán	0.32	0.14	0.74	0.48	0.28	0.77
Zacatecas	0.30	0.00	0.73	0.47	0.28	0.76

Source: own elaboration.

Correlation analysis

Table 3 shows positive correlations between the percentage of women in the state legislatures and the percentage of elected mayors, the critical mass of elected legislators and mayors, the HDI and the education sub-index ($p=0.01$). Similarly, there is a significant and positive correlation between the percentage of elected mayors with the critical mass of elected legislators and mayors, the human development index and the education sub-index ($p=0.01$).

The variables referring to the critical mass of women in state legislatures are favorably related to the SHDI and the education sub-index ($p=0.01$). The variable referring to the critical mass of women of 20% in mayoralties is positively associated with the SHDI, and the education sub-index ($p=0.01$). There is a favorable and significant correlation between the variables of critical mass of women in the mayoralties with the SHDI and the education sub-index ($p=0.01$).

The SHDI has a positive correlation with the different sub-indexes that comprise: health, education and standard of living sub-indexes and the GNI per capita ($p=0.01$). The economic growth is positively associated with GNI per capita ($p=0.01$).

There are significant negative correlations between the percentage of women in state legislatures and the economic growth ($p=0.01$); between the critical mass levels of women in legislatures and mayoralties and the economic growth ($p=0.01$). There are no multi-collinearity problems between the study variables.

Econometric analysis

To account for unobserved heterogeneity, a balanced data panel was adopted, using fixed-effects, which are often used in observational data contexts (Park and Liang, 2019). Table 4 shows several empirical models: SHDI index (column 1), health sub-index (column 2), standard of living sub-index (column 3) and education sub-index (column 4) and GNI per capita (column 5).

The participation of women in state legislatures affects positively and significantly the SHDI ($p=0.01$) and the education sub-index ($p=0.01$). The health sub-index is increased when the critical mass reaches 20 or 30% of women in legislatures ($p=0.10$). In the same line, the education sub-index improves with the presence of women in legislatures ($p=0.01$) and with a critical mass of 30% ($p=0.01$). Furthermore, the critical mass of 20% of female in may-

oralties motivates to a higher education sub-index ($p=0.10$). The presence of women in mayoralties, and their critical mass levels of 20 and 30% of female as majors, enhances the standard of living sub-index ($p=0.01$ and $p=0.05$, respectively). By contrast, the critical mass level of women in state legislatures has a negative effect over the standard of living sub-index ($p=0.01$). Finally, the presence of women in legislatures and mayoralties has a negative effect on the standard of living sub-index. Public debt has an unfavorable effect on the health sub-index, the standard of living sub-index and the GNI per capita ($p=0.01$). Nevertheless, public debt favors the education sub-index ($p=0.01$). The population size increases the SHDI ($p=0.01$), health sub-index ($p=0.05$) and education sub-index ($p=0.10$). GDP growth has a favorable effect on the SHDI ($p=0.01$) and the education sub-index ($p=0.05$).

The above results lead us to partially accept hypothesis 1, which establishes that the greater the representation of women in state legislatures and mayoralties in Mexico, the higher the SHDI and their sub-indexes of education and standard of living. The women's parliamentary representation favors some of human development indicators (SHDI, health sub-index and education sub-index). The percentage of women in mayoralties has a positive effect on the standard of living sub-index.

Table 3 proves the econometric results, leading to accept hypothesis 2, which maintains that when the critical mass of women is reached in state legislatures and mayoralties in Mexico, some indicators of human development are improved. For instance, a critical mass level of 30% in legislatures motivates to a better performance in health and education sub-indexes. In the same way, a critical mass of 20% of female in mayoralties favors the SHDI and the standard of living and education sub-indexes. When the critical mass is reached, women begin to influence the process of group discussions to a greater extent and may have better performance (Joecks *et al.*, 2013). Below this threshold people may ignore the presence of the minority, which means women cannot exert enough influence to change the group's decision making in a meaningful way (Yang *et al.*, 2019).

Table 3. Correlation analysis

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. % Women in the legislatures	1.000														
2. Critical mass of women (20%) in legislatures	.583**	1.000													
3. Critical mass of women (30%) in legislatures	.795**	.521**	1.000												
4. Critical mass of women (40%) in legislatures	.816**	.310**	.596**	1.000											
5. % Women as mayors	.566**	.269**	.483**	.528**	1.000										
6. Critical mass of women (20%) as mayors	.555**	.294**	.491**	.528**	.871**	1.000									
7. Critical mass of women (30%) as mayors	.285**	.147**	.283**	.263**	.715**	.501**	1.000								

8. Critical mass of women (40%) as mayors	.178**	0.081	.155**	.180**	.503**	.274**	.547**	1.000											
9. Human development index	.206**	.157**	.179**	.226**	.332**	.317**	.235**	.209**	1.000										
10. Health sub-index	-0.029	0	-0.045	0.017	0.01	-0.074	-0.025	0.095	.544**	1.000									
11. Standard of living sub-index	-0.095	-0.011	-0.083	-0.007	0.052	0.087	0.035	0.064	.846**	.500**	1.000								
12. Education sub-index	.410**	.252**	.362**	.379**	.500**	.476**	.365**	.268**	.904**	.302**	.586**	1.000							
13. Population size	-0.013	-0.018	-0.017	-0.008	0.07	0.034	0.026	-0.085	0.07	-0.077	0.035	.116*	1.000						
14. Public debt ratio	0.044	.111*	0.091	0.042	-0.038	0.032	0.034	-0.008	-0.051	-.319**	0.039	-0.016	0.01	1.000					
15. Economic growth	-.378**	-.139**	-.287**	-.332**	-.299**	-.282**	-.168**	-0.038	0.053	0.021	.203**	-0.066	0.014	0.049	1.000				
16. GNI per capita	-.114*	-0.011	-0.089	-0.023	0.041	0.075	0.028	0.068	.845**	.507**	.997**	.580**	0.025	0.042	.233**				

Notes: ** the correlation is significant at a 0.01 level (bilateral); * the correlation is significant at a 0.05 level (bilateral).

Source: own elaboration.

Table 4. Gender diversity in legislatures/mayoralities and SHDI (Panel data FE)

	(1)	(2)	(3)	(4)	(5)
<i>Variables</i>	<i>HDI</i>	<i>Health index</i>	<i>Standard of living index</i>	<i>Education index</i>	<i>GNI per capita</i>
% Women in legislatures	0.02*** (2.35)	-0.01 (-1.34)	-0.01 (-0.50)	0.07*** (2.95)	-0.10 (-1.19)
Critical mass of women (20%) in legislatures	0.00 (0.73)	0.00* (1.61)	-0.00 (-0.27)	-0.00 (-0.59)	0.00 (0.13)
Critical mass of women (30%) in legislatures	-0.00 (-0.47)	-0.00* (-1.77)	-0.01*** (-4.34)	0.01*** (2.63)	-0.05*** (-3.70)
Critical mass of women (40%) in legislatures	0.00 (0.89)	-0.00 (-0.28)	-0.000 (-0.39)	0.01* (1.67)	-0.00 (-0.17)
% Elected women as mayors	0.00 (0.14)	-0.00 (-0.43)	-0.04*** (-3.31)	0.04 (1.60)	-0.20** (-2.34)
Critical mass of women (20%) as mayors	0.01*** (2.48)	0.00 (0.45)	0.01*** (2.44)	0.01* (1.67)	0.02 (1.30)
Critical mass of women (30%) as mayors	0.00 (0.48)	-0.00 (-0.05)	0.01** (2.29)	-0.00 (-0.25)	0.03 (1.49)
Critical mass of women (40%) as mayors	0.00 (0.14)	-0.00 (-1.33)	-0.00 (-1.00)	0.00 (0.72)	-0.02 (-1.00)
Population size	2.41*** (2.90)	1.85** (2.22)	1.280 (1.16)	3.53* (1.67)	7.02 (0.98)
Public debt ratio	-0.01 (-0.20)	-0.23*** (-5.02)	-0.21*** (-3.49)	0.40*** (3.48)	-1.42*** (-3.61)
GDP growth	-0.04*** (-3.34)	-0.00 (-0.24)	-0.01 (-0.78)	-0.06** (-1.97)	-0.02 (-0.17)

	(1)	(2)	(3)	(4)	(5)
<i>Variables</i>	<i>HDI</i>	<i>Health index</i>	<i>Standard of living index</i>	<i>Education index</i>	<i>GNI per capita</i>
Constant	0.73*** (196.79)	0.86*** (229.01)	0.77*** (154.33)	0.60*** (63.29)	9.78*** (303.44)
R ²	0.386	0.233	0.366	0.698	0.386
Prob > F	0.000	0.000	0.000	0.000	0.000
Observations	352	352	352	352	352

Note: numbers in parentheses refer to statistics t. ***, **, * and indicate the significance level of 1%; 5% and 10%, respectively.

Source: own elaboration.

Robustness analysis

For robustness tests, the models were re-estimated with regards to the measure of the dependent variable SHDI and its components. Differentials between high and low human development indicators in the 31 Mexican federal states and Mexico City might be explained by the influence of women's participation in political spheres. A Logit regression analysis is carried out to analyze the relation between the SHDI and their components and gender variables. For this purpose, a new measure of the dependent variable was constructed, categorizing federal states (including Mexico City) into two groups: 1) high human development federal states, and 2) low human development federal states. This distinction is classified at the mean value of each human development indicator. Therefore, the dependent variable of the SHDI and their sub-indexes are of a binary nature, which equals 1 if the federal state obtains a value above of the mean in each year of study, and 0 otherwise. For this, the following econometric Logit model is established:

$$\begin{aligned}
 \text{High_Hum_Development}_{i,t} = & \alpha_0 + \alpha_1 \text{GenderLeg}_{i,t} \\
 & + \alpha_2 \text{GenderMayor}_{i,t} \\
 & + \alpha_3 (\text{Control}_{i,t}) + \mu_{i,t}
 \end{aligned} \tag{2}$$

Where:

High_Hum_Development, dummy variable for each HDI indicator, which takes the value of 1 when the variable obtains a value above the mean, and 0 otherwise.

GenderLeg, percentage of women who participate as members of the state legislatures in the year t , a dichotomous variable that takes the value of 1 if at least 20, 30 or 40% of women are in legislatures in year t and 0 otherwise.

GenderMayor, percentage of women elected as mayors in year t , a dichotomous variable that takes the value of 1 if at least 20, 30 or 40% of women mayors are elected in year t and 0 otherwise,

Control: public debt ratio, GDP growth, population size, region, and year of study.

$\mu_{i,t}$ is the error term.

Table 5 exhibits the Logit regression analysis. It is observed that the percentage of women in legislatures is more likely to decrease the standard of living sub-index and the GNI per capita indicators ($p=0.05$ and $p=0.01$, respectively). However, when legislatures reach 30% of women are more likely to increase the standard of living sub-index ($p=0.05$) and the GNI per capita ($p=0.05$). Similarly, the critical mass of 40% of female in legislatures is more likely to have a positive and significant effect on the SHDI ($p=0.05$), the standard living sub-index ($p=0.01$), and the GNI per capita ($p=0.10$). Women elected in mayoralties are more likely to increase the health sub-index ($p=0.10$). The critical mass level of 20% of women as mayors is more likely to increase the standard of living sub-index ($p=0.10$), the education sub-index ($p=0.10$) and the GNI per capita ($p=0.10$). The critical mass level of 40% of women in mayoralties is more likely to enhance the standard of living sub-index ($p=0.05$) and the GNI per capita ($p=0.05$). Regarding control variables, the economic growth is more likely to favor human development indicators such as standard of living and education sub-indexes ($p=0.01$). These results confirm that a critical mass level of women on leadership positions in the public sector has a favorable influence over human development indicators, since women show greater sensitivity in relationships [being more understanding, compassionate, sympathetic and empathetic] (Clayton and Zetterberg, 2018).

Table 5. Female representation in legislatures/mayoralities and sub-national human development index (Logit regression analysis)

	(1)	(2)	(3)	(4)	(5)
<i>Variables</i>	<i>HDI</i>	<i>Health index</i>	<i>Standard of living index</i>	<i>Education index</i>	<i>GNI per capita</i>
% Women in legislatures	-1.56 (-0.55)	-0.42 (-0.16)	-6.17** (-2.10)	0.31 (0.10)	-7.33*** (-2.57)
Critical mass of women (20%) in legislatures	-0.07 (-0.15)	0.43 (0.87)	0.49 (1.00)	0.10 (0.20)	0.362 (0.74)
Critical mass of women (30%) in legislatures	0.33 (0.76)	0.55 (1.25)	0.96** (2.09)	0.16 (0.36)	0.88** (2.10)
Critical mass of women (40%) in legislatures	0.93** (1.84)	0.33 (0.70)	1.36*** (2.70)	0.58 (1.10)	0.92* (1.86)
% Elected women as mayors	1.86 (0.56)	5.64* (1.75)	2.93 (0.91)	0.99 (0.28)	-1.52 (-0.51)
Critical mass of women (20%) as mayors	0.63 (1.00)	-0.76 (-1.23)	1.19* (1.75)	1.14* (1.68)	0.99* (1.69)
Critical mass of women (30%) as mayors	1.08 (1.44)	1.15* (1.86)	-0.68 (-1.11)	0.62 (0.79)	-0.13 (-0.21)
Critical mass of women (40%) as mayors	0.10 (0.26)	0.18 (0.24)	2.01** (2.07)	0.00 (0.62)	1.93** (2.10)
Population size	5.64 (0.14)	-8.66** (-2.04)	-2.52 (-0.63)	-1.96 (-0.45)	-2.30 (-0.64)
Public debt	9.54 (1.48)	-21.39*** (-3.41)	11.44* (1.77)	7.52 (1.09)	7.83 (1.23)

continue

Table 5. Female representation in legislatures/mayoralities and sub-national human development index (Logit regression analysis) (*continuation*)

	(1)	(2)	(3)	(4)	(5)
<i>Variables</i>	<i>HDI</i>	<i>Health index</i>	<i>Standard of living index</i>	<i>Education index</i>	<i>GNI per capita</i>
GDP growth	5.59 (1.38)	-0.12 (-0.03)	12.42*** (3.04)	12.61*** (2.83)	12.75*** (3.26)
Constant	0.40 (0.57)	0.91 (1.30)	0.77 (1.23)	-2.32 (-2.85)	0.87 (1.39)
R ²	0.081	0.094	0.124	0.164	0.09
Prob > chi ²	0.019	0.002	0.000	0.000	0.001
Observations	306	320	320	306	319

Note: numbers in parentheses refer to statistics t. ***, **, * and indicate the significance level of 1%; 5% and 10%, respectively.

Source: own elaboration.

5. CONCLUSIONS

This article has shown the benefits of women’s political representation in a context characterized by low rates of human development and high poverty and inequality framework. Although several studies have addressed the relevance of the gender parity in political decision-making, yet gendered barriers remain: women face institutional, structural and cultural barriers (Sumbas, 2019). In this sense, this research extends the international literature in relation to “critical mass theory” and data collection to identify how the institutional context may interact with gender norms to shape women’s influence in decision-making spaces (Dahlerup, 1988).

Although there is an advance for women’s political participation in decision-making spheres, and equal political representation is more evident, Mexico faces challenges to reach real gender parity in political positions. For instance, women candidates are questioned in aspects such as their appearance or their family ties to their possible capacity and preparation to occupy the

position. The fact that more women hold political positions does not mean that there is less discrimination or less harassment. The glass ceiling still prevails, since the mechanisms to evade gender quotas have multiplied and the places meant for women do not always tend to be occupied by women (Delgadillo and Trejo, 2018).

This research aimed to analyze the association between political empowerment of women in legislatures and mayoralties, and the level of human development performance at a sub-national level in Mexico. The empirical results suggest that female representation in state legislatures and mayoralties increase some of the human development indicators in Mexico. Health and education register higher indicators when legislatures reach the critical mass of 30%. However, it is the critical mass of 20% of women as elected mayors that have the greatest impact on the sub-national HDI and the standard of living and education sub-indexes. The robustness analysis confirms that a critical mass level of 40% of women in legislatures, increases the SHDI and the standard of living sub-index; while a 40% of women as mayors increases standard of living sub-index. Finally, the level of public debt has a negative impact on human development indicators, while GDP growth and the size of the population favor them.

The results of this research makes a call to those responsible for legislating, designing and implementing public policies, with the aim of strengthening strategies in matters of gender quotas and human development performance. A substantial increase in elected women has the potential to transform the political agenda (Krook, 2015), therefore, contributing to important practical implications for those responsible for designing and implementing public policies and regulations.

Mexico is one of the most advanced countries in terms of political parity at constitutional level, which translates into jurisprudence that requires to be implemented vertically and horizontally. Although significant progress has been made, particularly in the case of the state legislatures, mayoralties' progress has been slower. It is necessary to deepen the guidelines and selection criteria so that women, who occupy political positions, successfully carry out their responsibilities and have a favorable impact on the economic and social development of the country.

The practical implications of this research are reflected in several recommendations to strengthen public sector and promote the incorporation of women with the required profile by the new public administration: 1) monitor women's representation in legislatures and mayoralties through

an observatory that includes databases of their characteristics and achieved performance; 2) promote ethnic and cultural diversity of women who participate in leadership positions in the public sector; 3) adopt ethics codes and good governance in positions of popular representation, regardless of gender; 4) focus public spending on essential projects for social development with a comprehensive strategy for the efficient and effective allocation of resources; 5) implement a goals-based evaluation system that identifies women's strengths and areas of opportunity in leadership positions in the public sector.

Finally, the limitations and future research are acknowledged in the field of gender quotas in the public sector. First, the study sample is limited to Mexico and the variables at a state level, so it is recommended to carry out comparative studies at municipal level or include other Latin American countries. Second, limitation focuses on the influence of women on SHDI, excluding their influence on other spheres such as innovation, corruption indexes or competitiveness of the states and municipalities. Research on gender diversity issues in the public sector is scarcely developed in Latin America, and particularly in Mexico, so it offers a vast opportunity to explore new variables of public finance or social nature.

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APPENDIX

Appendix A. Variable definition and measurement

<i>Dependent variables</i>	
<i>Sub-national Human Development Index (SHDI)</i>	
Global HDI	Average of the subnational values of three dimensions: education, health and standard of living in a given year t . It is composed by indicators aggregated from household surveys and census datasets (Global Data Lab, 2020). the sub-national HDI takes values between 0 and 1, that is, the lowest possible value is 0 and the maximal level is 1 (Smits and Permanyer, 2019).
Education sub-index	Expected years of schooling and average years of schooling in a given year t (Global Data Lab, 2020; Smits and Permanyer, 2019).
Health sub-index	Life expectancy at birth is adopted as indicator in a given year t (Global Data Lab, 2020; Smits and Permanyer, 2019).
Standard of living sub-index	The log of gross national income per capita is used — measured with Purchasing Power Parities [PPP] in 2011 US\$ in a given year t (Global Data Lab, 2020; Smits and Permanyer, 2019).
<i>Independent variables</i>	
<i>Gender diversity</i>	
GenderStateLeg	Proportion of women in the state legislatures in a given year t (Briano-Turrent, 2019).
CriticalMassLeg	Dichotomous variable that takes the value of 1 if at least 20, 30 or 40% of women are in legislatures in a given year t and 0 otherwise (Briano-Turrent, 2019; Saint-Germain, 1989; Grey, 2006).
GenderMayoralties	Percentage of women elected as mayors in a given year t (Briano-Turrent, 2019; Saint-Germain, 1989; Grey, 2006).
CriticalMassLeg	A dichotomous variable that takes the value of 1 if at least 20, 30 or 40% of women mayors are elected in year t and 0 otherwise (Briano-Turrent, 2019; Saint-Germain, 1989; Grey, 2006).
<i>Gender diversity</i>	
Public debt	The ratio of public debt over GDP (Panizza and Presbitero, 2013).
GDP growth	GPD growth of each state in a given year t (Panizza and Presbitero, 2013).
Population size	Number of people usually living in that region a given year t (INEGI, 2022).
Region	Region of study in Mexico (INEGI, 2022).
Year of study	Year of study.
μ_i	Error term.

Source: own elaboration.

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