UNIVERSIDAD AUTÓNOMA DE NUEVO LEÓN
FACULTAD DE ECONOMÍA
DIVISION DE ESTUDIOS DE POSGRADO

"MATERNAL EMPLOYMENT AND CHILDREN: EFFECTS OF MATERNAL EMPLOYMENT STATUS ON CHILDREN'S SOCIOECONOMIC CHARACTERISTICS"

Por

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Tesis presentada como requisito parcial para obtener el grado de Doctorado en Ciencias Económicas

AGOSTO 2024

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Agosto, 2024

Acknowledgments

I want to thank the Facultad de Economía of the Universidad Autónoma de Nuevo León and my professors for their support and teaching. Especially to my advisor, Dr. Ernesto Aguayo Téllez, who was undoubtedly my best choice to achieve this goal. Thank you for your invaluable contribution to my education as an economist. Special thanks to Dr. Raúl Ponce and Dr. Ikuho Kochi, who have taught me and supported me infinitely since my master's degree.

To my readers, Dr. Jorge Valero, Dr. Cinthya Caamal, Dr. Raymundo Campos, and Dr. Luisa Blanco, for taking the time to read my work and for their valuable comments to continue improving. Finally, I would like to thank CONAHCYT for funding my doctoral studies.

Dedication

I dedicate not only this work but also the achievement of my degree to my family, partner, and friends. To my mother, who always supported me in my career and worked hard so that I could complete each stage, and to my sister, who always accompanied me and encouraged me in my projects. To my friends who were always attentive and made the road more bearable. Especially to my partner who taught, guided, and supported me with love and patience, my unconditional partner throughout the process. Thank you, I love you all.

Contents

Introduction

Millions of women have joined the labor market in various parts of the world in recent decades. In Mexico, the female labor participation rate increased from 30% in 2000 to 46.2% by 2023. Despite this increase, women continue to be the main caregivers in the home. According to data from the National Time Use Survey (ENUT-2019) for Mexico, more than 90% of women over 18 years of age who are employed help with their children's homework, 97% prepare food at home and perform more than 50% of housework. Given this context, we are interested in investigating how the increase in female labor participation has impacted the different socioeconomic aspects of families, especially their children.

In the first chapter, we analyze the effect of maternal education and employment on children's educational attainment in Mexico since children's educational attainment is mostly determined by parental education (and other socioeconomic characteristics). In addition to the increase in labor participation, an increase in the educational attainment of women has also been observed. In 2000, the average schooling of women was 7.2 years, which increased to 9.6 years by 2022.

Most studies on intergenerational educational transmission focus on how the educational attainment of the mother or father impacts their children's educational attainment. However, few studies consider the mother's employment situation. This chapter aims to analyze the effect of the employment situation and the mother's educational level on the educational attainment of her children simultaneously. We estimate the probabilities of passing each school year through a duration model, including an analysis by sex.

Our results show that the mother's employment status is positively related to the probability of staying at school, but only for sons. However, the educational attainment gap between daughters and sons is reduced when the mother works. Furthermore, for higher-educated mothers, their employment status is positively related to the probability of their daughters staying at school. Our results imply that mothers' socioeconomic characteristics significantly impact their children's educational future. They have been higher for daughters than for sons.

For the second chapter, we analyze how maternal overweight and employment status determine the overweight and obesity in school-age children in Mexico. In 2016, one in five children and adolescents was overweight or obese in the world. Obesity rates among children and adolescents in low- and middle-income countries have recently accelerated. We estimate an ordered probit model using information from Mexico's National Health and Nutrition Survey 2018-19 (ENSANUT-2018-19). Our results suggest that if a mother is overweight, the probability that the child will be overweight or obese is lower when the mother is employed than when she is not. On the other hand, when the mother is not overweight, the probability that the child will be overweight or obese is lower when the mother is not employed than when she is. The results provide new causal evidence on how socioeconomic environmental factors significantly affect children's health.

In the third chapter, we analyze the effects of maternal employment and sibling gender on housework time allocation. At the international level, the study of the distribution of time dedicated to housework is vast; however, for developing countries and with a traditional family context, such as Mexico, the literature is scarce. For this reason, this chapter analyzes the allocation of time spent on housework among all family members. In addition, the possible influence of maternal employment on the patterns of time allocation to children's housework is

analyzed. Finally, an analysis by the gender composition of the children is included. Using data from the 2019 Time Use Survey for Mexico, we employ a model of seemingly unrelated regressions (SUR) to determine the time spent and contribution to housework of each family member.

We find that maternal employment does affect the allocation of housework. However, mothers are still primarily responsible for these tasks. Daughters are the ones who participate more in housework, which is accentuated when they have a sibling, and the mother is employed. In addition, we found no statistically conclusive evidence on the effect of maternal employment and the gender composition of the children. These results support the view of intergenerational transmission of household chore behavior from parents to children, affirming that current families continue to reproduce traditional patterns of gender inequality.

This thesis contributes to the study of female labor participation and its implications for the family economy in Mexico. The first chapter contributes to the literature on educational attainment and intergenerational educational transfer in Mexico by adding a combined effect of two of the main maternal socioeconomic characteristics to the analysis. In addition, an empirical strategy is proposed that differs from most of the literature on intergenerational educational transfer from parents to children.

The second chapter contributes to the literature by employing an empirical strategy to observe how maternal overweight and maternal employment status combinations affect the odds of children becoming overweight or obese in Mexico. The analysis identifies factors related to childhood overweight and obesity that lead to health risks and affect household productivity.

The third chapter first contributes to analyzing the time allocation of housework among all family members in Mexican households. Second, it explores the possible influence of maternal employment on the patterns of time allocation to children's housework through intergenerational transmission processes. Third, it analyzes how the presence of siblings of the same or different genders influences children's contribution to housework. Through these last two objectives, the study contributes to understanding participation in housework in the early life course stages, of which much less is still known compared to the extensive literature on adult women and men.

The work comprises the three chapters mentioned above, wherein the corresponding literature and theoretical research are developed, followed by the presentation of the data and empirical strategy used to achieve the established objectives. The results obtained are presented, and each chapter ends with the corresponding conclusions, where the main findings, public policy implications, and limitations of each one are presented.

Chapter 1

Effect of maternal education and employment on children's educational attainment in Mexico

Effect of maternal education and employment on children's educational attainment in Mexico

Introduction

In Mexico, although schooling is still low compared with the rest of the OECD countries and there are still severe problems to be addressed (such as access to education, coverage, and achievement, some progress has been made over the last few decades (INEE, 2019)). In 2000, the average years of education of the Mexican population was 7.5 years, by 2020 these numbers increased to 9.7 years of schooling (INEGI, 2022).

In this context, the schooling of women increased more than that of men, going from a difference of 0.5 years in 2000 to 0.2 years in 2020 (INEGI, 2022). This increase, added to a rise in their labor demand due to changes in Mexico's trade policy, had a impact on the labor participation of women (Aguayo-Tellez et al., 2013). In 2000, Mexican women recorded 7.2 years of schooling and 30% participated in the labor market. Twenty years later, they register 9.6 years of schooling and their labor participation has reached the figure of 45.9% (INEGI, 2022).

Another possible determinant of the increase in the labor participation of women in Mexico is the change in the structure of the family during the last decades. According to the National Institute of Statistics and Geography (INEGI), in 2000, 8% of all households were single-mother households. By 2020, the percentage of single-mother households increased to 10%. In 2000 only 21% of mothers in two-parent households worked. By 2020 it increased to 37%. In the last two decades, the labor participation rate of mothers of two-parent households increased by 16

percentage points (p.p.), while the number of single-parent households increased by 25 percentage points (INEGI, 2017).

Despite the significant increase in the labor supply of women, their wages compared to men have not fallen (remaining around 85 cents for each dollar of men's income), which implies an increase in the labor demand for women in Mexico (Aguayo-Tellez et al., 2013; Bhalotra & Fernández, 2021). These relative gains for women have had positive effects on consumption decisions within the households, on children's health and education spending, and in general, on the empowerment and well-being of Mexican women (Cuellar & Moreno, 2022; López Acevedo et al., 2021) However, women continue to receive lower salaries than men and continue to have fewer opportunities (Arceo & Campos-Vázquez, 2014).

Literature agrees the educational attainment of an adult depends mainly on the parent's socioeconomic characteristics and the level of wealth of the household of origin, including parents' education level, employment status, and the type of household: two-parent or single-parent (Torche, 2015, 2019; Torche & Spilerman, 2009; Yalonetzky, 2017).

In Mexico, a child born in a household where the head has 12 or more years of schooling is 2.5 times more likely to complete secondary school than a child born in a household whose head has 6 years of schooling (Binder & Woodruff, 2002). By gender, the school achievement of sons depends more on the number of siblings, household wealth, and parents' desire for schooling, while that of daughters depends more on the order of birth and the family structure (Binder, 1998).

Although mothers have increased their participation in the labor force, they continue to be the main ones caring for and raising their children (Folbre, 1994). For example, in Mexico, women

spend almost 7 hours daily in unpaid work at home (Esquivel, 2011). In other words, even though the availability of time, specialization, and intrafamily negotiation have changed within households, gender patterns have been maintained over time between women and men (Lachance-Grzela & Bouchard, 2010; Schulz, 2021).

How do mothers' education and employment status affect their children's educational attainment? If so, do these effects vary by sex of the child? In this chapter, we analyze the combined effect of mothers' education and employment status in Mexico on their children's long-term educational attainment to determine if the mothers' socioeconomic characteristics impact daughters and sons differently we include an analysis by sex.

We employ a database containing retrospective information on the respondent's origin, including the parent's educational level and the parents' employment status when the respondent was 14 years old. We performed a long-term survival model analysis to estimate the probabilities of individuals reaching a specific educational level according to the mother's socioeconomic characteristics, such as educational level and employment status.

Our main results are a) the mother's educational level is positively related to her child's school attainment. Furthermore, b) although the mother's employment status turns out to be statistically significant only for men, it helps to reduce the educational gap between daughters and sons. Finally, the combined effect of employment and higher educational attainment in the mother gives daughters a greater probability of reaching a college educational level.

In addition to using a database that allows analyzing long-term educational achievement in the Mexican context, the present study is, to our knowledge, the first to examine these effects through duration models.

Literature review

A vast body of literature studies the determinants of socioeconomic achievement, including educational attainment. Various theories have developed around this topic, generating several study approaches over the years. However, until the early 1980s, socioeconomic status and achievement studies mostly followed a model that Goldthorpe (1983) called the "conventional view." Within the conventional view, the socioeconomic achievements of family members are established solely by the father's resources (Goldthorpe, 1983, 1984). In addition, the conventional view assumes that mothers outside the labor force are part of the family strategy.

According to the conventional view, wives depend on their husband's socioeconomic achievements for most of their lives. Therefore, only paternal status determines the social and economic status of the family. The conventional view leads to the expectation that only the father's socioeconomic characteristics determine the educational level of his children, and the mother's socioeconomic characteristics do not affect them. An example of this approach is Psacharopoulos (1988), who analyzes the determinants of achieving higher education in Greece, using only the father's occupational status and educational level. The main result Psacharopoulos found is that children whose parents are college-educated are three times more likely to have the same education level than those whose parents are farmers or workers.

A second approach is the "dominance model." It includes only the parent with more resources, leaving the other parent out of the model. However, according to Garnsey (1978), the resource contribution of the lower-status parent continues to affect some families, particularly those with a family head in unskilled or manual labor. The author argues that excluding the nondominant parent in the "dominance model" may theoretically misrepresent the achievement of parental resource transfer. He adds that it is not enough to consider only the parent with the highest status

position to encompass the status records of the children. The lower-status parent also contributes to the transfer of resources to the children. This latter approach is known as the "modified dominance model."

A third approach is the "sex roles" approach. The central hypothesis is that the mother's educational and occupational status is essential only for the daughter. Compared to the mother, the father only has an essential socioeconomic influence on his son. Several studies have found that sex roles transfer from generation to generation (Smith & Self, 1980; Starrels, 1992). For example, Papapetrou and Tsalaporta (2018) study the relationship between parental educational level and children's school performance in the European Union. The main result is a strong positive correlation between a mother's education and her daughter's educational achievements. This means that the role of sex is a crucial factor in women's educational achievement.

Mark (2008), using the scores obtained in the Program for International Student Assessment (PISA) test, performs an analysis of 30 countries. He explicitly asks: Is the children's performance mainly influenced by the socioeconomic characteristics of the parent of the same sex? Among the main results, he finds a tendency for the socioeconomic characteristics of the father, specifically the father's occupation, to have a more significant effect on children in some countries. However, he found very few cases in which the mother's characteristics are more robust among daughters.

Last, the "individual model" is also noteworthy. This model states that the socioeconomic characteristics of both parents influence their children's educational success; therefore, their attributes should be considered individually (Acker, 1973; Sorensen, 1994). Furthermore, this model arises from increased female participation in the labor force, which has changed the authority structure within family relationships.

Korupp et al. (2002) analyze which models best capture the structure and trend of socioeconomic characteristics of origin in early childhood education. The work uses data from the Netherlands, Germany, and the Western United States. Among the main results is that the models that include the characteristics of both parents have a better fit. In addition, adding mothers' characteristics to the model does not change the general conclusions on educational reproduction, with the mother's education and employment status having a substantive influence on the children's educational attainment.

Several studies have included the socioeconomic characteristics of both parents (Behrman & Wolfe, 1987; Birdsall, 1985; Deolalikar, 1993; Handa, 1996; Kalmijn, 1994; Singh, 1992). One of the most relevant results is that the mother's educational level has a more significant effect than the father's on the children's educational attainment. Kalmijn (1994), analyzing data for the United States, shows that maternal employment status substantially affects children's educational attainment. The author concludes that excluding maternal socioeconomic characteristics underestimates the effects of socioeconomic background.

Few studies have focused on how the mother's socioeconomic characteristics affect the educational level of children in single-parent households. Furthermore, of those few, most were conducted in developed countries such as the United States (Bankston & Caldas, 1998; S.-L. Pong, 1997; S. Pong, 1998; S. Pong et al., 2003). In general, it has been argued that the results are mixed; others argue a causal relationship. For example, Amato et al. (2015) analyze how the growing number of single-parent households affects children's school performance in the United States. He finds that single parenting does not produce widespread school failure in children. Furthermore, increases in the educational level of mothers were positively associated with most educational outcomes.

Using data from 30 countries in the OECD, Marks (2007) analyzes which parent's socioeconomic characteristics are more important for children's school performance: those of the mother or the father. Among the countries included in the study is Mexico, where the impact of the mother's education tends to be greater than that of the father's. However, paternal employment status has a more significant effect than maternal employment status. Finally, Marks argues that, in general, there is evidence that the relative importance of maternal characteristics has increased over time.

For Mexico's specific case, Binder (1998) analyzes the importance of both parents' education for children's educational attainment and the difference in the determinants of schooling between boys and girls. The results show that the mother's education has a more significant effect on children's education than the father's. While Binder does not include parental employment status in the analysis, the study controls for the wealth of the household of origin, household type, number of siblings, and birth order. The author finds that original wealth and the number of siblings mainly affect sons' educational attainment in Mexico. In contrast, household type and birth order mainly affect daughters. Aside from only focusing on parental education, Binder's short-term analysis focuses only on three large cities in Mexico.

Concerning the long term in Mexico, most studies on educational attainment focus on intergenerational educational mobility. They only analyze how parents' educational level determines the educational level of their children but do not consider parental employment status (Binder & Woodruff, 2002; Torche & Spilerman, 2009). Among their main results, they find that the educational level of the parents and the wealth of the household of origin are the main determinants of a person's educational attainment. The results vary by sex; women tend to have lower educational attainment than men for certain socioeconomic levels (Torche, 2015;

Yalonetzky, 2017). However, the result that the mother's educational level has a statistically significant and positive effect on children's educational attainment is consistent in all the studies conducted.

In contrast to the literature presented, our research analyzes the combined effect of maternal educational level and employment status on their children's long-term educational achievement in Mexico. We also include an analysis by sex. Maternal labor participation has become relevant in recent years and deserves special attention in this study area.

Theoretical background

In the analysis of educational attainment, empirical literature usually resorts to household production theory, which started by using the conceptions introduced by Becker (1981). Under this theory, the time allocated to the labor market and the household to maximize the utility function is controlled by factors within the household. The utility function is constrained by time, the marginal productivity of household products, market prices, and wages. Subsequently, the parents' utility function could include the children's schooling, either directly or as future income of the children (Birdsall, 1982; Wolfe & Behrman, 1984).

Children's education enters directly into the parents' utility function because the characteristics of the parents affect their preferences, prices, and wages in the market. A mother with more schooling can improve her home production. For example, the mother's educational level may reduce information costs and influence her taste for schooling her children, reducing the price of schooling. In a socioeconomic structure where prices and wages do not vary, the extent of schooling is determined solely by family characteristics (Binder, 1998).

On the other hand, when we analyze investment models, children's schooling enters as future income. Becker (1981) postulated that children of more educated parents are more likely to achieve a higher level of education just because they have a higher accumulated endowment. He added to his theory that the quality of time parents offer their children is a determining factor, giving rise to investment models. Education is considered an investment suitable for the potential productivity of children or to ensure parents' economic stability in old age. When the expected value of the educational benefits is greater than the investment, the investment will occur. Schultz (1988) provides a comprehensive review of investments and returns to education and discusses the role of the parental background. Our work aims to analyze the combined effects of maternal socioeconomic characteristics on children's educational achievement. Therefore, according to the preceding review, we can expect a positive relationship between a mother's educational performance and children's educational achievement.

However, the expected result is unclear when we analyze the effect of a mother's employment status on children's educational attainment. For example, suppose a woman participates in the labor market. In that case, she will generate a higher total income for the household with her contribution. Nevertheless, it is unclear whether this income compensates for the costs of not having one of the parents in charge of the household's domestic activities, including helping with the children's education. Todaro (1989) mentions two associated costs in child-rearing: opportunity and direct costs. In the first case, mothers limit their participation in the labor market to raise their children, i.e., they sacrifice potential income to care for children at home.

The second case is the direct costs of schooling children and where the economic theory of fertility comes in (Becker, 1960). Becker's fertility theory argues a financial trade-off between having fewer but more educated children with high earning potential versus more but less

educated children with low earning potential. The implication is that if the price of children increases due to the increased cost of missed labor opportunities for women, parents will demand fewer children but invest more in their education. Thus, mothers would opt to work outside the home and leave children with relatives or professionals to care for them. Accordingly, we can expect a positive effect between maternal labor force participation and children's educational achievement in our analysis.

Becker (1992) continues his analysis of fertility theory, arguing, among other things, that the cost of children can also vary according to where one lives. He mentions that the cost of children in less developed countries is lower given the potential contribution of income that children can have. For example, people have more children in rural areas, although their income is lower than in cities. For them, it is cheaper since the children contribute labor to the tasks on the farm.

In summary, according to Becker's household production, investment, and fertility theories, individual educational attainment is determined directly and indirectly by demographic characteristics. The household characteristics where they grew up, including their rural or urban condition, are also important.

Data

To estimate the combined effect of maternal educational level and employment status on their children's educational attainment, we use the 2017 Social Mobility Survey in Mexico (EMOVI-2017). [1] The EMOVI-2017 is a cross-sectional survey with a sample size of 17,665 individuals.

[1] To determine maternal employment status, we use the EMOVI-2017 question "When you were 14 years old, did your mother work?". We consider that the mother worked if the child answered any of the following answers: a) she worked, b) she helped a family or non-family business, c) she sold some product, or d) she carried out any other type of activity in exchange for money.

It represents men and women aged 25 to 64 at the national level and in five regions.[2] In addition, the survey structure has retrospective household information that records details from when the individual was exactly 14 years old, such as parents' education and employment status, family structure, and the goods and services of the household of origin.

Although the retrospective information of the EMOVI-2017 is essential to achieve the objective of this research, such information may suffer from memory bias. This is because the survey occurs when the individual is an adult and may not remember their family situation when they were young. In addition, the cross-sectional structure of the survey allows us to have only information about the individual at the time of the interview and when they were 14 years old and not throughout their life.

Since the survey is nationally representative, not all individuals come from the same type of household. Of all individuals, 77.3% lived with both parents when they were 14 years old. The distribution of the rest of the individuals is as follows: 15.3% lived with the mother, 2.8% with the father, 3.6% with another relative, and 1% with a nonrelative.

Based on the empirical evidence discussed previously on the importance of controlling for the socioeconomic characteristics of both parents to avoid information biases, the analysis we performed in this research considers only individuals who reported having lived with both parents when they were 14 years old. Thus, the final sample includes 12,781 observations, of

[2] The five regions are north, north west, central north, center and south of Mexico. The details of the regionalization of the database can be consulted in the following link https://ceey.org.mx/wp-content/uploads/2021/02/Nota-sobre-la-regionalizaci%C3%B3n-ESRU-EMOVI-2017.pdf

which 39% are men and 61% are women. However, when the sample expansion factor is applied, this percentage changes to 46% men and 54% women (see Table 1.1).[3]

In Table 1.1, we show the descriptive statistics of the sample. The means of the variables of interest and a test of means difference according to the mother's employment status are presented. Most of the mean differences between individuals with mothers who worked and those whose mothers did not participate in the labor market are statistically significant.

For 28% of the individuals, their mothers participated in the labor market when they were 14 years old. In the case of paternal employment status, this figure rises to 96%. The index of socioeconomic level[4] is higher for those individuals with mothers who worked. The average age of the sample is 43.5 years; the group of individuals with working mothers is younger on average by a difference of 3 years; this is consistent with the trend of greater increases in the female labor force in recent years, so younger mothers tend to have greater labor participation. The average number of siblings is 4.5 for the entire sample, and 35% of the individuals come from rural areas.

Descriptive statistics indicate that for the group of households where the mother worked, the mother's education, the father's, and the child's current education are higher. This is because mothers and fathers tend to have similar educational attainments, and mothers with higher

[3] The original sample structure has this percentage difference by gender, possibly because it is a survey conducted in households where women are more likely to be found. The results of the work remain the same.
[4] The Index of Socioeconomic Level is a variable included in the EMOVI database and is used as a proxy for wealth of origin. It was calculated by means of a multicomponent analysis based on the goods and services of the household of origin. It has zero mean, a standard deviation of 0.97, and takes values from -1.25 to 3.42. The index of socioeconomic level is also divided in five socioeconomic strata using the following formula: $\frac{index\ value - mean\ index}{standard\ deviation\ index}$. 22.2% of the observations belong to the lowest stratum, 19.7% to the medium-low stratum, 21.4% to the middle stratum, 19.3% to the medium-high stratum, and 17.3% to the upper stratum. For more details see https://ceey.org.mx/contenido/que-hacemos/emovi/

educational levels usually have children with higher educational attainment (Hernandez, 2015). On average, individuals with working mothers have one more year of education than those with nonworking mothers. The mother who participated in the labor market has 1.5 years more education on average than those who did not. This is consistent with Bussemakers (2017), who finds that the benefits of working, in terms of salary and status, are larger for higher-educated women, making it more likely for them to be actively engaged in the labor market. The fathers of individuals with working mothers have 1.1 years more education on average.

Table 1.1 Descriptive statistics of all households and material's employment status

		Mother's employment status		
Variable	All	Yes	No	Diff.
Years of schooling	9.43	10.34	9.35	0.99***
Mother's years of schooling	4.25	5.40	3.84	1.56***
Mother's work status	0.28	1	0	1
Father's years of schooling	4.65	5.48	4.30	1.17***
Father's work status	0.96	0.99	0.96	0.02***
Socioeconomic level index	-0.05	0.14	-0.11	0.25***
Age	43.57	40.85	43.88	-3.03***
Number of siblings	4.53	5.15	5.66	-0.51***
Last of the siblings	0.21	0.21	0.20	0
Rural origin	0.35	0.30	0.37	-0.07***
N	12,781	3,579	9,202	
N (expanded)	42,300,234	11,544,707	30,755,527	

Source: Own estimations using data from EMOVI 2017.
Note: †, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

Table 1.2 shows the same exercise by sex. Generally, men have one more year of education than women; men have an average of 10 years of schooling, and women have 9 years. However, both men and women with working mothers have more years of education than those whose mothers did not participate in the labor market. For men, the average length of education among those whose mothers worked is 11.1 years, while for those whose mothers did not work, it is

9.8 years. In the case of women, we observe that those with mothers who worked have 9.9 years of education, compared to 9 years of schooling for those whose mothers did not work.

Table 1.2 Descriptive statistics by sex

Variable	All	Mother's employment status Yes	No	Diff.
		Men		
Years of schooling	10.01	11.10	9.85	1.24***
Mother's years of schooling	4.56	5.95	4.07	1.87***
Father's years of schooling	4.96	6.11	4.57	1.54***
Father's work status	0.96	0.99	0.95	0.02***
N	4,986	1,342	3,644	
N (expanded)	19,648,127	5,281,650	14,366,477	
		Women		
Years of schooling	9.06	9.93	9.06	0.87***
Mother's years of schooling	4.05	5.13	3.73	1.39***
Father's years of schooling	4.44	5.16	4.18	0.97***
Father's work status	0.96	0.99	0.96	0.02***
N	7,795	2,237	5,558	
N (expanded)	22,652,107	6,263,057	16,389,050	

Source: Own estimations using data from EMOVI 2017.
Note: †, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively.

Concerning parental education, mothers and fathers have a higher average number of years of schooling in the group with working mothers. The above is true for both men and women. In the case of men, working mothers have, on average, 1.8 more years of schooling than nonworking mothers. For women, this difference is 1.3 years. Those men who worked have parents with 1.5 more years of schooling than those who did not. The difference between working and nonworking women is parents with 0.9 more years of schooling. The difference between the educational attainment of men and women according to the employment status of their mothers is relevant. The data describe a potential differentiated effect of maternal employment status according to the sex of the individual.

Methodology

We use a survival model or Cox proportional hazard model to measure the impact of different socioeconomic characteristics of the mother on the child's educational level. The use of this kind of model allows us to estimate the probability or risk index that an individual will finish education in a particular school year, given the retrospective information of the mother.

An ordinary least squares model assumes linearity in the effect of the mother's characteristics on the individual's educational attainment. On the other hand, a survival model allows us to observe whether the marginal effect of the mother's characteristics changes as the individual's educational attainment increases. In survival models, it is necessary to define the dependent variable T as the wait time until the occurrence of a well-defined event, in our case, the individual's educational attainment (Cameron & Trivedi, 2005).

To estimate the density function $f(t)$ of the probability of the duration, we estimate the hazard ratio (λ) following the standard procedure (Heij et al., 2004). The hazard ratio indicates the risk index between two individuals with different characteristics. For example, an individual with a mother with an elementary education who used to work when the individual was 14 years old is compared with another individual with a mother with a college education who did not work. Therefore, the proposed model is as follows:

$$S(t) = S_0(t)^{\lambda(\rho H_i + \gamma X_i + \delta R_i)} \quad \dots (1.1)$$

where S is the observed educational attainment of the individual. H is a vector of household characteristics when the individual was 14 years old, including parental educational levels, parental employment status, the number of siblings, whether the individual was the youngest

sibling (1 if youngest, 0 if not), and a proxy for the family's wealth. [5] X is a vector of current individual characteristics, such as sex (1 if male, 0 if not) and age. Finally, R is a vector of two regional variables when the individual was 14 years old: whether the individual grew up in a rural area (1 if from a rural area, 0 if not) and their region of origin.[6]

Results

The results of the Cox model are shown in Table 1.3. We present the hazard ratios for the variables of interest for two specifications. In the first specification (Column 1), we present the estimations' results, including only parental socioeconomic characteristics as independent variables. The second specification (Column 2) includes controls such as the wealth of origin, sex, age, family structure, and place of origin. The estimated coefficients of the parental socioeconomic characteristics do not change considerably when we include the controls on the second specification. Columns 3 and 4 present the hazard ratios of the second specification for men and women independently.

Based on the estimated coefficients of the second specification, we find a positive relationship between the probability that an individual will stay in school and the maternal educational level. Compared with children whose mothers had no schooling at all, the children whose mothers had an elementary education have an 18% higher probability of staying in school, which increases educational attainment.[7] This percentage improves as the maternal educational level increases. For example, the children of mothers who studied through middle school have a probability of 20% that they will continue their education. For the children of mothers who

[5] We included a dummy variable for technical education. However, results were not statistically significant.
[6] The country is divided into 5 regions: north, northwest, north central, central, and south.
[7] The way in which the interpreted probability is obtained is: $(1 - \lambda) \times 100\%$.

studied through high school, the probability increases to 26%. Finally, for children of mothers with a college education or higher, the survival probability rises to 33%.

Table 1.3 Result of the Cox survival model

			Sex	
			Men	Women
	Hazard ratio	Hazard ratio	Hazard ratio	Hazard ratio
	(1)	(2)	(3)	(4)
Mother studied elementary school	0.78***	0.82***	0.76***	0.85***
	(0.020)	(0.023)	(0.035)	(0.030)
Mother studied middle school	0.66***	0.80***	0.84**	0.77***
	(0.025)	(0.033)	(0.057)	(0.041)
Mother studied high school	0.56***	0.74***	0.73***	0.73***
	(0.029)	(0.042)	(0.064)	(0.055)
Mother studied college	0.49***	0.67***	0.71***	0.64***
	(0.034)	(0.050)	(0.079)	(0.065)
Father studied elementary school	0.78***	0.84***	0.76***	0.89***
	(0.021)	(0.024)	(0.036)	(0.032)
Father studied middle school	0.62***	0.78***	0.70***	0.84***
	(0.028)	(0.032)	(0.046)	(0.045)
Father studied high school	0.54***	0.72***	0.65***	0.77***
	(0.028)	(0.039)	(0.056)	(0.054)
Father studied college	0.44***	0.62***	0.55***	0.66***
	(0.025)	(0.037)	(0.050)	(0.052)
Mother's work status	0.94***	0.96†	0.92†	0.97
	(0.021)	(0.022)	(0.035)	(0.028)
Father's work status	0.98	0.96	1.04	0.91
	(0.052)	(0.056)	(0.095)	(0.071)
Socioeconomic level index		0.77***	0.81***	0.74***
		(0.012)	(0.020)	(0.015)
Sex		0.85***	-	-
		(0.018)		
Age		1.00†	0.99	1.00***
		(0.001)	(0.001)	(0.001)
Number of siblings		1.02***	1.03***	1.02***
		(0.004)	(0.006)	(0.005)
Last of the siblings		0.95†	0.95	0.94†
		(0.024)	(0.039)	(0.031)
Rural origin		1.20***	1.27***	1.17***
		(0.029)	(0.050)	(0.036)
N	10,526	9,711	3,775	5,936

Source: Own estimations using data from EMOVI 2017.

Note: †, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively. Columns 2-4 include four dummies for the region of origin as control variables.

In the case of paternal education, the results are similar. The hazard index indicates that children of fathers with an elementary education provide their children with a 16% probability of staying in school compared to children of fathers without education. The hazard index would increase to 22% if the father studied through middle school, to 28% if he studied through high school, and to 38% if the father studied through college or more.

Concerning the effect of maternal labor participation, mothers who worked raised the probability of their children staying in school by 6% compared with mothers who did not work. Regarding the control variables included in the second specification, we found that the higher the socioeconomic level index, the higher the probability of staying in school. On the other hand, being older, having more siblings, and coming from a rural area decreases these probabilities.

In the analysis by sex, compared to children of mothers with no education, the children of mothers with some level of education have a greater probability of staying in school: for daughters, this probability shifts from 15% to 36%, and for sons, it shifts from 16% to 29%, depending on the mother's level of education. Similarly, children of fathers who have some level of education have a greater probability of staying in school than sons of fathers with no education. Between 11% and 34% of daughters and between 24% and 45% of sons were more likely to stay in school, depending on the paternal level of education. For men, the effect of the father's educational level is greater than that of the mother's. In contrast, for women, the effects of each parent are similar. In both cases, the effects of the father's and the mother's education are statistically significant.

Maternal employment status is statistically significant only for men. The sons of mothers who participated in the labor market are 8% more likely to stay in school. On the other hand, being the youngest of the siblings is positively related to staying at school, but only for women. In other words, being the youngest in the family is a favorable scenario for a woman. They have a 6% greater chance of achieving higher schooling than the other siblings. While greater wealth in the home of origin increases the probability of attending school, more siblings and rural origins reduce it. The above is true for both men and women.

Figures 1.1-1.8 show the main interest groups' Kaplan–Meier survival curves. These curves show the relationship between years of schooling (educational attainment) and the survival probability (probability of staying in school and achieving the next level). Notably, the long-rank test was performed in each case and was statistically significant for all cases.

In Figure 1.1, we can observe the survival curves of children according to the mother's educational level. A higher maternal educational level provides a higher survival curve for her children. For example, the probability of a child reaching 9 years of schooling is 39.3% if the mother studied through elementary school (6 years of schooling), 69.5% if the mother studied through middle school (9 years of schooling), 88.6% if the mother studied through high school (12 years of schooling) and 93.8% if she studied through college (16 years of schooling).

The red line represents the average years of schooling in the sample (9.4 years), and the cyan line represents the years of schooling before starting college (12 years). In Mexico, individuals with mothers who studied up through elementary school have a 13.2% probability of attending a college education. In comparison, the children of mothers with a college education have a 75.3% probability.

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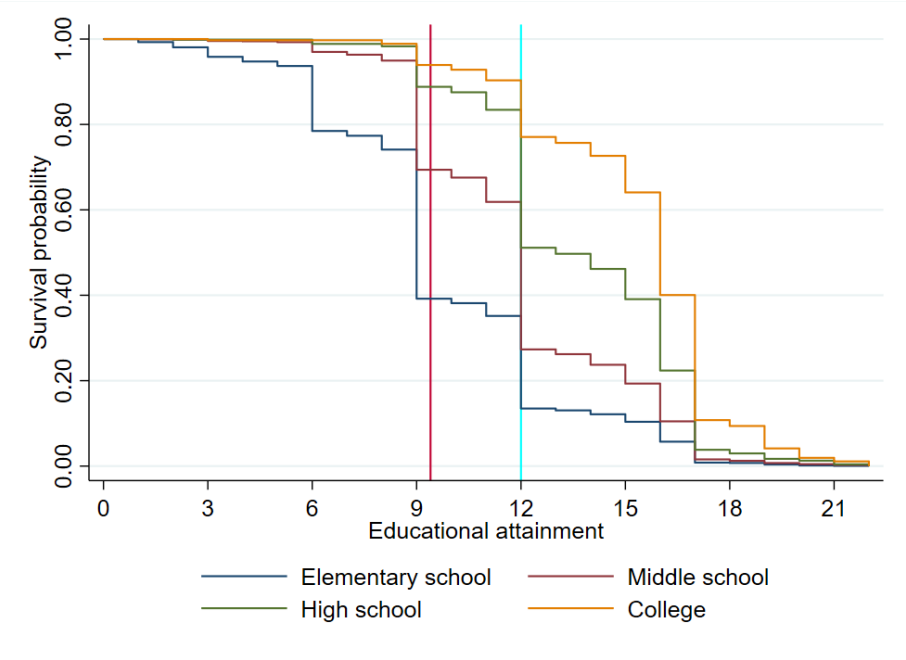
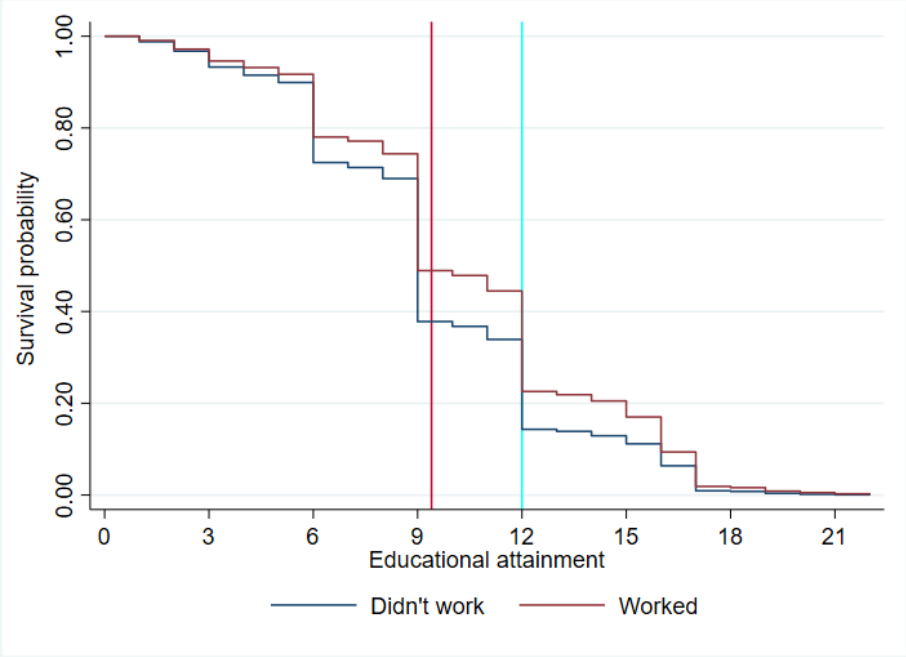
Figure 1.1 Survival probability according to maternal educational level



Source: Own estimations using data from EMOVI 2017.

In Figure 1.2, we present the survival curves of children divided into whether the mother worked or not. The children of mothers who did not work have a 37.8% probability of reaching average schooling (9.4 years). Meanwhile, the children of mothers who worked have a 48.9% probability. In addition, the children of mothers who worked have an 8% higher probability of attaining a college education than those of mothers who did not.

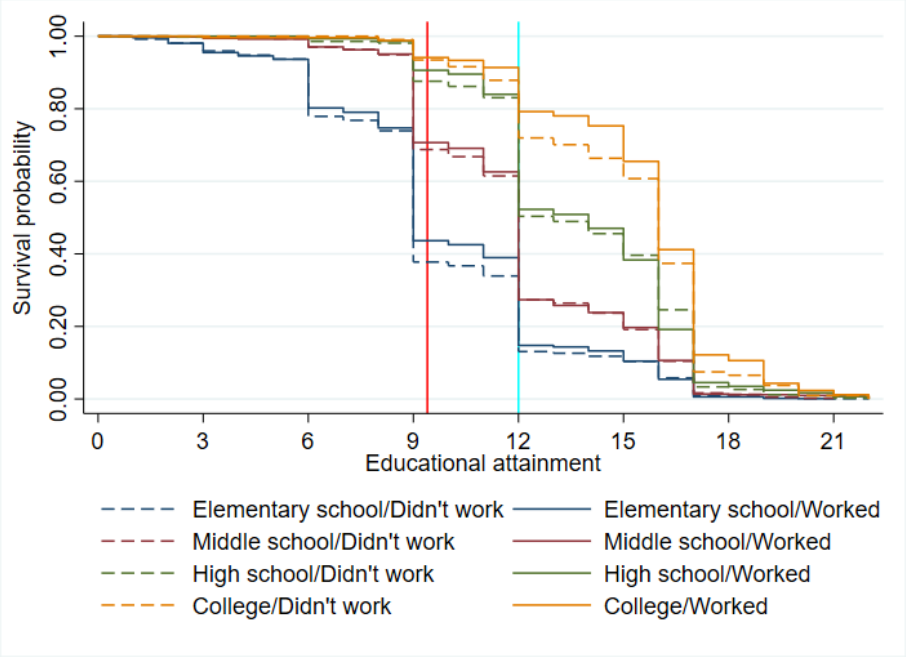
Figure 1.2 Survival probability according to maternal employment status



Source: Own estimations using data from EMOVI 2017.

The combination of the mother's education level and working status in the children's educational attainment is shown in Figure 1.3. Mothers with the same educational level but different work statuses affect their children's schooling differently. The probability of a child reaching 9.4 years of schooling, given that his mother studied through elementary school and did not work is 33.9%. In contrast, if the mother worked, this probability increases to 39.0%. The lower the maternal educational level, the greater the impact of the maternal employment status on the probability that their children reach the average education length of 9.4 years. The probability that a child of a college-educated mother will attain a college education is 70% if the mother did not work and 78% if the mother worked. This 8 percentage point difference is relevant when analyzing the Mexican context, where only 17% of the population reaches college education.

Figure 1.3 Survival probability according to maternal educational level and employment status



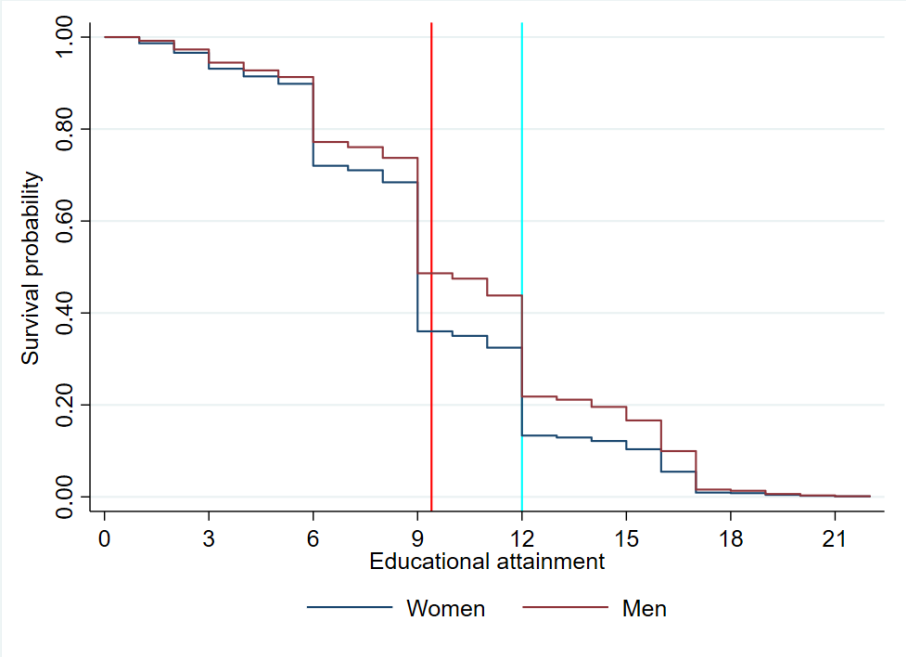
Source: Own estimations using data from EMOVI 2017.

In Figure 1.4, we can observe that the probability of staying in school is higher for men than for women. We observe a difference of 12 percentage points between men and women who achieved the average length of schooling of the sample (9.4 years). Men have a 43.7% probability of achieving the average, while women have a 32.6% probability. In the case of attaining a college education, the difference is 8 percentage points in favor of men. This disparity between the two curves remains throughout the entire educational attainment, attenuating at the lowest and highest levels.

In Figures 1.5 and 1.6, we continue with the analysis by sex. Figure 1.5 shows the survival curves of staying in school according to the mother's education level and the sex of the child. The difference by sex stands out when the mother's education level is low, and the children are about to reach the average education of 9.4 years. For example, the probability that a woman reaches the average length of education if her mother studied only through elementary school

is 33.8%. On the other hand, for a man with the same conditions, the probability rises to 48.6%. Differences in school attainment probabilities between daughters and sons decrease considerably when mothers have a college education.

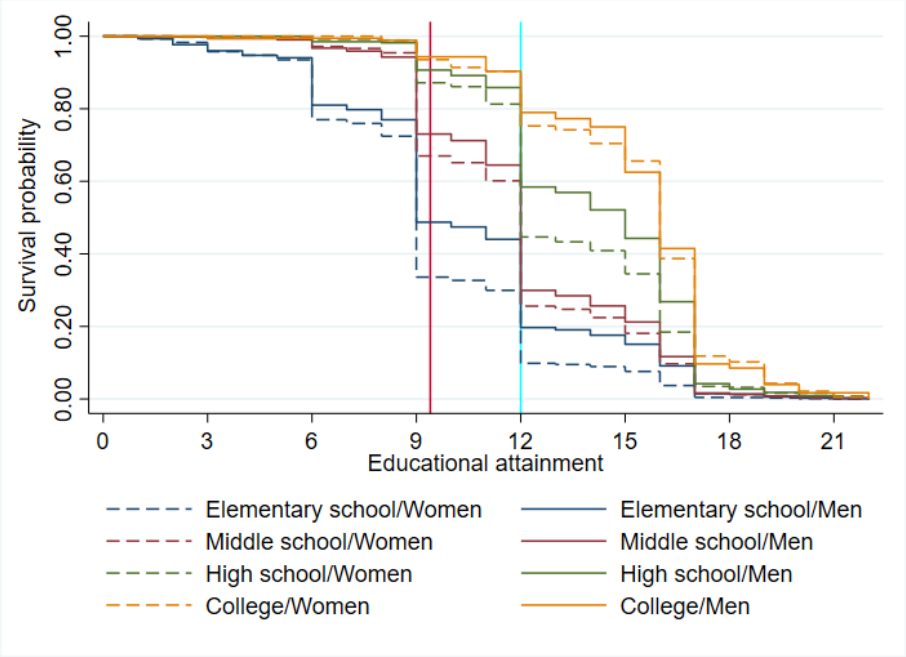
Figure 1.4 Survival probability by sex



Source: Own estimations using data from EMOVI 2017.

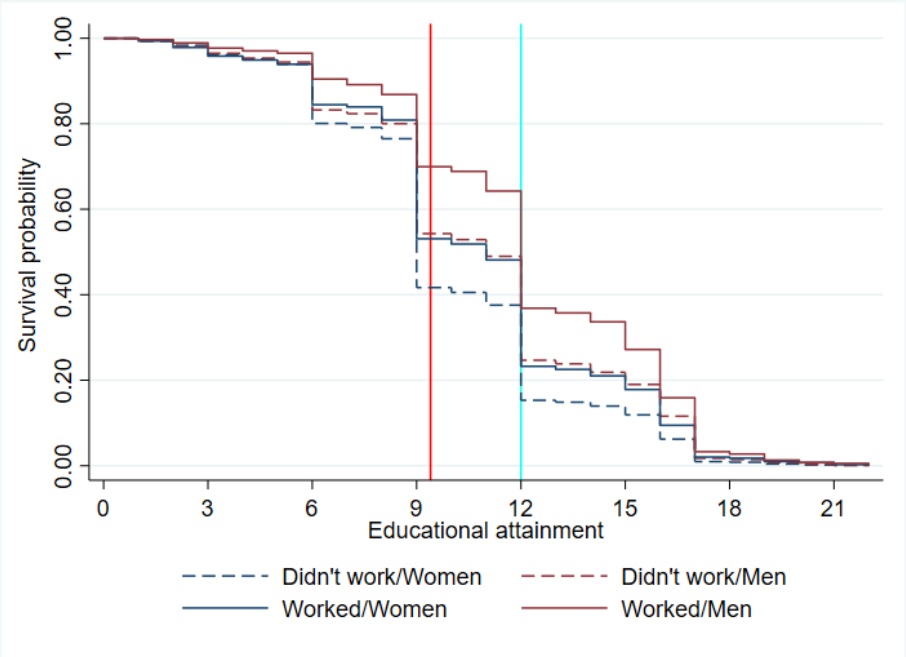
not work and men with mothers who did. For example, the daughter of a mother who did not work has a 29.7% probability of exceeding the average years of schooling. In comparison, the son of a mother who did work has a 53.4% probability, a difference of 23.7 percentage points. However, this gap is reduced by 10 percentage points when the daughter's mother worked. Thus, it seems that maternal labor participation may play a role in reducing the educational gap between women and men in Mexico.

Figure 1.5 Survival probability according to the educational level of the mother by sex



Source: Own estimations using data from EMOVI 2017.

Fig 1.6 Survival probability according to mother's employment status by sex



Source: Own estimations using data from EMOVI 2017.

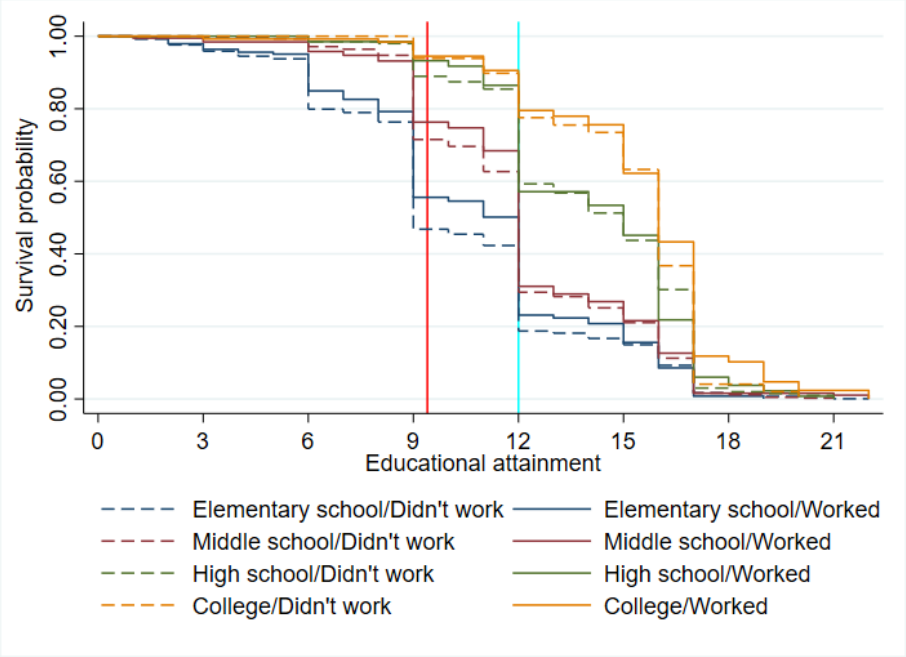
In Figure 1.6, we present the survival probability curves separated by the mother's employment status and the sex of the child. The most notable gap is between women with mothers who did

not work and men with mothers who did. For example, the daughter of a mother who did not work has a 29.7% probability of exceeding the average years of schooling. In comparison, the son of a mother who did work has a 53.4% probability, a difference of 23.7 percentage points. However, this gap is reduced by 10 percentage points when the daughter's mother worked. Thus, it seems that maternal labor participation may play a role in reducing the educational gap between women and men in Mexico.

Finally, in Figures 1.7 and 1.8, we analyze the effect of the mother's educational level and employment status by sex. In the case of men (Figure 1.7), mothers who did work provided a higher survival curve regardless of the mother's educational level. This effect is noticeable when mothers have an elementary school education. A man with a mother who did not work and had only an elementary education had a 46.8% probability of attaining the average years of education in the sample (9.4 years). In comparison, a man whose mother did work and had elementary education had a 55.6% probability.

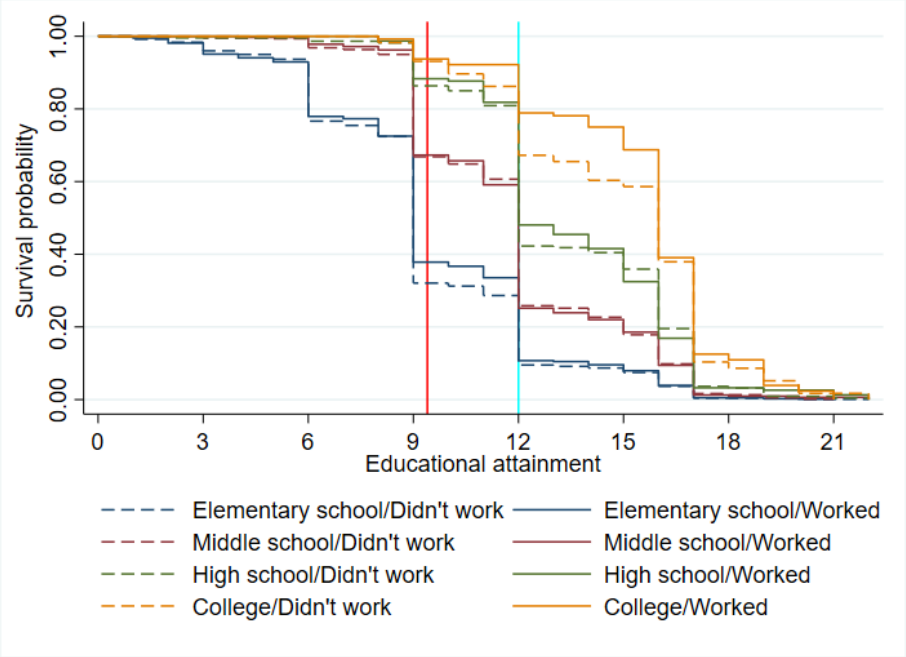
Figure 1.8 shows the case for women. As in the case of men, the mother's employment status increases the probability of daughters staying in school, independent of the mother's educational level. For women, the mother's labor situation becomes relevant only when the mother has a college education. A daughter whose mother studied through college but did not work has a 65.5% probability of entering college. In comparison, the daughters of mothers who studied college and did work have a 78.1% probability. This difference of 12.6 percentage points highlights the importance of labor participation by mothers, especially when they have daughters.

Figure 1.7 Survival probability according to educational level and maternal employment status for men



Source: Own estimations using data from EMOVI 2017.

Figure 1.8 Survival probability according to educational level and maternal employment status for women



Source: Own estimations using data from EMOVI 2017.

Our results show the critical role that mothers' socioeconomic characteristics play in children's educational attainment. The level of education that mothers have and their participation in the labor market (when their children are young) impact the children's probability of attaining a certain level of schooling. This means that the higher the mother's educational level is, the higher the child lands on the survival curve. A working mother also provides the same effect. Therefore, a mother who worked and was highly educated provided the best outcome for children regarding the likelihood of educational attainment.

Discussion and conclusions

In Mexico, in recent decades, the participation of mothers in the labor market has increased significantly. Moreover, at the same time, there has been a significant increase in the average education of women. Therefore, in our study, we analyze whether the better levels of schooling and the greater labor participation of mothers in Mexico increased their children's educational attainment.

Focusing on the mother's education, labor participation, and other family characteristics when the individual was 14 years old, we use a duration model to obtain the probabilities for which Mexicans stay in school and increase their educational attainment. Our main results show that a) the higher the mother's educational level is, the higher the child's survival probability of staying in school; b) the children of working mothers tend to have better educational attainment; and c) the combination of the mother's schooling and labor participation potentiates the probability of continuing to study, increasing the educational attainment of the children.

Our results suggest that in Mexico, the additional income generated by a mother who participates in the labor market does offset the costs of not having the mother at home helping

with children's education. That is, the direct cost to the mother when she does not participate in the labor market is greater than the opportunity cost of remaining at home raising the child (Todaro, 1989).

Our results are consistent with Becker's theory of fertility. We found that in the long term, mothers' labor participation reflects higher educational attainment for their children. Mothers who enter the labor market can provide better education to their children, obtaining fewer children but of higher quality (Becker, 1960, 1981, 1992). Our results are also consistent with Bourdieu's theory of social capital. A more educated mother and a greater household wealth due to the mother's labor participation provide greater social capital for the children (Bourdieu, 1986). This is a consequence of the higher socioeconomic status that the mother provides to the child.

Given the background we have on the differential effect of household socioeconomic characteristics between male and female children, our research includes an analysis by sex. In this analysis, we found that being a man in Mexico increases the probability of having higher educational attainment than being a woman. The results are consistent with other authors who analyze educational attainment in the country (Binder, 1998; Binder & Woodruff, 2002; Torche, 2015). Separating the model by sex, we found that the mother's employment status only affects sons and not daughters, as established in sex role theory. That is, in Mexico, mothers have a substantial influence on the educational achievement of their sons. However, there is insufficient evidence to say the same about their daughters. This result is consistent with other researchers who argue that the sons of working mothers tend to have wives who also participate in the labor market (Campos-Vazquez & Velez-Grajales, 2014).

Based on the Kaplan–Meier survival curves, we observed consistent results with the above findings and four additional relevant results. First, a working mother increases the probability that her child will exceed the average years of education, and this probability increases as the mother's educational attainment increases. If this mother has a college education, her child is three times more likely to achieve a college education than mothers who only attended middle school. Second, the educational gap between daughters and sons is greater for mothers with low levels of education, disadvantaging women. This educational attainment gap between women and men is substantially reduced for mothers with a college education. Third, maternal labor participation also helps to reduce the educational attainment gap between men and women. The recent increases in women's labor participation in Mexico, especially mothers, may impact the educational gap between women and men in the mid-term. Fourth, the maternal employment status becomes relevant for women when the mother's educational level is high and for men when the mother's educational level is low.

Our work contributes to the literature on educational attainment and intergenerational educational transfer in Mexico by adding to the analysis a combined effect of two of the main maternal socioeconomic characteristics. In general, the implication of our research is to continue promoting female labor participation in Mexico and continue promoting women's education—more educated women with greater participation in the labor market result in empowered mothers.

Prettner & Strulik (2014) mentioned that empowered mothers promote the preference for fewer but more educated children, which leads to faster economic growth. Furthermore, the preceding finding helps reduce the investment bias in human capital between sons and daughters within households and the educational gap between women and men. Therefore, continuing to

implement policies to empower women within households promotes the development of a country.

One of the main limitations of our study is that the sample analyzed includes only children of two-parent households. A growing trend in recent years in the country is that single mothers are part of the labor market. A future work of interest would be to carry out an exercise similar to the one presented in this research, differentiating the effects of mothers with parental support versus single mother.

Chapter 2

Maternal overweight and employment status: determinants of overweight and obesity in school-age children in Mexico

Maternal overweight and employment status: determinants of overweight and obesity in school-age children in Mexico

Introduction

Obesity is a global pandemic; according to the World Health Organization (WHO, 2022), since 1975, obesity has tripled worldwide. Over 340 million children and adolescents aged 5-19 were overweight or obese in 2016. In addition to being associated with various diseases (heart disease, diabetes, and various types of cancer), overweight and obesity have a significant economic impact. Okunogbe et al. (2022) estimate a negative impact of 2.19% on global GDP in 2017, which will increase to 3.29% by 2060 if the trend continues.

Nowadays, overweight and obesity begin at an early age. Various studies on the influence of family characteristics on the overweight and obesity of its members mention that genetic factors such as the mother's weight during pregnancy can predispose children to be overweight or obese (Lake, Power, and Cole 1997; Whitaker 2004). However, genetic influences require a conducive environment to manifest. Classen and Hokayem (2005) find a positive relationship between the degree of obesity of the mother and the probability of raising an overweight or obese child. Coate (1983) analysed the determinants of obesity in children and adolescents in the United States, finding that it depends on diet choice, parental overweight, age, race, and gender. While diet choice is determined by family income, mother's education, and family size. Anderson and Butcher (2006) clarify that it is difficult to differentiate the influence of genetics and parents' behaviour as parents influence children's food choices.

Maternal employment has been another factor to consider in the literature on the determinants of childhood overweight. During the last decades, maternal employment has increased

considerably, as has child overweight. According to the Organization for Economic Cooperation and Development (OECD, 2022), employed mothers increased, in average, from 47% in 2000 to 72% in 2019 for OECD countries. Anderson et al. (2003) document a positive relationship between maternal work and the probability that the child will be overweight. Other authors, such as Liu et al. (2009), analyse whether full-time maternal employment impacts their children's Body Mass Index (BMI). The authors find a positive relationship between full-time maternal employment and the child's probability of being overweight. However, the hypothesis that maternal employment contributes significantly to childhood obesity has been rejected in other studies (Agiro and Huang 2020; Loureiro et al. 2004).

Although factors determining childhood overweight and obesity have been widely analysed in the literature, research including maternal overweight and employment status is scarce. Given the growing global trend towards overweight and obesity from an early age, the continuous analysis of its determinants becomes relevant. Especially for developing countries where cases of childhood overweight and obesity have recently increased more than the world average. As Bhurosy and Jeewon (2014) have pointed out, childhood overweight and obesity are no longer an exclusive problem of wealthier countries. In this chapter, we contribute to this literature by establishing an empirical strategy that includes the interaction between maternal overweight and maternal employment status to analyse its effect on childhood (5 to 11 years) overweight and obesity in Mexico.

Materials and methods

We use the 2018-19 National Health and Nutrition Survey for Mexico (ENSANUT 2018-19), which has as one of its main objectives to identify environmental and socioeconomic factors

that determine overweight or obesity in the population. In its nutrition component, with a sample size of 32,000 households, family members are measured for weight and height. We focused on school-age children, ages 5 to 11, who live with their mothers in the same household, having anthropometric and socioeconomic information of 2,613 children of school age and their mothers.

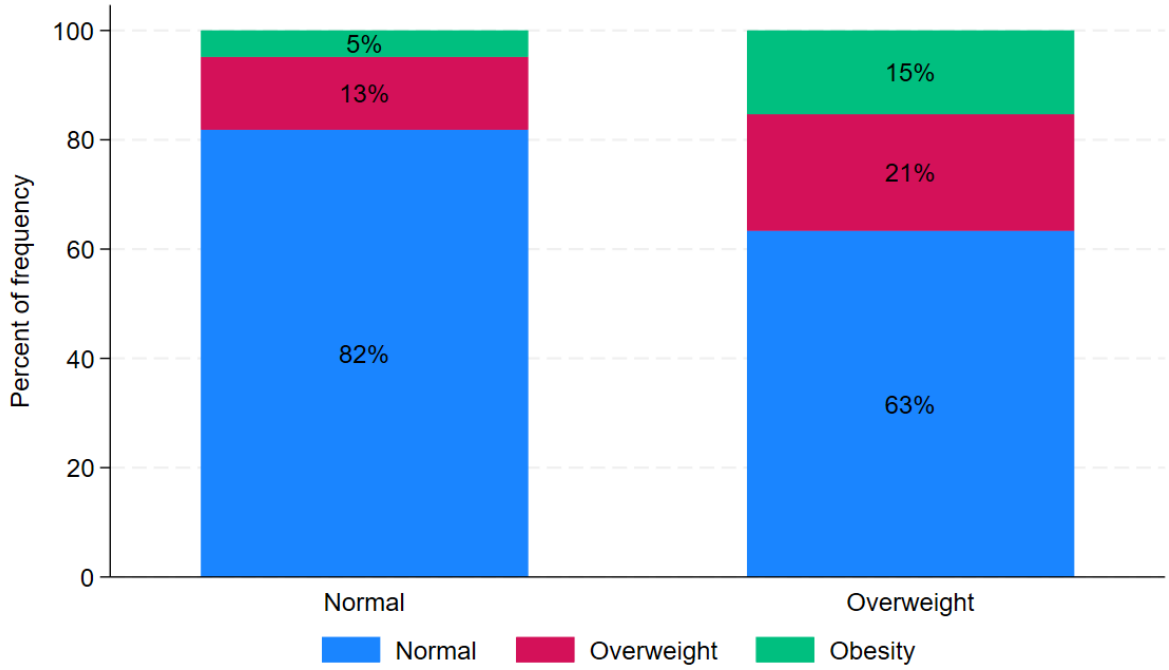
To identify the body composition of children, we used the BMI and considered the cut-off points proposed by the WHO for children under 18 years of age (de Onis et al., 2007). Thus, from the valid z score of the BMI for the age and sex of the child, we construct a dependent variable with three categories: normal weight, overweight, and obesity.

Similarly, we use the z-score formula for adults proposed by the WHO to calculate the BMI of the mother and two weight categories: normal weight if BMI < 25 kg/m2, and otherwise overweight. Regarding the mother's employment status, we use the survey question "Did you work at least one hour during last week outside the home?" to create a dichotomous variable.

Figure 2.1 shows the percentage of children in each weight category according to the mother's weight category. The difference in the percentages of children with normal weight is notorious between mothers with normal weight and mothers with overweight. Eighty-two percent of children of normal-weight mothers also have a normal weight; this percentage is reduced to 63% for overweight mothers. The percentage of children with obesity is three times higher in overweight mothers than in normal-weight mothers.

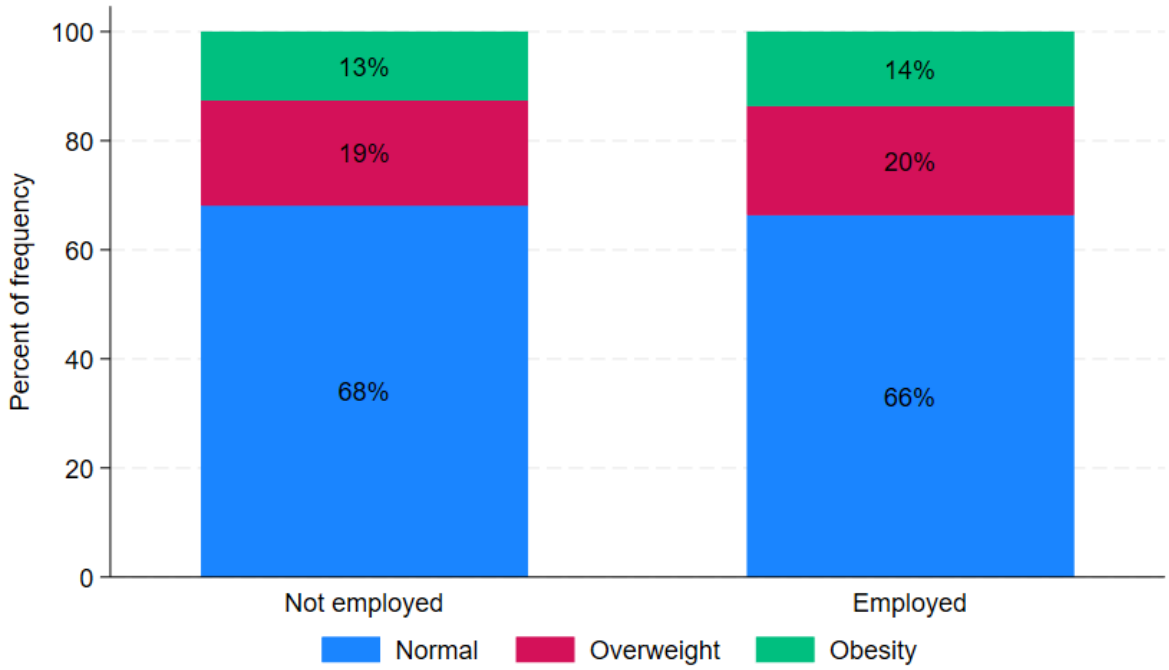
On the other hand, Figure 2.2 shows the percentage of children by weight category according to maternal labor status. Dividing only by maternal employment status, we do not observe any clear difference between the distribution of children by weight category.

Figure 2.1 Percentage of the child's weight category combining the mother's weight category



Source: Own estimations using data from ENSANUT 2018-19.

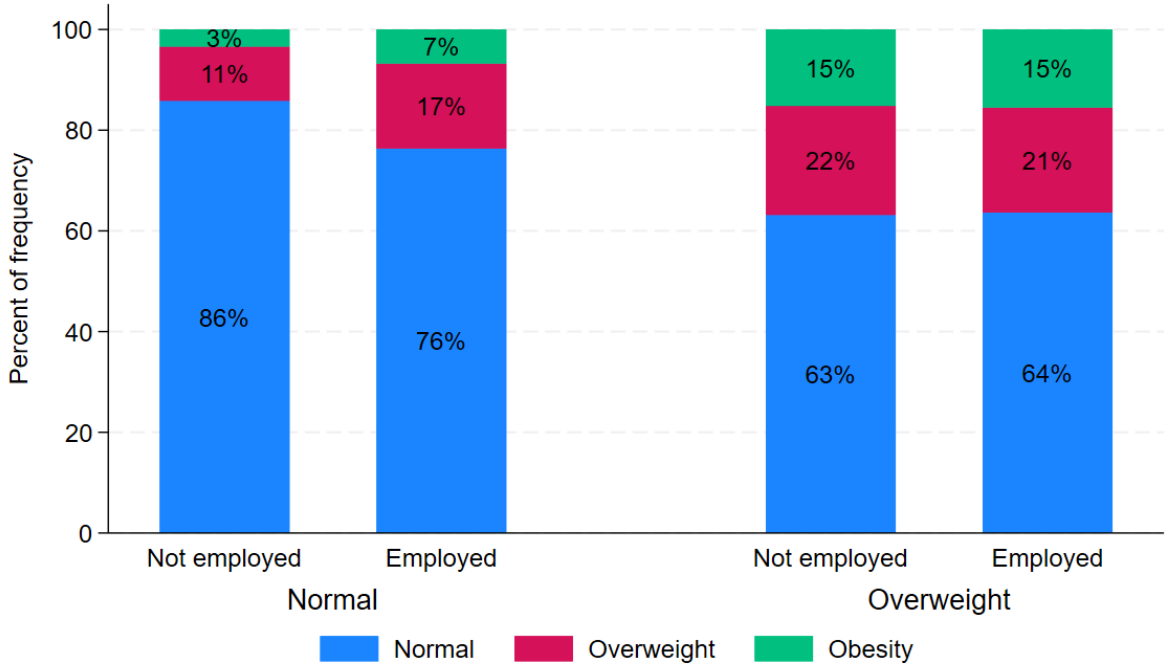
Figure 2.2 Percentage of the child's weight category combining the mother's employment status



Source: Own estimations using data from ENSANUT 2018-19.

Figure 2.3 shows the percentage of children with normal weight, overweight and obesity classified by maternal weight and employment status. According to the survey data, overweight mothers have a lower percentage of children with normal weight than normal-weight mothers. Within the category of overweight mothers, no differences are observed in the overweight children between working and non-working mothers. On the other hand, within the category of normal-weight mothers, the percentage of children with overweight or obesity is lower for mothers who do not work.

Figure 2.3 Percentage of the child's weight category combining the mother's weight category and employment status



Source: Own estimations using data from ENSANUT 2018-19.

To measure direct and combined effects of maternal overweight and employment status on the child's weight, we used the following ordered probit model:

$$Child's\ weight = f(Mat\_over, Mar\_emp, Mat\_over \times Mat\_emp, X) + \varepsilon \quad \ldots (2.1)$$

$Child's\ weight$ is a categorical variable that takes the value of zero if the child's weight is normal, one for overweight, and two for obese. The dichotomous variable Mat_over takes the value of one if the mother is overweight or obese, and zero otherwise. Finally, Mat_emp takes the value of one if the mother is employed and zero otherwise. The vector of variables X includes socioeconomic characteristics of the mother, the child, and the household (such as age, educational level of the mother, gender of the child, and household size).

Results

Table 2.1 shows the marginal effects of the ordered probit model. Maternal overweight reduces the probability that the child has a normal weight by 19.8 percentage points (p.p.) or increases the probability that the child is overweight or obese by 8.4 p.p. and 11.4 p.p., respectively. By itself, maternal employment does not impact the weight of the child.

Table 2.1 Effect of maternal overweight and employment status on child's weight. Ordered probit model (Marginal effects)

Child's weight	Normal	Overweight	Obesity
Maternal overweight	-0.198***	0.084***	0.114***
	(0.049)	(0.020)	(0.030)
Maternal employment	-0.081	0.034	0.046
	(0.071)	(0.030)	(0.041)
Maternal overweight × employment	-0.128†	-0.054†	-0.074†
	(0.075)	(0.032)	(0.044)
Observations	2,613	2,613	2,613

Source: Own estimations using data from ENSANUT 2018-19.
Note: †, ** and *** indicate statistical significance at the 10%, 5% and 1% level, respectively. Robust standard errors are in parentheses. All estimates were controlled for socioeconomic characteristics.

The interaction between maternal overweight and employment status is statistically significant. Table 2.2 presents the predicted marginal effects for each combination of maternal weight and employment status on the probability that the child will be normal weight, overweight or obese.

Table 2.2 Effects of maternal overweight and employment status on child's weight (Predicted probabilities)

	Child's weight		
Mother's weight	Normal	Overweight	Obesity
Normal			
Not employed	81.28%	11.49%	7.20%
Employed	74.27%	15.61%	10.56%
Overweight			
Not employed	62.60%	20.30%	17.08%
Employed	67.94%	18.11%	13.93%

Source: Own estimations using data from ENSANUT 2018-19.
Note: All the results are statistically significant at a 1%-level.

Results show that when the mother is overweight, the probability that the child will be overweight is 2.19 p.p. lower when the mother is employed (18.11%) than when she is not (20.30%). On the other hand, when the mother is not overweight, the probability that the child will be overweight is 4.12 p.p. lower when the mother is not employed (11.49%) than when she is (15.61%). Similar results are found for obesity.

Discussion

We analysed the effect of the interaction between maternal overweight and employment status on overweight and obesity in school-age children. We use information from the National Health and Nutrition Survey 2018-19 for Mexico and an ordered probit model.

Our results indicate that the combination of maternal overweight and employment status are significant determinants in the children's weight, and its effect varies according to the weight-employment combination. We found that having a normal-weight mother reduces the probability of an overweight or obese child if the mother is not employed. On the other hand, having an overweight mother reduces the probability of being overweight or obese if the mother is employed.

Although genetic factors can predispose children to be overweight or obese, a favorable environment is required to manifest, with the parents' lifestyle being a very important factor. Even though women have increased their labour participation, they continue to carry out most housework, as well as children caring. Therefore, the mother's role in the child's eating and activity practices and habits is essential. A mother with bad eating habits will be encouraged his habits more intensively through the child if she spends more time at home. It is important to implement programs that educate mothers and fathers about the importance of healthy eating habits. These programs should focus on providing information and resources to improve the quality of family nutrition.

Since the good eating habits of the mother can be reduced when she works, it is crucial to implement policies that promote the reconciliation between work and family life. This may include promoting flexible hours, maternity, and paternity leave, and fostering a work environment that values the active participation of fathers in raising children. These measures can help improve the situation of children's eating habits and promote a healthier environment for families. The main limitation or a potential follow-up point for this work is the inclusion of the father's weight. Additionally, the sample could be expanded to include children over 11 years of age, allowing for the tracking of their weight over time and during their growth.

Chapter 3

Effects of maternal employment and sibling's gender on housework time allocation in Mexico

Effects of maternal employment and sibling's gender on housework time allocation in Mexico

Introduction

In the last three decades, one of the most notable changes has been the increasing participation of women in the labor market. Women's labor participation rate in Latin America increased from 33.7% in 1990 to 51.7% in 2022 (CEPAL, 2024). Despite this increase, specialization within the household has changed very little; housework and care are still mostly performed by women (Campaña et al., 2017; Chant, 2002). In Latin America, of the total time spent on housework by men and women in a household, 70% is performed by women (Rubiano & Viollaz, 2019).

The gender division of labor in Latin American countries places significant constraints on women's time, often leading to what is termed the "second shift" or the "double burden" of working women (Gimenez-Nadal & Sevilla, 2012; Hochschild, 2018; Hochschild & Machung, 2012). Previous research has shown that, in addition to women's employment, the presence of children, their gender, and birth order composition also influence the time spent on housework in households (Casique, 2008; Dotti Sani, 2016; Schulz, 2021). It has been found that gender socialization patterns are transmitted intergenerationally, as girls have a greater participation in housework than boys and even their fathers from an early age.

However, these studies have been conducted mainly for developed countries, such as the United States and European countries. The literature on the distribution of household tasks among family members is still scarce for Latin American countries, despite the significant changes in women's labor force participation, the marked gender difference in the distribution of household

tasks, and where most households apply traditional parenting. Therefore, this chapter addresses three questions that have been little researched in the field of housework time allocation in Mexico.

First, this study delves into the concept of socialization within family households in Mexico. Utilizing data from the country, it employs a point sample to provide a snapshot of how housework time is allocated among all family members. Second, the study investigates the potential influence of maternal employment on children's housework patterns through intergenerational transmission processes. Third, it explores how the presence of siblings, regardless of gender, influences children's contributions to housework. Through these last two objectives, the study contributes to our understanding of housework participation during the early stages of the life course (Cordero-Coma & Esping-Andersen, 2018; Larson & Verma, 1999), of which much less is still known compared to the extensive literature on adult women and men (Schulz, 2021).

Using data on time use in Mexico for the year 2019, applying a household design that includes only four-person households (two parents of different sexes and two children), this study evaluates the absolute and relative use of the distribution of time spent on housework by fathers, mothers and two children in their households. This selection results in a sample of rigorously reduced heterogeneity, with which it is possible to identify and analyze each position within the household (mother, father, older and younger sibling) and their respective roles in the distribution of time allocation on housework. The selected data are particularly suitable for the study, as they contain first-hand information on the time use of all household members over 12 years of age.

The study is structured as follows: a review of the literature on the distribution of time dedicated to housework within families at the international level and for Latin America, followed by a theoretical review of the main approaches to this type of study, followed by a presentation of the data used for the analysis, as well as the empirical strategy employed for the analysis, to present the results obtained, and ending with the conclusions of the study.

Literature review

The division of household labor within families has been one of the most promising applications for studying women's and men's behavior and their interaction in the household and society. Extensive research has provided insights into the gendered division of labor in the household and its causes and consequences in societies (Coltrane, 2000; Lachance-Grzela & Bouchard, 2010).

International studies have documented that women participate in unpaid work, especially housework, much more than men. In recent years, there have been signs of gender convergence, showing a narrowing of the gender gap between adult women's and men's domestic work time (Leopold et al., 2018; Sullivan et al., 2018). However, women continue to perform most of the housework, and to a greater extent in adult couples of different genders, especially in households with children (Bianchi, 2000; Leopold et al., 2018).

Beyond adult women and men, mothers, and fathers, research on the allocation of housework among children and adolescents in several countries, such as Denmark, Germany, Italy or the United States, found essentially the same patterns of gender inequality: The gender gap is already present in children; girls contribute much more to housework than boys and becomes

even more pronounced as children grow older (Bonke, 2010; Dotti Sani, 2016; Lee et al., 2003; Schulz, 2021).

Several studies have shown that gender socialization processes and allocating time to children's housework depend on the mother's employment. If the mother works, this increases the probability that children will participate in housework (Blair, 1992; Bonke, 2010; Gager et al., 1999, 2009). Mothers who work full time are more pressed for time and require more support from their children to perform housework (Bonke, 2010).

Research reveals that, compared to children of non-working mothers, children whose mothers work full-time play a greater role in housework (Benin & Edwards, 1990; Peters & Haldeman, 1987). In addition, having a full-time working mother has consistently been found to increase the time girls spend on housework (Blair, 1992; Bonke, 2010; Gager et al., 1999, 2009), while the effect on boys is less consistent (Benin & Edwards, 1990; Blair, 1992).

The number of children and the gender composition of siblings also have an impact on the distribution of housework. Several authors argue that housework per child decreases with the number of children, and that the first child contributes more than the last one (Schulz, 2021; Solberg, 1994). Sibling configuration has also been documented to be associated with the gendered allocation of housework for girls and boys (Blair, 1992; Goldschneider & Waite, 1991), as well as with the typification of children's domestic activities by parents (Brody & Steelman, 1985).

Having a sister or brother reduces boys' housework, while the opposite is true for girls, who increase their housework when they have a sister or brother (Bonke, 2010; Gager et al., 1999; Schulz, 2021). The initial levels of housework for girls and boys are also different, and families

with girls spend more time on housework than families with boys; in relative and absolute terms, girls contribute more than boys the more housework there is to do in the family (Bonke, 2010). This vast literature on the distribution of chores within households, including all family members such as parents and children, extending the analyses to the gender composition and birth order of children, is carried out for developed countries. In Latin American countries, research on the distribution of housework still needs to be made available.

Housework and gender inequality in Latin America countries

The study of decisions made within the household is especially relevant in Latin America. This region has higher levels of gender inequality than in the developed world and extremely rigid patterns in the distribution of work by gender within households (International Labour Organization, 2009).

The literature on housework is dominated by comparisons of European and OECD countries (Álvarez & Miles, 2003; Bittman et al., 2003; Connelly & Kimmel, 2011; Leopold et al., 2018; Schulz, 2021). However, no research has captured these patterns in Latin America, with the recent exception of Domínguez-Amorós et al., (2021).

However, most of these studies focus on the distribution of total time (paid and unpaid work) between adult men and women without analyzing the time spent on housework or the time used by other family members (Amarante et al., 2024; Amarante & Rossel, 2018, 2021; Campaña et al., 2017, 2018, 2020; Casique, 2008; Domínguez-Amorós et al., 2021; Gimenez Nadal, 2015; Rubiano & Viollaz, 2019). However, most of these studies focus on the distribution of total time (paid and unpaid work) between adult men and women without analyzing the time spent on housework or the time used by other family members.

In Latin American countries such as Mexico, the distribution of housework is rigid and mainly carried out by women (Amarante et al., 2024; Amarante & Rossel, 2018). In addition, factors such as maternal employment and the presence of children impact the distribution of housework time throughout the family (Amarante & Rossel, 2021; Casique, 2008; Rubiano & Viollaz, 2019). However, literature on this subject is still scarce for this type of country. An important methodological difference concerning the present study is that none of the previous studies conducted for Latin America included each household member in their analysis but combined all children's contributions to housework in aggregate measures or did not treat the gender composition of children as a determinant factor.

This study aims to analyze the concept of socialization within family households and obtain a picture of the allocation of housework time among all household members (father, mother, and children). In addition, it will analyze the influence of maternal employment on the patterns of time allocation to children's housework through intergenerational transmission processes. Finally, it will explore how the presence of siblings of the same or different genders influences the contribution of children to housework.

Addressing these knowledge gaps improves our understanding of gender inequality and housework. First, children do not only cause housework (as is often assumed in research on adult housework performance), but also perform it themselves and are relevant actors in the household production process (Gager et al., 1999, 2009; Larson & Verma, 1999). Second, research has identified the family as a crucial context for young people's overall development and household productivity (Crouter et al., 1995, 2001; McHale et al., 1999).

Therefore, the study of children in their primary socialization environments adds to our understanding of the basis of the gender division of housework among adults (Cordero-Coma

& Esping-Andersen, 2018). On the one hand, the life courses of parents and children are intrinsically linked and influence each other in their time commitments, their flexibility in daily life, and their work-life balance. On the other hand, children's connection to their siblings plays a role. Sibling configuration is associated with both girls' and boys' gendered housework behavior (Blair, 1992; Goldschneider & Waite, 1991), and with how parents categorize their children's housework activities (Brody & Steelman, 1985; Leopold et al., 2018).

Theoretical background

Gender ideology, time availability, and relative resources, including specialization and negotiation within the family, continue to influence gender patterns in the distribution of time between adult women and men. This is despite progress toward gender convergence, increased investments in human capital, and women's increased negotiation power (Coltrane, 2000; Lachance-Grzela & Bouchard, 2010; Schulz, 2021).

The gender ideology perspective postulates an inverse relationship between traditional gender attitudes and an egalitarian division of domestic labor (Berk, 1985; Davis et al., 2007). In the context of housework, "doing gender" refers to the performance of specific activities that confirm traditional male or female identities and is considered an important factor in the allocation of time among men or women, which is largely independent of other processes, such as relative productivities or labor market arrangements (West & Zimmerman, 1987, 1991). Domestic work can still be considered an essential component of gender identity in women, so women are more attached to domestic work than men, and this difference is more pronounced in middle adulthood (Leopold et al., 2018), especially in the case of parenthood (Kühhirt, 2012).

It has been shown that women with more egalitarian attitudes are less likely than women with traditional attitudes to perform all housework (Arrighi & Maume, 2000; Davis et al., 2007; Fuwa, 2004). Gender ideology evolves toward egalitarianism; new generations tend to be more egalitarian than previous generations (Brooks & Bolzendahl, 2004; Fan & Marini, 2000). Mothers who participate in the labor market hold more egalitarian gender attitudes and socialize their children with more egalitarian attitudes. Such a pattern of effects, in combination with the increase in female education and employment, suggests that the trend toward an egalitarian gender ideology should continue (Fan & Marini, 2000).

The relative resources perspective also called the economic exchange hypothesis or economic dependence model, is based on the premise that a couple's external resources, such as income and education, confer decision-making power (Mannino & Deutsch, 2007). Although with a different mechanism, the expected empirical outcome of this concept is consistent with gender negotiation or economic specialization models, such as Becker's approach (1981), which typically assumes higher household productivity of women compared to men or uses resource exchange mechanisms to explain traditional patterns of housework division.

The time availability perspective postulates that the time each partner works outside the home influences their participation in housework, so partners divide housework according to the time each has available (Davis et al., 2007). Given that the greater presence of women in the economically active population limits the time they have available to perform housework, the need for their partner to reconsider and reallocate the workload in the home has become an important topic of debate and research in the last decade (Robinson & Hunter, 2008).

In fact, the time availability and relative resource approaches have been effective in explaining the division of household labor in modern societies. Although both mechanisms are gender-

neutral, gender inequality is still reflected in domestic arrangements in which women perform the bulk of housework (Coltrane, 2000; Lachance-Grzela & Bouchard, 2010; Schulz, 2021).

Two primary frameworks have been used to explain children's contributions to housework: necessity and socialization (Blair, 1992; Bonke, 2010; Cordero-Coma & Esping-Andersen, 2018). The necessity approach argues that children have to do housework because of parental time constraints, e.g., due to maternal employment. The socialization perspective posits that parents pass on housework patterns to their children while living together in a shared household. As girls and boys grow up, they develop a sense of gender roles, and gender-appropriate behavior by observing and imitating their parents, where they may tend to classify the children's housework by gender (Blair, 1992; Cordero-Coma & Esping-Andersen, 2018; Hu, 2015).

Data

To analyze family members' participation in housework, we employ the 2019 National Time Use Survey (Encuesta Nacional de Uso del Tiempo, ENUT) for Mexico. The ENUT is a cross-sectional survey that aims to provide statistical information to measure both paid and unpaid work, as well as how men and women use their time in domestic production (INEGI, 2019). Time-use surveys are typically employed to analyze individual time allocation decisions (Amarante et al., 2024; Bianchi, 2000; Campaña et al., 2020; Casique, 2008; Folbre, 1994; Folbre et al., 2005; Gimenez-Nadal & Sevilla, 2012).

The survey size is 27,214 households, with a target population of 12 years and older. It has information on the hours and minutes dedicated to housework for each family member, with two reference periods: workweek and weekends. Our target sample is those nuclear families comprising four individuals: father, mother, and two children. The parents are of different

genders, are less than or equal to 60 years old, and have two children between 12 and 17 years old. Thus, by obtaining a final sample of 1,043 households and applying the expansion factor, we get a representativeness of 1,400,825 households. This selection of households results in a sample of rigorously reduced heterogeneity, with which it is possible to identify and analyze each position within the household and their respective contributions to the time dedicated to housework.

The time spent by each family member on housework is obtained by adding the minutes spent on each housework task during the workweek and then dividing by five to obtain the average time per day. The housework contemplated includes cooking, general household cleaning (washing dishes, sweeping, taking out the garbage, etc.), caring for plants or pets, cleaning and organizing clothes (washing, ironing clothes, etc.), maintaining household vehicles (washing, repairing, etc.), purchasing food, goods, and services for the household, as well as paying and administrating household bills[8].

Table 3.1 shows the descriptive statistics by maternal employment and total households. Of the total households, 54% of the mothers are employed; they may be self-employed or have a full-time or part-time job[9]. The sample shows a high percentage of employed women due to our research's specific group of households: young mothers with children aged 12-17, averaging 40 years old. Households with non-employed mothers dedicate more time to housework, with a daily difference of nearly one hour (51 minutes).

[8] Complete list of questions used in List A1.
[9] A mother is considered employed if she performs an activity for which she receives remuneration.

Table 3.1 Descriptive household statistics by maternal employment

	Maternal employment		
	No	Yes	Total
N	639,406 (46%)	761,419 (54%)	1,400,825 (100%)
Total household time (min per day)	10hrs 24min	9hrs 33min	9hrs 56min
Sibling gender composition			
Boy/Boy	26.2%	24.5%	25.3%
Boy/Girl	24.4%	24.4%	24.4%
Girl/Boy	19.7%	26.8%	23.6%
Girl/Girl	29.6%	24.1%	26.6%
Older sibling's age	15	15	15
Age difference (older-younger sibling)	2	2	2
Mother's age	40	40	40
Older sibling employment status	26.1%	31.4%	28.9%
Mother's education			
Elementary	41.0%	25.4%	32.5%
Middle school	42.2%	41.6%	41.9%
High school	10.9%	17.0%	14.2%
College	4.7%	14.4%	10.0%
Postgraduate	0.9%	1.4%	1.2%

Source: Own estimates using data from ENUT 2019.
Note: Select variables only, see Table A3.1.

The gender composition of children is divided into four categories: Boy/Boy, Boy/Girl, Girl/Boy, and Girl/Girl, where the first denotes the gender of the older sibling. The distribution of households between employed and non-employed mothers by gender composition is balanced in most compositions. A greater tendency to have an older daughter and a younger son is only observed in households where the mother is employed. The oldest son's age averages almost 15 years, with a difference of 2 years on average with the youngest sibling.

The oldest child is employed in 28.9% of the households, which varies according to the mother's employment. The percentage of older children who work is higher in households where the mother is employed, at 31.4%, in contrast to 26.4% in households where the mother is not employed. Of the non-employed mothers, 83.2% have elementary or middle school schooling;

however, employed mothers have more schooling on average. For descriptive statistics of the rest of the socioeconomic characteristics of the household, see Table A3.1.

Methodology

Linear regressions were used to estimate the time each family member spent on housework. In various analyses of time allocation in households, the empirical strategy of Ordinary Least Squares (OLS) has applied an independent linear regression for each household member (Amarante & Rossel, 2021; Casique, 2008; Leopold et al., 2018; Schulz, 2021). However, the time that one family member spends on a household task is time that another family member does not spend on that activity. Therefore, using the time spent by family members on housework independently would lead to endogeneity problems, so we estimate a Seemingly Unrelated Regressions (SUR) model, which considers the relationship that exists between the time spent on housework by each family member. Other authors have used the estimation of SUR models to analyze time allocation within households and have taken it as a reference for the present study (Campaña et al., 2018, 2020). For a given household "i", let TF_i, TM_i, TO_i, TY_i, let be the average time in minutes per day during the workweek spent on housework for each family member (father, mother, oldest child, and youngest child, respectively).

The vector of variables $Composition_i$ comprises four dummy variables, the different compositions by gender of the children that a household may have. The component variables are *Boy/Boy*, *Boy/Girl*, *Girl/Boy* y *Girl/Girl*, where the first to appear denotes the gender of the oldest child and takes the value of "1" if household "i" is formed by such composition, and "0" otherwise. In the model, *Boy/Boy* is taken as the reference variable. Other analyses at the international level have been used this type of arrangement (Schulz, 2021).

The variable $Maternal\_emp_i$ is equal 1 if the mother is employed, 0 otherwise. The vector $Interactions_i$ contains the interactions $Composition_i \times Maternal\_emp_i$, the vector X_i is conformed by socioeconomic characteristics of the household (age, age difference between siblings, maternal education, domestic employee, rural area and whether the mother is indigenous), ε_{tfi}, ε_{tmi}, ε_{tosi} y ε_{tysi} are random variables representing unobserved factors. The equation for each household member was estimated separately but not independently as:

$$TF_i = \alpha_{tf} + \beta_1 Composition_i + \beta_2 Maternal\_emp_i + \beta_3 Interactions_i + \beta_4 X_i + \varepsilon_{tfi} \quad (3.1)$$

$$TM_i = \alpha_{tm} + \beta_1 Composition_i + \beta_2 Maternal\_emp_i + \beta_3 Interactions_i + \beta_4 X_i + \varepsilon_{tmi} \quad (3.2)$$

$$TO_i = \alpha_{os} + \beta_1 Composition_i + \beta_2 Maternal\_emp_i + \beta_3 Interactions_i + \beta_4 X_i + \varepsilon_{toi} \quad (3.3)$$

$$TY_i = \alpha_{ys} + \beta_1 Composition_i + \beta_2 Maternal\_emp_i + \beta_3 Interactions_i + \beta_4 X_i + \varepsilon_{tyi} \quad (3.4)$$

It considers the correlations in the unobserved determinants by allowing the error terms to be normally distributed jointly, with no restrictions on the structure of these correlations. This specification considers the constraint on a household's total time on housework, which may force one member to spend more on housework and thus less time on another. In addition, we assume that the error components are independent across family members. (Campaña et al., 2018, 2020):

$$\begin{pmatrix} \varepsilon_{tfi} \\ \varepsilon_{tmi} \\ \varepsilon_{toi} \\ \varepsilon_{tyi} \end{pmatrix} \sim N \left[\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \begin{matrix} \sigma_{tfi}^2 & \rho_{tfitmi}\sigma_{tfi}\sigma_{tmi} & \rho_{tfitoi}\sigma_{tfi}\sigma_{toi} & \rho_{tfityi}\sigma_{tfi}\sigma_{tyi} \\ \rho_{tmitfi}\sigma_{tmi}\sigma_{tfi} & \sigma_{tmi}^2 & \rho_{tmitoi}\sigma_{tmi}\sigma_{toi} & \rho_{tmityi}\sigma_{tmi}\sigma_{tyi} \\ \rho_{toitfi}\sigma_{toi}\sigma_{tfi} & \rho_{toitmi}\sigma_{toi}\sigma_{tmi} & \sigma_{toi}^2 & \rho_{toityi}\sigma_{toi}\sigma_{tyi} \\ \rho_{tyitfi}\sigma_{tyi}\sigma_{tfi} & \rho_{tyitmi}\sigma_{tyi}\sigma_{tmi} & \rho_{tyitoi}\sigma_{tyi}\sigma_{toi} & \sigma_{tyi}^2 \end{matrix} \right]$$

Similarly, the model is applied taking as an independent variable the share of each member in the total time the household dedicates to housework. $ShareF_i$, $ShareM_i$, $ShareO_i$, and $ShareY_i$, denotes the variable of share for each member, and is calculated by:

$$Share_i = \frac{Time\ of\ the\ member\ j}{Total\ time\ of\ the\ household\ i} \times 100$$

where $j = father, mother, older, younger$. In other words, the percentage of time spent by each member of the household of the total time a household spends on housework (Craig et al., 2015; Craig & Powell, 2018; Schulz, 2021).

Results

In Table 3.2, we observe the results of the regressions of the SUR models for the independent variables, time and share, for each family member. All the regressions are controlled for socioeconomic variables[10]. In the case of the SUR models with time in minutes as the independent variable, we observe that maternal employment statistically affects the time spent on housework by almost all family members. If the mother is employed, fathers' time spent on housework increases by nearly 21 minutes on average, compared to fathers in a household with a non-employed mother. As expected, if the mother is employed her time spent on housework is reduced by 62 minutes on average per day. The older sibling's time spent on household activities increases by 31 minutes if his mother is employed. These results align with the theoretical perspective of time availability in the couple and the "need" approach of the children's participation in housework due to the parents' time constraints.

[10] Only selected variables are shown, for complete results see Table A3.2.

Table 3.2 Seemingly unrelated regression of housework time and shares for all family members

	Time				Share			
	Father	Mother	Older sibling	Younger sibling	Father	Mother	Older sibling	Younger sibling
Maternal employment								
Yes	20.70**	-62.37***	31.68***	9.98	3.33**	-11.93***	5.63***	2.96**
	(8.99)	(13.63)	(9.41)	(8.24)	(1.48)	(2.25)	(1.44)	(1.27)
Sibling gender composition								
Boy/Boy	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Boy/Girl	-9.36	-11.79	-9.96	31.11***	-1.40	-3.08	-1.15	5.63***
	(9.11)	(13.81)	(9.55)	(8.37)	(1.50)	(2.28)	(1.46)	(1.29)
Girl/Boy	-22.71**	-13.98	43.23***	-6.57	-2.522	-6.41**	8.45***	0.47
	(10.01)	(15.18)	(10.50)	(9.20)	(1.64)	(2.51)	(1.61)	(1.41)
Girl/Girl	-30.71***	-28.85**	34.70***	24.86***	-4.01***	-7.19***	6.59***	4.62***
	(9.29)	(14.10)	(9.74)	(8.53)	(1.53)	(2.33)	(1.49)	(1.31)
Interactions								
Boy/Boy*m_emp[a]	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Boy/Girl* m_emp	19.27	-19.43	-2.43	2.61	3.91†	-3.10	-0.48	-0.32
	(12.96)	(19.65)	(13.58)	(11.89)	(2.13)	(3.25)	(2.08)	(1.83)
Girl/Boy* m_emp	26.82**	-10.53	-28.35**	12.10	2.35	2.94	-5.25**	-0.03
	(13.27)	(20.12)	(13.90)	(12.18)	(2.18)	(3.33)	(2.13)	(1.87)
Girl/Girl* m_emp	14.06	-21.85	0.30	7.46	2.36	-1.48	-0.69	-0.17
	(13.03)	(19.76)	(13.65)	(11.95)	(2.14)	(3.27)	(2.09)	(1.84)
Controls[b]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-22.58†	82.36***	-5.09	-56.09**	8.43***	72.58***	14.99***	3.87
	(11.79)	(17.58)	(26.53)	(25.88)	(1.91)	(2.88)	(4.01)	(3.90)
Observations	1,043	1,043	1,043	1,043	1,043	1,043	1,043	1,043
R-squared	0.20	0.60	0.32	0.27	0.10	0.13	0.13	0.10

Source: Own estimates using data from ENUT 2019.

Note: Time is the minutes per day dedicated to housework and share measures the percentage that each member performs of the total housework. [a] Interaction of sibling gender composition and maternal employment. [b] Controls include age, age difference of siblings, employment status of the oldest child, mother's education, the total time in min per day the family spends on housework, if they have a domestic employee, rural area, and if the mother belongs to an indigenous group. Own estimates with data from ENUT 2019. Standard errors in parentheses, *** p<0.01, ** p<0.05, † p<0.1.

The children's gender composition with older daughters reduces fathers' time allocated to housework compared to the composition of two sons. In households with an older sister and a younger brother, the father's time spent on housework per day is reduced by 22 minutes; this time is reduced by up to 30 minutes in households with two daughters. For the mother, the only gender composition statistically significant is two daughters; mothers spend 28 minutes less on housework per day.

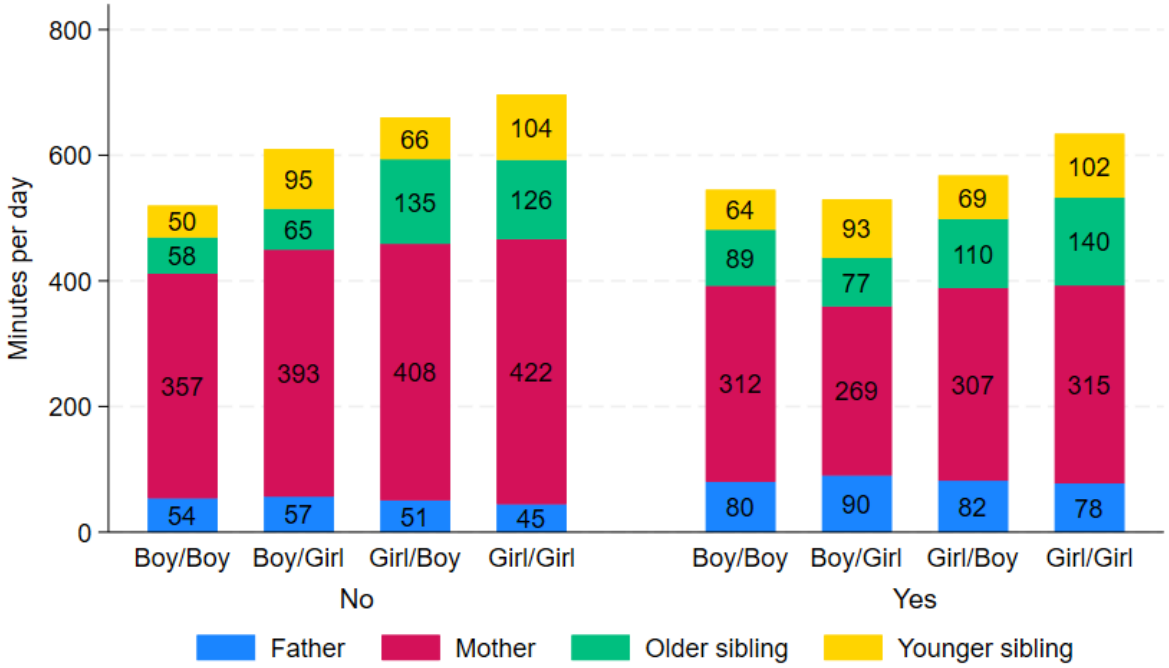
In the case of sibling sorting, we observe that older and younger sisters always spend more time on housework when having a brother than when having a sister. The interaction coefficients result statistically significant only for fathers and older brothers in households with the composition of an older sister and a younger brother. These results do not allow us to corroborate the theory that employed mothers hold more egalitarian gender attitudes and socialize their children with more egalitarian attitudes. Since the results are statistically significant for only one type of household, and the results in these households contradict this theory.

We find similar results for the SUR models with the independent variable share. If the mother works, the father's share of the total time dedicated to housework increases by 3.3 percentage points (p.p.), the mother's share is reduced by almost 12 p.p., for both siblings it increases, by 5.6 p.p. for the older sibling and nearly 3 p.p. for the younger sibling. For the children's gender composition, we observe that households with two daughters reduce the father's participation by 4 p.p., compared to households with two sons. In households with an older sister, the mother's participation is reduced by 6.4 p.p. if the older sister has a younger brother and 7.1 p.p. with a younger sister.

For siblings' gender composition, the shares increase for sisters in greater proportion when they have a brother than when they have a sister. The interaction terms are statistically significant only for fathers in households with older sons and younger daughters and for older sisters in households with older daughters and younger sons. These results, as in the models with time as the independent variable, do not allow us to corroborate the theory that employed mothers hold more egalitarian gender attitudes.

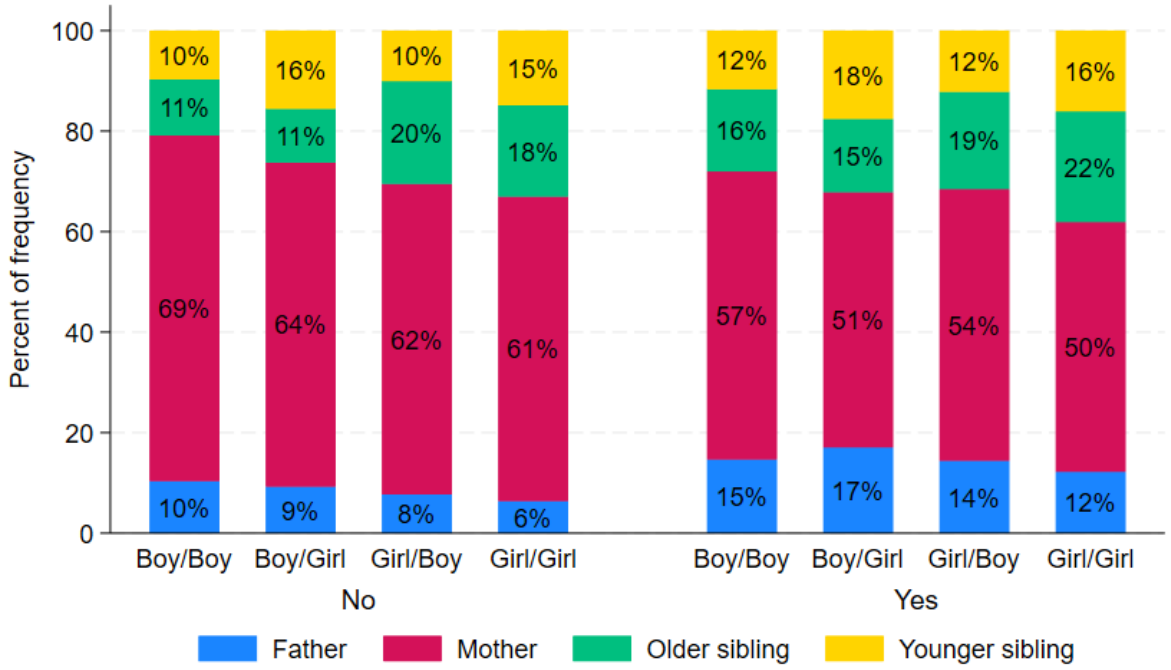
Below, we present the estimated time and shares using the SUR model for each family member in the different types of households. In Figure 3.1, we observe the average time in minutes allocated by each household member on housework per day during the workweek, separated by children's gender composition and maternal employment. As expected, regardless of maternal employment, the mother is the household member who spends the most time on housework. In households where mothers are not employed, they allocate between 357-422 minutes on average per day on housework, which is almost 8 times the allocated time by fathers in this type of household. In the case of households where the mother is employed, the time allocated by mothers on housework ranges from 269-315 minutes per day, which is almost 4 times the time allocated by fathers.

Figure A3.1 Estimate time use for total housework on weekdays of all household members, by gender composition of children



Source: Own estimates using data from ENUT 2019.
Note: The older sibling appears first in the labels on the x-axis.

Figure A3.2 Estimate relative share use for total housework on weekdays of all household members, by gender composition of children



Source: Own estimates using data from ENUT 2019.
Note: The older sibling appears first in the labels on the x-axis.

Fathers in households with employed mothers allocated more time on housework, between 72-90 minutes, compared to households with non-employed mothers, where the fathers allocated time on housework between 45-57 minutes. In Figure 3.2, we observe the shares of each family member in the total time allocated to housework. In terms of participation, fathers in households with employed mothers perform between 12%-17% of the housework compared to fathers in households with non-employed mothers, where this participation is reduced to 6%-10%. That is, fathers' involvement in housework depends on maternal employment, which is in line with what is suggested by the theory of time availability or relative resources.

On the other hand, the father's participation in housework is reduced in households with a daughter, especially in households with two daughters, regardless of the mother's employment status. In households with two sons, the father's participation is similar to that of the oldest son.

These results may be associated with the perspective of socialization between parents and children, where domestic work patterns are transmitted while living together in a shared household.

Households with two daughters dedicate the most time to housework, and households with two sons dedicate the least, a result consistent with the literature. However, in households where the siblings are of different genders, we observe that daughters dedicate more time to housework, regardless of whether they are the oldest or not, whether the mother is employed or not.

The households with the highest participation of mothers in the housework are those with two sons, and the lowest participation of mothers is in households with two daughters, regardless of whether the mother is employed or not. In other words, children's gender determined the mothers' housework participation regardless of maternal employment status. These results show us that there is still a strong gender ideology perspective, as we still observe traditional gender attitudes in households, causing an unequal division of housework among family members.

Conclusion

Despite the increase in female labor participation in recent decades, the distribution of housework continues to be unequal between men and women. This has caused women to have to add hours of unpaid work in addition to the time they spend on paid activities, having to face a double burden or a "second shift" of unpaid work (Hochschild, 2018; Hochschild & Machung, 2012).

Latin American countries are characterized by a traditional family and cultural structure, where gender identity is a determining factor in the allocation of time dedicated to housework. However, studies on the distribution of time dedicated to housework are still scarce,

particularly those that consider children as a unit of analysis. Therefore, in this study, using data from Mexico, we analyzed the allocation of housework time among all family members in households. In addition, we explored the possible influence of maternal employment on the patterns of time allocation to children's housework through intergenerational transmission processes. Adding an analysis of the gender composition of siblings and how it influences children's contribution to housework.

From our results, we can conclude that in Mexico, women perform most of the total domestic work in households. However, the availability of time and the relative resources of mothers and fathers determine the allocation of time dedicated to housework. In addition, the children's gender composition matters, especially for daughters, since regardless of whether she is the older or younger sister, she will always allocate more time to housework if she has a brother.

On the other hand, in Mexican households where the mother is employed and has two daughters, the daughters absorb a large part of the mother's participation in housework. In other words, we observe an intergenerational transmission of housework behavior in Mexico from parents to children. Furthermore, the observed results support the theoretical perspectives of gender socialization and family learning concerning the distribution of housework so that current families continue to reproduce traditional patterns of gender inequality.

Implementing educational programs in schools and communities, coupled with media campaigns that challenge traditional gender stereotypes, can play a role in fostering gender equality from an early age. Additionally, encourages companies to develop active parenting programs and support co-responsibility in the home. These public policies can contribute to reducing the unequal burden of unpaid domestic work between men and women, promoting greater gender equality in Mexican households.

One limitation of the study is that it focused on the classic case of the nuclear family. Including other forms of family life, such as single-parent or extended households, would broaden the picture by including arrangements that might be less susceptible to the traditional model. On the other hand, mothers and daughters may exchange some housework differently than mothers and sons, fathers and sons, or fathers and daughters. Future research could delve more deeply into the shared or solo contexts of children's time spent on housework. Finally, future analyses could include measures that capture the difference in the time allocated to housework in households with two daughters and families with two sons, as this could be an important part of the unobserved heterogeneity of time spent on housework.

General conclusions

Female labor force participation has been extensively studied in the literature due to the increase observed in recent decades. However, the effects of the increase in female labor participation, specifically of mothers, on their children's socioeconomic characteristics are still scarcely researched, especially in Mexico. Therefore, this paper contributes to the family economics literature for Mexico with the three studies presented above.

Chapter 1 analyzes the impact of mothers' education and employment status on their children's educational attainment in Mexico. The main results are: Higher maternal education correlates with higher probabilities of children staying in school; Children of employed mothers tend to achieve better educational outcomes, and the combination of maternal education and employment significantly boosts children's educational prospects.

The study suggests that the benefits of employee mothers, such as increased household income, outweigh the drawbacks of reduced direct maternal involvement in education. This aligns with Becker's fertility theory and Bourdieu's social capital theory, indicating that a more educated mother and higher household income enhance children's social capital and educational attainment. Gender analysis reveals that sons benefit more from their mothers' employment status than daughters, supporting sex role theory. However, higher maternal education levels help reduce the educational gap between sons and daughters.

The study advocates for policies that promote female labor participation and education, as these contribute to more empowered mothers who can foster better educational outcomes for their children. This empowerment leads to fewer but more educated children, which can drive faster economic growth and reduce educational inequality between genders. A limitation of the study

is its focus on children from two-parent households, suggesting future research should include single mothers to understand the broader impacts of maternal labor participation.

Chapter 2 examines the interaction between maternal overweight and employment status on overweight and obesity in school-age children using data from Mexico's National Health and Nutrition Survey 2018-19 and an ordered probit model. The main results are: Maternal overweight and employment status significantly influence children's weight, with the impact varying by the weight-employment combination; children are less likely to be overweight or obese if they have a normal-weight mother who is not employed, and conversely, having an overweight mother reduces the likelihood of children being overweight or obese if the mother is employed.

The study highlights that while genetic factors play a role, the parental lifestyle, particularly the mother's, is crucial. Employed mothers with poor eating habits may have less influence on their children's habits due to reduced time at home. The study recommends programs educating parents on healthy eating and policies promoting work-life balance, including flexible hours and parental leave, to improve family nutrition and children's health. A noted limitation is the exclusion of paternal weight and the focus on children under 11, suggesting future research should include older children for longitudinal analysis.

Finally, chapter 3, using data from Mexico, analyzes the allocation of time in housework among all family members, explores the influence of maternal employment on these patterns through intergenerational transmission, and considers the gender composition of the children. The main results are: Time spent on housework varies according to the gender composition of the children, daughters participate more in the chores, especially in households with different

gender siblings, and intergenerational transmission of household chore behaviors is observed, with traditional patterns of gender inequality.

The study concludes that Mexican families continue to reproduce traditional patterns of gender inequality in the distribution of housework and that employed mothers do not necessarily socialize their children with more egalitarian attitudes. It highlights the need for policies and programs that promote a more equitable distribution of housework and support the reconciliation of work and family life.

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Appendix

List A3.1 Questions used on the use of time of family members

1. “How many min during the week did you cook, prepare or heat food or beverages?”
2. “How many min during the week did you serve food, pick up, wash, dry or set out dishes?”
3. “How many min during the week did you take food to someone in your household to school, work or other place?”
4. “How many min during the week did you sweep the sidewalk, garage or yard of your dwelling?”
5. “How many min during the week did you clean or pick up the inside of your dwelling (tidy up objects, make beds, sweep, mop, shake, wash the kitchen, bathroom, among others)?”
6. “How many min during the week did you pick up, separate, throw away or burn garbage?”
7. “How many min during the week did you care for or water pots and plants in your yard or garden?”
8. “How many min during the week did you clean feed or care for pet(s) (companion animals) in your household?”
9. “How many min during the week did you wash, hang out or put clothes out to dry (if by machine, remove operating time)?”
10. “How many min during the week did you iron clothes?”
11. “How many min during the week did you sort, fold, arrange or put away the laundry?”
12. “How many min during the week did you clean, polish or paint your shoes (tennis shoes, huaraches, boots, etc.)?”
13. “How many min during the week did you repair or do any minor installation to your dwelling?”
14. “How many min during the week did you repair furniture, toys, household appliances or computer in your home?”
15. “How many min during the week did you wash or clean any means of transportation in your household (bicycle, motorcycle, van, car)?”
16. “How many min during the week did you repair or maintain any means of transportation in your household (bicycle, motorcycle, van, car)?”
17. “How many min during the week did you look for or buy spare parts, tires, tools or materials for construction, car, house or land?”
18. “How many min during the week did you look for or shop for groceries, pantry, stationery, medicines or cleaning supplies?”
19. “How many min during the week did you search for or purchase items or goods for your household such as dishes, tablecloths, furniture, clothing, shoes or other?”
20. “How many min during the week did you keep expenses (bills) for your household?”

Table A3.1 Descriptive household statistics by maternal employment

	Mother work		
	No	Yes	Total
N	639,406 (45.64%)	761,419 (54.36%)	1,400,825 (100%)
Total household time (min per day)	624.26	573.26	596.54
Sibling gender composition			
Boy/Boy	26.20%	24.54%	25.30%
Boy/Girl	24.43%	24.48%	24.46%
Girl/Boy	19.71%	26.88%	23.61%
Girl/Girl	29.66%	24.10%	26.64%
Older sibling's age	15.71	15.82	15.77
Age difference (older-younger sibling)	2.47	2.52	2.50
Mother's age	39.81	39.97	39.90
Father's age	42.68	42.35	42.50
Older sibling employment status	26.10%	31.40%	28.98%
Mother's education			
Elementary	41.08%	25.46%	32.59%
Middle school	42.22%	41.63%	41.90%
High school	10.98%	17.03%	14.27%
College	4.75%	14.45%	10.02%
Postgraduate	0.96%	1.43%	1.22%
Father's education			
Elementary	35.67%	21.95%	28.21%
Middle school	40.09%	42.43%	41.36%
High school	13.43%	17.75%	15.77%
College	9.30%	16.73%	13.34%
Postgraduate	1.52%	1.14%	1.31%
Domestic employee	1.45%	2.13%	1.82%
Indigenous mother	17.67%	17.27%	17.45%
Indigenous father	20%	19.09%	19.50%
Rural area	39.90%	22.59%	30.49%

Source: Own estimates using data from ENUT 2019.

Table A3.2 Seemingly unrelated regression of housework time and shares for all family members

	Time				Share			
	Father	Mother	Older sibling	Younger sibling	Father	Mother	Older sibling	Younger sibling
Mother works								
Yes	20.70**	-62.37***	31.686***	9.98	3.33**	-11.93***	5.63***	2.95**
	(8.99)	(13.63)	(9.41)	(8.24)	(1.48)	(2.25)	(1.44)	(1.27)
Sibling gender composition								
Boy/Boy	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Boy/Girl	-9.36	-11.79	-9.96	31.11***	-1.39	-3.08	-1.15	5.63***
	(9.11)	(13.81)	(9.55)	(8.37)	(1.50)	(2.28)	(1.46)	(1.29)
Girl/Girl	-30.71***	-28.85**	34.70***	24.86***	-4.01***	-7.19***	6.58***	4.62***
	(9.29)	(14.10)	(9.74)	(8.53)	(1.53)	(2.33)	(1.49)	(1.31)
Girl/Boy	-22.71**	-13.98	43.23***	-6.57	-2.52	-6.41**	8.45***	0.47
	(10.01)	(15.18)	(10.50)	(9.20)	(1.64)	(2.51)	(1.61)	(1.41)
Interactions								
Boy/Boy* m_emp[a]	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Boy/Girl* m_emp	19.27	-19.43	-2.43	2.60	3.91†	-3.10	-0.48	-0.32
	(12.96)	(19.65)	(13.58)	(11.89)	(2.13)	(3.25)	(2.08)	(1.83)
Girl/Boy* m_emp	26.82**	-10.53	-28.35**	12.10	2.35	2.94	-5.25**	-0.03
	(13.27)	(20.12)	(13.90)	(12.18)	(2.18)	(3.33)	(2.13)	(1.87)
Girl/Girl* m_emp	14.06	-21.85	0.30	7.46	2.36	-1.48	-0.69	-0.17
	(13.03)	(19.76)	(13.65)	(11.95)	(2.14)	(3.27)	(2.09)	(1.84)
Age	0.01	-0.01	-2.93†	3.03†	0.00	-0.00	-0.48†	0.49**
	(0.07)	(0.08)	(1.68)	(1.68)	(0.00)	(0.01)	(0.25)	(0.25)
Age difference	-0.51	1.42	6.95***	-4.89**	-0.08	0.44	0.93***	-0.79***
(older-younger sibling)	(1.89)	(2.86)	(2.17)	(1.90)	(0.31)	(0.47)	(0.33)	(0.29)
Older sibling emp status	10.16†	-1.91	-17.07***	8.78†	1.81**	-1.52	-1.97**	1.68**
	(5.40)	(8.19)	(5.69)	(4.99)	(0.89)	(1.35)	(0.87)	(0.76)
Mother's education								
Elementary	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
Middle school	3.14	8.11	-7.30	-3.95	0.21	0.91	-0.29	-0.83
	(5.77)	(8.75)	(6.04)	(5.29)	(0.95)	(1.44)	(0.92)	(0.81)
High school	21.10***	6.85	-13.32†	-14.63**	4.16***	-1.37	-0.99	-1.79†
	(7.68)	(11.65)	(8.04)	(7.04)	(1.26)	(1.92)	(1.23)	(1.08)
College	19.21**	9.11	-19.42**	-8.90	4.68***	-0.33	-2.56†	-1.79
	(8.93)	(13.54)	(9.35)	(8.19)	(1.47)	(2.24)	(1.43)	(1.26)
Postgraduate	63.76**	-12.79	-24.39	-26.54	10.45**	-3.24	-2.55	-4.65
	(25.80)	(39.12)	(27.02)	(23.66)	(4.24)	(6.47)	(4.14)	(3.64)
Total household time[b]	0.13***	0.52***	0.19***	0.15***	0.00	-0.00**	0.00**	0.00
	(0.01)	(0.01)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Domestic employee[c]	4.38	-16.86	5.18	7.29	1.18	-2.71	-0.00	1.53
	(15.87)	(24.06)	(16.62)	(14.55)	(2.61)	(3.98)	(2.55)	(2.24)
Rural area	-1.21	-6.24	1.10	6.35	-0.18	-1.72	0.50	1.40†
	(5.22)	(7.92)	(5.47)	(4.79)	(0.86)	(1.31)	(0.84)	(0.73)
Indigene[d]	7.85	-30.38***	14.96**	7.56	0.95	-4.60***	3.12***	0.51
	(6.61)	(10.02)	(6.92)	(6.06)	(1.08)	(1.65)	(1.06)	(0.93)
Constant	-22.58†	82.36***	-5.09	-56.09**	8.43***	72.58***	14.99***	3.87
	(11.79)	(17.58)	(26.53)	(25.88)	(1.91)	(2.88)	(4.01)	(3.90)
Observations	1,043	1,043	1,043	1,043	1,043	1,043	1,043	1,043
R-squared	0.20	0.60	0.32	0.27	0.10	0.13	0.12	0.10

Source: Own estimates using data from ENUT 2019.

Note: Time is the minutes per day dedicated to housework and share measures the percentage that each member performs of the total housework. [a] Interaction of sibling gender composition and maternal employment. [b] Total time in min per day spent by the family on housework. [c] If the household has a part-time, full-time, or caretaker domestic employee. [d] If the mother belongs to an indigenous group. Standard errors in parentheses, *** p<0.01, ** p<0.05, † p<0.1.