



Caregiving solutions in Mexican households during COVID-19 lockdown

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Received: 9 November 2020 / Accepted: 12 April 2022 / Published online: 22 April 2022
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Abstract

The COVID-19 quarantine in Mexico has meant that household members spend more time inside the home, increasing the demand for direct and indirect care by minors, the elderly, chronically ill and disabled. This forced a reconfiguration of the provision of these services by household members. The aim of the document is two-fold: first, to describe socioeconomic and demographic aspects of Mexican households around care activities during the quarantine and second, to estimate the determinants of the provision of care in the quarantine. The information was obtained from the Survey of Care and COVID-19 in Mexican Homes during Quarantine (SCCMHQ). The propensity score-matching technique is used as a quasi-experimental procedure to estimate the causal effects of a treatment variable (presence of minors, elderly, chronically ill, disability, or domestic service in the home) in Mexican households. The Probit model shows that age and economic dependency are determinants of caregiving for treatment groups with minors, disability and chronic disease. In addition, sex, home income, and current employment situation are significant for treatment groups with a disability, paid domestic work, and minors, respectively. A positive “net” effect of the treatment variables in the probability of care provision was also observed. Particularly, the existence of minors at home was highly effective to promote direct and indirect care. The confinement solution is characterized by a balance between genders, except in the case of households with disabilities. This shows that a cultural and functional change is possible in the distribution of care responsibilities, which can be consolidated through public policies.

Keywords Caregiving solutions · Mexican households · Minors · Elderly · Chronically ill · Disabled

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Introduction

The effects of social distancing because of the COVID-19 pandemic in Mexico have led to an economic crisis, reflected in the closure of companies and increased unemployment. According to the National Institute of Statistics and Geography (INEGI 2020), 93.2% of the country companies were affected by this health contingency, which mainly increased unemployment and business closures. This resulted in a total job loss of 11.4 million people from May 2019 to May 2020 (INEGI 2020). In addition, 23.5% of the workers in the formal sector kept working from home, while 6.1 million were temporarily suspended from their jobs and only 38% received full-time income (INEGI 2020).

From the housing point of view, the pandemic has also brought economic problems. It is reported that in 30% of households at least one member lost his or her job while 65% of the total household income fell (INEGI 2020). Moreover, life within households is becoming more complex due to confinement, as children, parents, and in some cases, elderly people had to continue their livelihood with different care demands.

Moreover, before the pandemic, in 61% of households headed by men and 47% headed by women, were at least one dependent child, while both members of the couple worked in at least 39% of households (National Census of Population and Housing, CNPV 2010). Also, according to the National Survey of Demographic Dynamics (ENADID 2018), there were about 11 elderly dependents for every 100 people in working ages. Furthermore, this Survey indicated that of the 15.4 million people aged 60 years and over, 1.7 million lived alone, of which 69.4% had some type of disability.

In this context, school-aged children between 6 and 14 years old demanded more time of care and attention at home to carry out, among others, their school activities (Ehrler et al. 2021), while aging adults, as part of the most vulnerable population groups to get COVID-19 and with more risk for complications, demanded physical and emotional health care, as well as food (Lebrasseur et al. 2021). Thus, adults in the home-of-working age tend to assume the role of caregivers of minors and the elderly, becoming unique promoters of the development of their children and the integrity of adults (Hincapié et al. 2020), so that care practices in the home become vital to the well-being of the family.

As García et al. (2020) asserted, the confinement of the population, suppression of educational and childcare facilities, closure of day care centers, and other services for dependents concentrated the burden of care on families, especially women. Thus, confinement translated into more time at home, more work activities at home, more demand for care from family members, and in some cases, lower income. In this regard, as total home income decreased in confinement, households have had to provide domestic services by their own means. Also, due to lockdown consequences, the household members alternate to do domestic work, including care, according to their paid work activities (Gromada et al. 2020). In consequence, the Mexican households have had to reconfigure traditional care arrangements and paid activities, resulting in a redistribution of care responsibilities.

The aim of the paper is twofold: first, to describe some socioeconomic and demographic aspects of Mexican households related to care activities in the face of confinement due to COVID-19 pandemic and second, to estimate the socioeconomic and demographic determinants of the provision of informal domestic work within the Mexican homes. This allows an answer to the question of what the effects of minors, the elderly, the disabled, and/or chronically sick at home on caregiving solutions are.

Traditional caregiving solutions and its determinants

Care work is the foundation of societies and economies. If no one invest time, effort and resources in these types of activities, communities, workplaces, and entire economies would collapse (OXFAM 2020). According to the International Labour Organization (ILO 2018), care work comprises two types of overlapping activities. Those related to direct, personal, and relational care (feeding a baby or caring for a disabled person), and those related to indirect care (cooking, washing, etc.). Unpaid care work consists of the provision of care by caregivers who do not receive any economic compensation in return. In this sense, unpaid care services for the home and family should be recognized as work, since they involve time, energy, and material and financial resources (OXFAM 2018).

Globally, the bulk of care work is carried out by unpaid people, mostly women, and girls from socially disadvantaged groups (ILO 2018). According to the World Economic Forum (WEF 2019), in all Organisation for Economic Co-operation and Development (OECD) countries, women spend more time than men on domestic and care work. This is the main arrangement within homes, being the private solution to the social problem of care. In this regard, women perform over three-quarters of the unpaid care work in the world and make up two-thirds of the workforce engaged in paid care work (Addati et al. 2018). This can be explained by the fact that social norms tend to consider care as a natural role and obligation of women, and not as a service that the government must provide. Furthermore, caregiving is perceived as an unskilled and economically unproductive task (OXFAM 2020).

In this way, informal care shows a clear gender bias, leading to the phenomenon of feminization of care within households. This paradigm is characterized by disadvantages, efforts, and sacrifices of the caregiver that could lead to inequalities between sexes (Vaquiro and Stieповich 2010). The historical gender inequality in care tasks by mothers is currently reflected in the management and assimilation of responsibilities, as well as in the associated mental burden (García et al. 2020). Besides time, women provide more intensive care than men and perform personal care, such as feeding, grooming, or clothing more frequently, which implies a closer contact with the people they care for (del Rfo et al. 2017).

In the Mexican reality, the socio-demographic and economic context is characterized by a growing aging population and the entry of women into the labor market, leading to more pressure for care by the elderly, children, and other dependents. In 52% of urban Mexican households, there is at least one member who requires care (Labor and Social Co-responsibility Survey, ELCOS 2012). Thus, Mexican society

has had to create formal and informal solutions to meet this demand. For Vaquiro and Stieповich (2010), the family is the primary institution that provides care in situations of dependency constituting the main informal solution within families in Mexico.

In particular, males spend on average four hours less than females in unpaid care work, and people of higher-income households spend fewer hours on this work in comparison to those of lower-income households. (OXFAM 2018). That is, the arrangement in Mexican society is one where women are the main caregivers at home (García and Pacheco 2014), even when men have time to do it (Márquez and Mora 2014). This responds to the Mexican social structure with a clear division between male and female roles, based on the belief that men are responsible for economics, while the responsibility of women is housework (Fraga 2018).

Furthermore, Seiz (2011) showed that, within Mexican families, men dedicate little care time to minors, sick people, or dependents, and they do so to a lesser extent than women, while a significant proportion is not involved in care tasks at all. Also, when the State offers some type of care for elderly people with some disease or disability, only the women are in charge of feeding and transferring them to care centers (Rodríguez 2018).

Despite this conventional care solution in Mexican homes, Rodríguez (2018) argued that some deviation is evident in the model that attributes responsibility for care almost exclusively to women, identifying a significant percentage of men with visible participation in these tasks and even with a minority in terms of time. In this sense, the collapse of this model can be accelerated as an effect of confinement by COVID-19, where given the longer stay at home, men may become more aware of the implications of care.

Considering caregiving determinants, literature about care arrangement forms considers several aspects as determinants. For example, Rodríguez (2018) identified: youth, high educational level, and higher couple income, which were link to an incipient transformation of family values, attitudes, and behavior patterns. Trombetta et al. (2019) quantified the time dedicated to unpaid domestic work in a set of Latin American countries, finding that these tasks are mostly assumed by women (sex); time spent is substantially higher in low-income households compared to higher-income households (household income); time increases in households with infants, provided exclusively by women-mothers (age of household members); time gaps by gender increase when the woman is a spouse (marital status) and are reduced with the participation in the household's labor income (woman labor participation).

Sheng (2014) considered three groups of aspects for the provision of informal care services by the spouse/partner. First, the factors related to predisposition: age, gender, ethnicity, higher education, and number of children. Second, enabling factors: the existence of government support (such as a health plan), household expenses associated with care (such as health or education), and household wealth or income. Third, factors of need: chronic diseases (such as psychiatric problems, falls, and incontinence), functional dependence to perform various instrumental activities of daily living (bathing, dressing, eating, walking inside a room, managing money, taking medicine, buying food, etc.), and cognitive impairment.

Thus, considering the determinants of direct care, Hosseinpoor et al. (2013) found, for a sample of 48 low- and middle-income countries that caregiving is significantly higher in women, followed by adults aged 60 to 69 who have university education and higher incomes. Likewise, Watanabe et al. (2019a, b) established that time is a central determinant of care provision and caregiver burden. They added that excessive hours of daily care can lead to reduced care offers. Also, Park et al. (2015) showed, for a group of 1113 patients in the urban area of Korea, which dependence level of the person being cared (for disabilities), the marital relationship, the daily time for care, and the number of diseases of the caregiver, are significant variables. Wajnberg et al. (2016), in a study on the socio-demographic characteristics associated with the burden of caregivers in urban homes, established that the average caregiver burden is higher among spouse caregivers (heads of the household).

Regarding the determinants of indirect care performed by a member of the household, the literature on the subject considers socio-demographic aspects. For example, Treas and Drobnic (2010) established that the number of hours of unpaid work within a household is a function of the type of tasks and gender. Thus, for childcare, the main determining variables are the number of children and the age of the youngest child. For cleaning activities, the key aspects are the size of the living space, the number of children, cleaning standards, and the household's income level. For maintenance activities (housekeeping, car wash, etc.), the size of the house, age of the property, and number of cars. For Hunadi et al. (2014), the determinants of these tasks are differentiated by gender. The work carried out by women is positively influenced by the number of children and the elderly in the household and, negatively, by the wage level in the labor market and their share in the household income. In contrast, men's work is positively influenced by the number of Internet users and negatively by their educational level and their contribution to household income.

McCloughan et al. (2011) also found differentiated effects by gender. They stated that women, compared to men, dedicate almost twice as many hours a week to domestic tasks. Among the factors that influenced this bias were the education of children, employment status, and educational level. Kaščáková et al. (2013) confirmed this by noting that the significant determinants of this type of work within the home are age, educational level, and employment status.

Finally, a classic study is that of McFarlane et al. (1998) with very specific evidence that can be considered analyzing family arrangements in the current state of confinement by COVID-19. On the one hand, they established that living with people under 19 years old increases the average time spent on housework, and it reduces paid work for both men and women. They argued that both the availability of time to fulfill the family demands, as well as the capacity to respond, given the demands of paid work currently linked to telework, were important determinants of the time dedicated to care, especially for children. On the other hand, they also found gender asymmetries. In particular, they argued that women's time in household activities increases when their husbands dedicate more time to paid work; in contrast, men are not affected by their wives working time. However, women do less housework when they contribute more than half of the family income. As it stands here, it seems to be a contradiction and would demand more explanation.

Data and methodology

In order to analyze the impact of the COVID-19 lockdown on Mexican households, a questionnaire about care and caregivers during the COVID-19 lockdown was designed by GIECAE-IPN.¹ The aim was to know the care alternatives followed by Mexican homes in the face of confinement. Although there are various surveys in the country dealing with COVID-19 and its effects, the Survey of Care and COVID-19 in Mexican Homes during Quarantine (SCCMHQ) focused on the issue of care provision within homes. Therefore, its findings have public policy implications for promoting care solutions in terms of gender equity and economic autonomy.

In particular, the SCCMHQ comprises three sections: socioeconomic profile of the household, profile of co-inhabitants of the dwelling, and informal caregiving during the lockdown. The total number of items was 36 that considered the socio-demographic characteristics of each member household, including age, sex, marital status, education level, home income, economic dependence condition, and current employment status. In addition, the questionnaire looked for additional respondents' information about care activities they did at home. Thus, a set of questions were designed ad hoc to collect information on the situation of care solutions within homes, including the time spent by household members on different tasks related to care.

The data were collected between April and May 2020—during the validity of the *National Healthy Distance Program in Mexico*—, through the web page built to this end, which included a link to the questionnaire made with Google forms. The data obtained are at national level and correspond to people aged 18 years or older living in urban households. The sampling method was of snowball type, which allows expanding the sample size and scope of the study, while reducing costs and collection time (Benfield and Szlemko 2006). The initial participants were professors, administrative personnel, students, and directors of ten national public and private universities, as well as public officials from different federal agencies. Additionally, people on the streets in crowded areas of five cities were invited to answer the questionnaire.

Once the incomplete responses were eliminated, the final sample was of 612 individuals/households. The data allowed to determine to what extent the respondent (generally the parents) and his family were affected by the lockdown in terms of income, expenditure, and time distribution. In particular, how the respondents

¹ The GIECAE (Research Group in Care Economy and Economic Autonomy; GIECAE, for its acronym in Spanish) is an interdisciplinary team of researchers from the National Polytechnic Institute (IPN) and other public and private universities, specialists in social security, civil society, social economy, and other social organizations related to care, who study this phenomenon from a holistic approach. Thus, the link with the social area, humanities, and engineering facilitates the comprehension of the social dynamics of care, the consequences on economic autonomy and well-being, and the co-creation of sustainable solutions with specific communities and groups with whom it works directly. Researchers and students participated in the different stages of this research, both in the design of the questionnaire, analysis and interpretation of results, and in the dissemination of the questionnaire.

adjusted their time in order to combine their labor responsibilities with household activities.

With the information provided by the survey, individuals who perform unpaid housework (direct and indirect informal care) were identified as individuals aged 16 or over who report carrying out activities of house-cleaning, food-preparing or caring for a dependent person (under 15 years of age, older adult or with a functional disability).

In this way, for the design of the questionnaire and econometric analysis, the main factors indicated by the literature were selected (predisposition, enabling and need aspects), which are associated with the choice of being an informal or temporary caregiver (age, sex, marital status, education, household income, economic dependency and current employment situation, and presence in the home of minors, the elderly, people with disabilities or domestic workers).² STATA 15 software was used for econometric estimation.

Considering the methodology, some of the literature that performs impact evaluations uses quasi-experimental methods, such as the Propensity Score Matching (PSM) (Mayne et al. 2015; White and Sabarwal 2014), which has become a popular approach to estimate causal treatment effects. The PSM controls the differences between the comparison groups (caregivers and non-caregivers), considering the heterogeneity between them. In particular, this study is based on PSM methodology as it estimates the effect of the presence of dependent individuals and home needs, since it has the advantage of eliminating selection bias caused by unobserved factors, allowing causal inference. Thus, following Lin et al. (2012), the PSM allows identifying whether the effect of the presence of minors, adults, or disabled persons on care activities was actually caused by these factors and not by others.

Thus, the PSM model considers that the set of available observed variables eliminates some of the bias derived from the non-random selection of people in the household to care or not (self-selection). Therefore, based on these observed variables, the PSM establishes the propensity of people with the same characteristics to carry out unpaid domestic activities (probability of caring). This statistical matching means that every individual providing informal care within the household is matched to a set of individuals not providing informal care with similar observable characteristics. Hence, being a caregiver is uncorrelated with the other observed characteristics (and therefore the propensity to become a caregiver is equalized; de Zwart et al. 2017).

The PSM procedure is more efficient than other techniques, since, in the estimation, it generates adequate comparisons between two groups that have similar characteristics (caregivers—treatment group—and non-caregivers—control group), but they differ because the first has an event that happens and the second does not. Therefore, the PSM generates two balanced groups, measuring probabilities of impact in one group regarding another, meeting certain probabilistic criteria. To do

² Among the documents consulted to select variables/questions are Wakabayashi and Donato (2005), Ireland and Pakenham (2010), Trivedi et al. (2014), Villalobos (2019), Watanabe et al. (2019a, b), Del Boca et al. (2020) and Fernández and Herrera (2020).

this, the probabilities of being an informal caregiver are calculated first, from a logit or probit model, which in this case includes the covariates: age, sex, marital status, education, home income, economic dependence, and current employment situation. The probabilities are then converted into a score that summarizes the information from the covariates, and is used to select for each caregiver (“treated” group) an individual who has a similar score but is not a caregiver (“control” group).

Here, given two individuals whose observable characteristics are as similar as possible, any difference in their decision to provide care is attributable to the effect of the presence of factors demanding care (dependent persons and other household activities). Finally, the average treatment effect (average treatment effect—ATT) is estimated, which seeks to match all the cases in a sample (both treated and controlled). In other words, using ATT, the effect of different factors that demand-informal-domestic work is evaluated versus factors that do not demand it, on the decision to carry out informal domestic work.

In this case, the use of the PSM methodology was appropriate since the treatment and control groups were a priori similar in terms of observable characteristics. Furthermore, it was feasible because the sample was relatively large, the number of variables limited, and the observed values discrete and small. In this case, although a low dimensionality problem was expected, the PSM converts this problem into a one dimensional problem (Dehejia and Wahba 1999). In brief, Khandker et al. (2010) summarized the application of the PSM method in three steps: (i) the estimation of a model of participation, (ii) the definition of the region of common support and the balance tests, and (iii) the matching between participants, and non-participants.

In the context of the paper, where the socioeconomic determinants of caregiving activities in Mexican homes during the COVID-19 lockdown are determined, the dependent variable, *house activities*, is defined as the number of hours per day spent in (non-paid) domestic work. In order to estimate the PSM model, a treatment variable is needed. For this case, four alternative variables are considered: *minors* (with value 1 if there is at least one person under 16 years old in the home and 0 in any other case), *elderly* (equal to 1 if there is one or more elderly in the home and 0 in any other case), *disability* (value 1 when a person with a disability lives in the home and 0 in any other case), *chronic disease* (that takes the value of 1 if a household member has some chronic disease and 0 in any other case), and *paid domestic worker* (1 if the household has any paid domestic workers during the quarantine and 0 in any other case). Hence, the model estimates the impact of these treatment variables on the dependent variables (*house activities*).

Finally, some household and individual characteristics are needed to evaluate the treatment group. The proposed variables are the followings: *sex* (1 if the respondent is a woman and 0 if is a man), *marital status* (1 if he/she is married and 0 in any other case), *age* (years), education (years of schooling), *household income* (total monthly income of the home in US current dollars), *economic dependence* (number of people economically dependent inside the house—without own income), *currently employed* (1 if during the quarantine the respondent had paid job and 0 in any other case), *household income contribution* (number of individuals that contributes to household income), *people living in home* (number of individuals that lives in the house), *government support* (1 if someone in the house receives money support from

government and 0 in any other case), *house activities time* (number of hours dedicated by the interviewed in house activities), *paid work time* (number of hours dedicated by the interviewed in paid work time), *rest time* (number of hours dedicated by the interviewed in rest), *life as couple* (1 if the respondent actually lives with her/his couple and 0 in any other case), and *school* (1 if the respondent studies during the lockdown and 0 in any other case). This set of variables shows the characteristics of individuals, while reflecting the environment in which they live in quarantine.

To estimate the impact of the treatment variables (*minor, elderly, disability, chronic disease, paid domestic worker*) on the dependent variable (*house activities*), two groups were considered. The treatment group (those households that meet a specific characteristic, that is, that have minors, older adults, people with disabilities, or with some disease and/or employ paid domestic work) and the control group (those households with similar characteristics to the first group except that they do not meet this particular trait).

Furthermore, if all the treatment variables are considered at the same time in the estimations, there may be situations where the respondent, within the treatment or control group, carries out care activities or not. Here, the impact of the treatment variables would be mixed, hiding their individual effect. Therefore, the impact of the treatment variables is isolated, estimating five models with a single treatment variable. In this respect, following Bernal and Peña (2011), in the PSM estimation, only the variables that affect the caregiving decision and its outcome should be included simultaneously.

Results and discussion

In order to summarize the characteristics of informal caregivers and homes descriptive statistics are used. Particularly, the association between these dimensions is considered. Results are reported in Table 1. Considering the complete sample of Survey of Care and COVID-19 in Mexican Homes in Quarantine, it is observed that during the lockdown, in 34% of the houses, there was at least one minor, in 23%, there was one or more elderly, 11% reported at least one person with some disability, in 61% of the dwellings, some of its members faced some chronic disease, and just one of each ten houses (11%) paid for domestic work.

Moreover, the mean monthly home income is 566.87 US dollars (11,966.14 Mexican pesos) with a standard deviation of 312.84 USD and a median of 660.86 USD. This income is above the national poverty line defines of 154.23 USD (National Council for the Evaluation of Social Development Policy, CONEVAL 2020). The number of individuals contributing to the home income is on average more than two persons (2.03). The average household consists of 3.65 people, while the number of economic-dependent individuals is 2.90. A notable characteristic is that 36% of houses reported that some household members had monetary government support.

The average care burden by the respondent was 9.5 h per day, but this varies in a range of almost 5 h. The individuals also spend 4.5 h a day in working time, and 8.6 in resting time. Moreover, 56% of the respondents were men and 44% women. The average education level was about 15.6 years, equivalent to

Table 1 Households and caregiver characteristics (full sample, caregivers, and non-caregivers)

Household [mean (S.D.)]	Full sample N= 612	Caregiver N= 91	Non-caregiver N= 21	p value
Minors	0.34 (0.48)	0.35 (0.48)	0.19 (0.40)	0.061
Elderly	0.23 (0.42)	0.23 (0.42)	0.24 (0.44)	0.424
Disability	0.11 (0.31)	0.11 (0.31)	0.19 (0.40)	0.163
Chronic disease	0.61 (0.49)	0.61 (0.49)	0.67 (0.48)	0.201
Paid domestic worker	0.11 (0.32)	0.12 (0.32)	0.10 (0.30)	0.217
<i>During lockdown</i>				
Household income (monthly)	566.87 (312.84)	561.01 (311.38)	710.60 (311.85)	0.024*
Household income contribution	2.03 (0.98)	2.03 (0.99)	2.10 (0.54)	0.308
People living in home	3.65 (1.67)	3.65 (1.69)	3.62 (1.16)	0.424
Economic dependence	2.90 (1.43)	2.90 (1.44)	2.90 (1.00)	0.415
Government support	0.36 (0.48)	0.36 (0.48)	0.38 (0.50)	0.368
Individual [mean (S.D.)]	Full sample N= 612	Caregiver N= 591	Non-caregiver N= 21	p value
House-activities time	9.45 (4.92)	9.78 (4.67)	0 (0.000)	0.000*
Paid work time	4.49 (4.22)	4.36 (4.10)	8.33 (5.70)	0.003*
Rest time	8.56 (3.31)	8.46 (3.22)	11.38 (4.40)	0.002*
Sex	0.44 (0.50)	0.44 (0.50)	0.24 (0.44)	0.008*
Age	40 (1.42)	40 (1.42)	35 (1.43)	0.253
Education	15.61 (3.51)	15.6 (3.49)	15.86 (4.11)	0.456
Marital status	0.50 (0.44)	0.54 (0.44)	0.38 (0.35)	0.110
Life as couple	0.56 (0.36)	0.57 (0.38)	0.40 (0.41)	0.035
School	0.30 (0.46)	0.29 (0.45)	0.67 (0.48)	0.002*
Currently employed	0.59 (0.49)	0.59 (0.49)	0.76 (0.44)	0.060

Home-income is expressed in U.S. current dollars.

Source own elaboration based on Stata 15 software estimates.

truncated bachelor's degree. Likewise, 51% of the individuals reported to be married and 29% to be single. However, 57% actually lived with their partner. In the quarantine, 59% of the respondents reported that they were currently employed, and 41% were without a paid job. Finally, 30% studied during the lockdown.

Of the 612 homes in the study, 591 (97%) had at least one informal caregiver (usually the respondent). On average, these households were characterized by the presence of one or more minors (35%), elderly (23%), people with a disability (11%), and people with a chronic disease (61%). In contrast, in houses without care activities reported by the respondent, the presence of minors was notably lower (19%), but the presence of elderly, people with a disability and people with a chronic disease was larger. This is in line with McFarlane et al. (1998), who established that children require more care time.

Simultaneously, 96.6% of the total respondents self-identified as caregivers, meaning that they dedicate at least one hour a day to domestic activities (direct or indirect care), but 63.9% spent at least 8 h per day in some domestic activities, and 35% 12 h or more. Likewise, they spent 4.4 and 8.5 h a day in paid work and resting (leisure and sleeping time), respectively. This is related to the argument by McFarlane et al. (1998) that caring reduces time for paid work. The average caregivers time use distribution was as follows: 39.4% care activities, 35.7% resting, 18.7% paid work, and 6.3% others.

Among the caregivers, the mean age was 40 years, and contrary to what was expected, the majority were male (55.5%). Almost nine of each ten caregivers (87%) had completed a bachelor's degree or an equivalent. In fact, the average years of education was 15.6. Also, more than a half (50.9%) were married, 53.8% lived with their partner, 28.9% studied at university or equivalent, and 58.7% were currently employed. It is worth noting that differences between caregivers and non-caregivers in terms of time spent in house activities, paid work, resting, as well as, education activities and gender were statistically significant. Moreover, the absolute differences were not minor.

Table 2 summarizes the socioeconomic and demographic distribution in the propensity-matched sample, considering the five different treatment variables. In general, the two groups did not statistically differ, which is a sign of a suitable match. It was observed that independently where the household is classified, there was a systematic presence of caregivers. The greatest number of hours per day dedicated to caring occurred when there was someone with a disability in the home (10.4 h), followed by elderly (10.2 h). In contrast, the fewest hours of caring occurred when there is paid domestic service (8.5 h).

Furthermore, the presence of minors, people with chronic disease and paid domestic workers in the dwelling was accompanied by a higher home income. Inversely, the average income tended to be lower when there was an elderly or disabled. Likewise, homes that reported minors and paid domestic work were those where at least one member continued working during the lockdown. In contrast, the average respondent was not currently employed when there was an elderly, person with a disability or a person with a chronic disease in the household. For the rest of the variables, there was no obvious pattern. Considering the sex of the respondent, there was a greater presence of male than female caregivers for all groups, except where there was a member of the household with a disability.

The distribution of care between genders was more equitable in households with minors (46.5% women) or when there was someone with a chronic disease (46.4% women). The lowest presence of female caregivers occurred when the household hired domestic work (37.1% women). This result is contrary to that showed by Trombetta et al. (2019), García and Pacheco (2014), and Márquez and Mora (2014), and contributes to the idea of erosion of the traditional model of care, indicated by Rodríguez (2018). However, this information must be taken with care because the differences were not statistically significant.

Own elaboration based on Eviews estimates.

On the other hand, the decision to provide informal care depends on the ability of the potential caregivers to provide care and their opportunity cost. This potential

Table 2 Main household characteristics during lockdown

	Sex	Age	Education	Marital status	Home income (monthly)	Economic dependence	Currently employed	House-activities	No. of observations [p value]
Minors	0.4645	6.7583	15.8436	1.2749	655.28	3.4076	0.6303	9.7891	211 [0.123]
No-minors	0.4239	6.985	15.4863	1.0125	632.27	2.6284	0.5711	9.2700	401
Elderly	0.4437	7.9366	14.4155	1.1690	609.14	3.0211	0.5282	10.2379	142 [0.017*]
No elderly	0.4362	6.5957	15.9702	1.0830	649.60	2.8596	0.6106	9.2106	470
Disability	0.5821	7.3582	13.7164	1.1791	540.30	3.2836	0.4478	10.3699	67 [0.113]
No-disability	0.4202	6.8514	15.8422	1.0936	652.49	2.8495	0.6092	9.3358	545
Chronic disease	0.4638	7.0724	15.1984	1.1609	607.31	3.0107	0.5469	9.5709	373 [0.208]
No-chronic disease	0.3975	6.6485	16.2511	1.0126	691.57	2.7197	0.6611	9.2588	239
Paid Domestic worker	0.3714	7.0143	16.8714	0.9143	759.47	2.9857	0.7000	8.4745	70 [0.041*]
No paid domestic worker	0.4465	6.8930	15.4465	1.1217	615.3	2.8556	0.5775	9.5749	542

Source own elaboration based on Stata 15 software estimates

depends on the socioeconomic and demographic variables showed above. Thus, the PSM was estimated using a Probit model that included these explanatory variables of care during quarantine in homes.

The proposed model showed certainty in the prediction of probabilities of the determinants of home care during quarantine. In general, the model showed joint significance (joint p value = 0.012), the proposed variables were statistically significant (at 1 and 5%), and there was no evidence of multicollinearity problems (VIF less than 10 in all cases). The results of the Probit model for the different treatment variables are reported in Table 3.

Minors

The caregiving determinants in those households with minors were the age, marital status, the number of individuals economically dependent, and the current job situation. They were statistically significant at 95% of confidence. This means that caregiver's responsibility to do domestic works, including care of minors, increased with the caregiver age, the number of economically dependent individuals at home, and when they are married. Plöthner et al. (2019) also found that these variables were relevant. In contrast, if the respondents hired paid domestic work, it seems that they had no responsibility to perform minor-care work in the home. Doty et al. (1998) identified the relevance of potential caregivers' employment status to the amount of care they can provide.

Elderly

For homes with older people, the determinants of care were the same, except for economic dependence and with employment during lockdown. Metzelthin et al. (2017) established that the older age of the care receiver at home is associated with an increasing subjective burden, which is in line with this finding. The relevance of marital status could be explained because of the degree of family relationship (parents, children, children-in-law, parents-in-law, etc.) that influences on the willingness of family members to provide care (Pinquart et al. 2011).

People with a disability

In the case of the treatment variable disability, sex, education, and economic dependence were significant determinants of caregiving. Metzelthin et al. (2017) asserted that care receiver characteristics including morbidities/disability, and caregiver characteristics (sex, age, or more objective burden) are associated with an increase in burden. Nevertheless, Ghazawy et al. (2020) found that non-educated caregivers have more caregiving burden. When the care recipient experiences some disability, these tasks are short term but intense (Committee on Family Caregiving for Older Adults, CFCOA 2016).

Table 3 Caregiving determinants during lockdown. Probit estimations

Treatment	Variable	Sex	Age	Education	Marital status	Home income (monthly)	Economic dependence	Currently employed	Constant	Pseudo-R2	No. of observations	Region of common support
Minors	Coefficient	0.1606	-0.1178	0.0164	0.1839	0.0354	0.2706	-1.1768	-1.1768	0.0871	612	[0.07978, 0.92809]
	SE	0.1116	0.0429	0.0175	0.0513	0.0286	0.0396	0.4583	0.4583			
	$p > z$	0.150	0.006	0.349	0.000	0.216	0.000	0.010	0.010			
Elderly	Coefficient	0.0217	0.4062	-0.0233	-0.1374	-0.0324	0.0280	-0.0869	-3.0350	0.1569	612	[0.01494, 0.90140]
	SE	0.1232	0.0474	0.0185	0.0606	0.0317	0.0416	0.1265	0.5020			
	$p > z$	0.860	0.000	0.208	0.023	0.306	0.502	0.492	0.000			
Disability	Coefficient	0.3503	0.0816	-0.0623	-0.0509	-0.0350	0.0869	-0.2078	-1.0142	0.0855	612	[0.02508, 0.57383]
	SE	0.1444	0.0515	0.0207	0.0669	0.0363	0.0476	0.1477	0.5606			
	$p > z$	0.015	0.113	0.003	0.447	0.338	0.068	0.159	0.070			
Chronic disease	Coefficient	0.1403	0.1167	-0.0289	0.0133	-0.0485	0.0764	-0.1679	-0.0709	0.0449	612	[0.35899, 0.94226]
	SE	0.1078	0.0409	0.0174	0.0508	0.0278	0.0381	0.1119	0.4367			
	$p > z$	0.193	0.004	0.097	0.793	0.793	0.045	0.134	0.871			
Paid domestic worker	Coefficient	-0.0108	0.0872	0.0489	-0.1389	0.1867	0.0737	0.0738	-3.5473	0.0990	612	[0.02128, 0.31009]
	SE	0.1470	0.0559	0.0257	0.0836	0.0435	0.0506	0.1560	0.6675			
	$p > z$	0.941	0.119	0.057	0.097	0.000	0.145	0.636	0.000			

For each estimate, the highest log Likelihood value is reached in the third iteration, which indicates a good quality of the same. There is a joint p value close to 0.000; thus, the joint significance of the variables in each estimate is accepted. The VIF test indicates that there are no multicollinearity problems in the various specifications
 Source own elaboration based on Stata 15 estimates

People with a chronic disease

At the same time, caregiving determinants in households with some chronically sick people were age and economic dependence. Thus, during the lockdown, older people had the task to directly care for family members with a chronic illness. Adib-Hajbaghery and Ahmadi (2019) argued that chronic disease in a home members, especially children, is significantly associated with the caregiver burden.

Since there was a minor, an elderly, a people with some disability or a chronically sick people in home, the respondents (all older than 20 years old and family members), provide informal (and maybe temporal) domestic work in order to take care of these. This care could be considered voluntary (given the familiar relationship with the care receivers), less onerous—in comparison with professional care and extensive (given that caregiver and the care receiver stay all day long at home). A similar idea was discussed by Metzeltin et al. (2017), for whom the support of informal caregivers is associated with a greater subjective burden of care.

Paid domestic work

Lastly, for households with a paid domestic worker during lockdown, the determinants of caregiving were related to education and home income. In this respect, researchers found a positive role of income as determinant of paid domestic work (Fakih and Marrouch 2012), as well as educational resources (Shire et al. 2017). However, in this case, the estimated signs were the contrary. A plausible explanation could be that higher income and education could imply social and psychological skills. Roberts et al. (2007) indicated that education in school builds skills and fosters traits that are important to health, such as conscientiousness, perseverance, a sense of personal control, flexibility, the capacity for negotiation, and the ability to form relationships and establish social networks. These individual skills could probably help with family life's challenges in the COVID-19 context.

Probit variables

The variables included in the Probit model and their significance oscillated between the estimates, according to the treatment variable. No variable was significant for all specifications. However, age and economic dependency played a central role in two treatment variables (*minors* and *people with a chronic disease*). In contrast, the variables sex, household income, and current employment situation were only significant for the treatment groups associated with disability, paid domestic work, and minors, respectively. Nevertheless, in general terms, a relationship was estimated between the possibility of performing care work at home during quarantine and the group of variables considered. In this sense, the confinement conditions themselves could have promoted care.

Specifically, according to p values, during the quarantine the women probability of provide care was higher than men in a household with a person with a disability.

At the same time, older people were more likely to care for minors, other older people, and the chronically ill. Likewise, people with more years of school education were more likely to provide care when the household faced a disability or someone was hired to do domestic work. Also, the probability of caring for minors or the elderly was greater when an individual was married; and higher income meant a lower probability of doing domestic work. The more economically dependent people live in the home, the greater the probability of caring for minors, the disabled or the chronically ill. Finally, having a job decreases the likelihood of caring for minors and for the people with a chronic disease.

It should be noted that there was no significant general difference in care burden between sex; thus, it does not appear to be a bias against women in terms of care under these conditions. In other words, men and women are equally likely to do domestic work during quarantine. Nevertheless, an extension of the investigation could directly consider the sex variable as a treatment group and find more evidence.

Probit properties

According to the Probit estimates, the balance property was fulfilled, which could be observed in the common support region for the different specifications (Table 3). Specifically, the Kernel density functions for the case of the treated and control observations showed that practically for all the estimated Propensity Scores, there were one treated and one control observation. Therefore, fulfillment of the common support assumption improved the quality of matches without losing relevant observations. This was verified since 99.2% of the original base was included in the common support in minor specification, 96.4% in disability model, 100% in chronic disease, and 87.6% in paid domestic worker model.

Nevertheless, for the elderly specification, it was not possible to calculate a propensity score for each block, since the variables are not balanced, making it impossible to continue with the PSM analysis (ATT estimate). The lack of balance implied that the distributions of the treatment and control groups were not similar (Mata and Hernández 2015). In this specific model, the proposed variables did not have the same characteristics for both groups. For the rest of specifications, the balancing property was fulfilled, which gave certainty that these two groups were similar enough to resemble groups that had been randomly chosen.

Treatment variable impact

In addition to estimating the probability of performing domestic work during quarantine, given some characteristics of the individual and the household, it is required to know the impact of the treatment variables. For this, it is necessary to know the differential effect of the treatment variables (households with minors, the elderly, disabled persons, persons with a chronic disease, or with paid domestic staff) on people with the same probability of living in households with the same characteristics (ATT) and, therefore, similar to the treated individual in the rest of the known aspects (Mediavilla 2010).

Table 4 Caregiving determinants during lockdown

Treatment	Matching	Nearest	Radius	Kernel	Stratification	Average
	Procedure	Neighbor				
Minors	Treatment	211	209	211	208	0.674
	Control	134	396	396	399	
	ATT	0.598*	0.673*	0.766*	0.658*	
	T	1.031	1.672	1.359	0.982	
Disability	Treatment	67	66	67	67	0.287
	Control	61	523	523	523	
	ATT	- 0.115	0.583*	0.473*	0.208	
	T	- 0.073	2.026	0.598	0.207	
Chronic disease	Treatment	373	371	373	373	- 0.325
	Control	173	239	239	239	
	ATT	- 0.651*	- 0.087	- 0.324*	- 0.239***	
	T	- 2.205	- 0.175	- 1.213	- 0.461	
Paid domestic worker	Treatment	70	70	70	70	- 0.255
	Control	74	466	466	466	
	ATT	0.070	- 0.466**	-	- 0.251***	
	T	0.052	- 0.634	- 0.356	- 0.376	

Matching estimations

*, **, and ***Significative at 1, 5 and 10%, respectively

Source own elaboration based on Stata 15 estimates

In this way, from the information of the common support, the matching was estimated, where control units were established that were compared with the treated units in an area in which the PSM distributions overlap. This allowed estimating the ATT. Due to the difficulty of finding two people with the same probability, several matching methods have been developed that attempt to estimate the ATT (Mediavilla 2010): Nearest Neighbor (NN), Radius (R), Kernel (K), and Stratification (S) methodologies. The estimation outcomes are summarized in Table 4.

The results showed the significance of the impact of the treatment variables minors, disability, chronic disease, and paid domestic worker on the provision of domestic work by the respondent. In particular, it observed the effectiveness of the existence of minors in the home-positive signs of the ATT coefficients in all the methods—to promote direct and indirect care from a household member. For the rest of the variables, the different methods estimated both positive and negative signs. However, the four calculated matching techniques suggested a positive and statistically significant average treatment effect. Therefore, it can be affirmed that there was a positive “net” effect of these treatment variables in the provision of care in Mexican homes during quarantine.

For the households with minors, the ATT coefficients indicated a minimum average effect of 0.598 obtained using the Nearest Neighbor technique and a maximum average effect of 0.766 calculated with the Stratification technique, while for households with a disabled person, the minimum average effect was - 0.115 with NN and

the maximum 0.583 with R. Lastly, for households with chronically ill patients, the minimum effect was -0.651 (NN) and the maximum -0.087 (R) and for households with paid domestic work, the minimum effect was -0.466 (R) and the maximum 0.07 (NN).

Considering that the objective variable was defined as the number of hours per day spent in (non-paid) domestic work, it can be inferred that according to the people who said they have minors at home (211) regarding the control observations (134), the impact on the time spent by the respondent in home care during quarantine, due to an increase in the number of minors, was 0.674 given the similar characteristics (sex, age, education, marital status, economic dependence, currently employed). That is an additional minor at home implied dedicating approximately 40 extra minutes to domestic work, while the impact on care time for an additional person with a disability was more than 17 min a day (2.87%). In contrast, the impact on unpaid domestic work time by an additional person with a chronic illness or by having a person for domestic service was -0.325 and -0.255 , respectively. Thus, having a person in charge of housework can result in free time for other types of activities.

Nevertheless, contrary to expectations, a sick person at home tended to reduce the time for general care. This can be explained, on the one hand, by the very definition of the dependent variable that asked if the person spent time on general care activities and not on specific activities such as caring for a sick family member. On the other hand, the status of the diseases did not require greater care than those that were followed prior to the pandemic (for example, no household reported patients with cancer), so family dynamics did not change in this sense.

Limitations

This quasi-experimental (PSM technique) study has a main limitation that should be considered in relation to the findings and to the further research. The internet-based data collection followed a short time-snowball sampling method. Therefore, the results may only be generalized to those groups with similar characteristics to be studied.

Concluding remarks

The confinement of the population by COVID-19, the closure of schools, childcare centers, and day centers and other care services for dependent people, led to the concentration of the care burden in Mexican homes, and to reconfigure the traditional care arrangements, being distributed among family members mainly between the couple. In this context, based on information collected by the Survey of Care and COVID-19 in Mexican households during quarantine (SCCMHQ) with a representative sample of 612 individuals/households, and following a PSM methodology, the research goal was met. That is to determine the alternatives of care followed by Mexican homes in the face of confinement.

Specifically, some characteristics of the arrangement of Mexican homes during quarantine were observed. First, 34% of the houses had at least one minor, 23% one or more elderly, 11% at least one person with some disability, 61% reports some chronic disease, and 11% paid for domestic work. Second, 96.6% of the total respondents self-identified as caregivers, dedicated at least one hour a day to domestic activities (direct or indirect care), suggesting a systematic presence of caregivers.

A Probit model was estimated with significance which varies between the estimates, according to the treatment variable. Age and economic dependency were determinants for minors, disability, and chronic disease treatment groups, while sex, household income, and current employment situation were significant for the treatment groups associated with disability, paid domestic work, and minors, respectively.

In brief, during quarantine, several factors increased the probability of caring. Particularly, women (sex) or people living in marriage (marital status) showed more propensity to provide care for people with some disability. At the same time, older people tended to care for minors, other elderly people, and those with a chronic disease. Likewise, people with more school education tended to provide care focused on persons with a disability. While homes with higher income were characterized for hiring domestic work, nevertheless, hiring domestic service also increased the probability of doing domestic work. Finally, the number of economic-dependent people at home increased the probability of caring for minors, people with a disability or with a chronic disease. In contrast, having a paid job reduced the probability of caring for minors. It should be noted that, in general terms, there was no significant bias against women in terms of care under quarantine.

Furthermore, the average treatment effect was estimated. It was not possible to calculate the ATT for the elderly since the variables were not balanced. Nevertheless, the results indicated the significant impact of the treatment variables minors, disability, chronic disease, and paid domestic worker on the provision of unpaid domestic work. Thus, it is observed a positive “net” effect of the treatment variables in the provision of care in Mexican homes during quarantine. Particularly, the existence of minors at home was highly effective to promote direct and indirect care by the respondents. For instance, an increase in the number of minors at home led to 40 additional minutes of domestic work, while additional disabled individuals translated into approximately 17 min a day more. However, additional chronically ill persons or domestic service tends to free time for non-domestic activities.

Vaquiroy and Stieпович (2010) argued that the family is the primary institution that provides care in dependency situations, within the main informal solution in Mexican society is for women to provide care, which historically represents a bias against them and an effect on their economic independence and state of health. However, the confinement solution was characterized by a balance between genders, except in the case of households with disabilities. This showed that a cultural and functional change is possible in the distribution of care responsibilities in the family.

In particular, the change in the care model of Mexican households can be consolidated through public policies, as a pillar of social protection, which favor co-responsibility between the sexes through incentives to virtual work, as a mechanism that guarantees access to services and care time. This would boost the labor insertion of

women with positive effects on household income, at least for a sector of occupations with medium to high remunerations. The modification of the narrative of care within homes during quarantine, makes it more than ever possible to establish public policies to assume state co-responsibility for care.

Funding This work was supported by the Instituto Politecnico Nacional IPN- SIP20202168.

Data availability The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Code availability The paper processes data by STATA software using open common commands.

Declarations

Conflict of interest No potential conflict of interest was reported by the authors.

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