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A Gender-Based and Quasi-Experimental Study of the Catastrophic and Impoverishing Health-Care Expenditures in Mexican Households with Elderly Members, 2000-2020

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ABSTRACT

Latin America has experienced a rise in noncommunicable diseases (NCDs) which is having repercussions on the structuring of healthcare delivery and social protection for vulnerable populations. We examined catastrophic (CHE) and excessive (EHE, impoverishing and/or catastrophic) health care expenditures in Mexican households with and without elderly members (≥65 years), by gender of head of the households, during 2000–2020. We analyzed pooled cross-sectional data for 380,509 households from eleven rounds of the National Household Income and Expenditure Survey. Male- and female-headed households (MHHs and FHHs) were matched using propensity scores to control for gender bias in systematic differences regarding care-seeking (demand for healthcare) preferences. Adjusted probabilities of positive health expenditures, CHE and EHE were estimated using probit and two-stage probit models, respectively. Quintiles of EHE by state among FHHs with elderly members were also mapped. CHE and EHE were greater among FHHs than among MHHs (4.7% vs 3.9% and 5.5% vs 4.6%), and greater in FHHs with elderly members (5.8% vs 4.9% and 6.9% vs 5.8%). EHE in FHHs with elderly members varied geographically from 3.9% to 9.1%, being greater in less developed eastern, north-central and southeastern states. Compared with MHHs, FHHs face greater risks of CHE and EHE. This vulnerability is exacerbated in FHHs with elderly members, because of gender intersectional vulnerability. The present context, marked by a growing burden of NCDs and inequities amplified by COVID-19, makes key interlinkages across multiple Sustainable Development Goals (SDGs) apparent, and calls for urgent measures that strengthen social protection in health.

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Introduction

Many health-system reforms of the last three decades in low- and middle-income countries (LMICs) with segmented health systems have striven to reduce the incidence of catastrophic and/or impoverishing health expenditures.[1] However, the sustained increase in such spending and the persistence of health inequities including those gender-related[2,3] threaten their progress toward achieving these objectives, critical to universal health coverage (UHC).[2]

One less-recognized dimension of UHC pertains to tackling gender disparities and its intersection with health and gender-equity goals outlined in the SDGs.[4] However, financing mechanisms do not explicitly consider gender and other markers of exclusion and discrimination, e.g., ethnic origin and sexual orientation, in the implementation of health policies and programs.[5] As a social determinant of health, gender accounts for differentials in power relations, access to health care and control over resources. Gender inequality disproportionately affects women vis-à-vis men, influencing health and well-being across three domains: (a) the social, economic assessment and commercial determinants of health; (b) health behaviors; and (c) health-system responses.[6] Studies have suggested that gender roles, socially constructed beliefs, and attitudes toward specific genders contribute to health inequalities.[7] This often manifests as variations in care-seeking behaviors (demand for health-care services) by

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gender, or as gender bias,[8,9] expressed through altruistic behavior on the part of women,[10] inequality aversion[11] and risk aversion related to the health problems of other household members,[12] a phenomenon rarely addressed in health-policy initiatives.[13]

Latin America, including Mexico, has experienced a substantial rise in noncommunicable diseases (NCDs) over recent decades,[14] which is having direct repercussions on the structuring of health-care delivery and social protection in the region, particularly for vulnerable populations. The most disadvantaged sectors of Mexican society have experienced a notable rise in the prevalence of and mortality resulting from the NCDs pandemic, one of the major contributors to health-care spending.[15,16] The diagnosis, treatment and management of NCDs frequently generate long-term-care costs that impoverish households and exacerbate inequities. This is critical in households with elderly members because comorbidity generally increases with age and exerts disproportionately negative effects on family finances.[17–19]

It is also known that population aging is accompanied not only by a higher prevalence of NCDs, but frequently also by the coexistence of two or more chronic conditions in the same individual (comorbidity).[17] The aging process in Mexico (as in other LMICs) is occurring in the midst of a fragile economy with high levels of poverty, limited access to health-care services and insufficient health resources.[20] The most prevalent chronic conditions in older adults are arterial hypertension (42.4%), hypercholesterolemia (25.5%), diabetes (25.1%), and hypertriglyceridemia (21.4%), while 55% of this population group presents comorbidity.[18] These conditions tend to negatively affect the quality of life of elderly people and generate a high economic burden for them and their households. They therefore constitute an important determinant of health-care expenditure that often results in financial catastrophe, particularly prevalent in vulnerable households.[19,21] Previous studies have also shown that in Mexico, FHHs are marked by greater social vulnerability than MHHs. The ensuing socioeconomic pattern is clear: FHHs suffer the most severe social disadvantages in Mexico.[22]

NCDs are both a cause and consequence of poverty,[23] and "the threat posed by NCDs is exacerbated by [...] gender inequalities,"[24] among others. The design of effective gender-sensitive policies in Mexico and other LMICs should be anchored in research that deepens our understanding of the health-related financial burden of NCDs from a gender perspective.[25]

Yet, studies on the financial protection of households based on gender remain scarce.[26,27] A better understanding of the gender-related vulnerabilities underlying inequitable health conditions and limited access to health services would serve to enhance system-wide efforts to improve the health-system response, optimizing the prevention, treatment and management of NCDs in Mexico and other LMICs.

Gender intersects with other drivers of inequity such as ethnicity, socioeconomic status, disability, age, geographical location, sexual orientation and sexual identity, all of which have a direct bearing on the 2030 Sustainable Development Agenda. For example, it is well known that education (SDG 4) exerts a major impact on the health outcomes of women and children, while decent work (SDG 8) affects the rates of occupation-related morbidity and mortality, for both men and women. Additionally, SDG 5 ("to achieve gender equality and empower all women and girls") interacts with SDG 3 ("to ensure healthy lives and promote well-being for all at all ages"). Gender and health thus intersect across multiple other SDGs in ways that can either hinder or boost health equity.[6]

Following WHO recommendations for analyzing microdata on household health expenditures from a gender perspective,[28] this study aimed to analyze the CHE and EHE in Mexican households with and without elderly members (≥65 years) by gender of head of the households, during the period 2000–2020. We hypothesized that FHHs experienced greater financial health risks than MHHs, and that this was exacerbated in households with elderly members.

Methods

Data and Sample

We conducted a pooled cross-sectional and quasi-experimental analysis based on the last 11 waves of the biennial National Income and Expenditure Household Survey (ENIGH), 2000–2020.[29] This probabilistic survey was representative at the national, state and rural-urban levels, and included the socioeconomic and demographic characteristics of 390,313 Mexican households. After excluding 2.5% of those that provided incomplete or implausible survey responses, our study population consisted of 380,690 households over the complete analyzed period.

We included the following characteristics:

(i) Head of household: age, schooling, employment and marital status, household type (unipersonal, nuclear, extended or composite), presence of members aged 0–5, ≥55 and ≥65 years, number of equivalent adults, health-

insurance coverage (none, Seguro Popular-SP /INSABI, Social Security, mixture or private), socioeconomic status (SES), according to a standardized factorial asset and housing material index,[30] where higher values indicated better housing conditions, and participation in a government conditional/non-conditional transfer program.

(ii) Place of residence: rural/urban (urban ≥2,500 inhabitants), and access to public services, housing conditions and income, according to a social-deprivation index,[31] where higher values indicated more socially developed municipalities. We grouped the 32 Mexican states into seven socioeconomic regions, with one representing the lowest and seven the highest level of development.[32]

Catastrophic and Impoverishing health-care Expenditures

We began by calculating total quarterly consumption for each household h (TE_h) by adding consumption on food and beverages (FE_h), transportation and communication, housing and services, personal care, education and health (HE_h), among others. HE_h represented expenditures on medicines and other health products, outpatient care, hospitalization and other services such as laboratory analyses and dental care.[33] In line with our previous work,[34] household health-care consumption (in constant 2018 USD) consisted of two components: "monetary" expenditure and "non-monetary" consumption, which included purchases or gifts received from other households, as well as institutional contributions such as transfers from the government or private organizations designed to help bear the health-care costs incurred at the household level.[34]

We analyzed three binary indicators of financial risk in health-care:

(i) Positive health-care expenditure was determined where $HE_h>0$.

(ii) Catastrophic health-care expenditure (CHE_h) was equal to 1 where $HE_h \geq 30\%$ of household capacity to pay (CTP_h) and otherwise equal to zero.[35] To calculate CTP_h, we first defined the poverty line (PL) as an average expenditure on food of between 45% and 55% of TE, adjusted for equivalence in consumption (equal to household size$^{\beta}$), where β was set at 0.56, as reported elsewhere.[36] Thus, $CTP_h = TE_h\text{-}FE_h$ if $PL>FE_h$, and $CTP_h = TE_h\text{-}PL$ if $PL \leq FE_h$.

(iii) Excessive health-care expenditure (EHEs) included households with CHEs and/or those with impoverishing health expenditures (equal to 1 if $TE_h \geq PL$ and $TE_h - HE_h < PL$, and equal to zero otherwise).[35]

Statistical Analysis

All analyses were performed using Stata v17 MP software. We first described the sociodemographic characteristics of households (averages and percentages with a 95% confidence interval-95%CI) as well as household health expenditures (medians with an interquartile range-IQR) according to the gender of the head of household in families with elderly members. We considered four time periods: 2000–2006, 2008–2012, 2014–2018, and 2020, and evaluated the temporal differences in each characteristic for each type of household (FHHs and MHHs). We then estimated the differences between them within each time period by constructing bivariate regression models as follows: linear for continuous variables, logistic for binary variables, quantile for amounts spent, and fractional for measures of proportion.

To estimate the HE>0, CHE and EHE probabilities in percentages for FHHs and MHHs with and without elderly members, we considered two sources of bias: (i) self-selection in the demand for health services (HE>0), attributable to gender bias pertaining to the head of household,[8–12,37,38] and (ii) the truncation of CHE and EHE when HE>0. To assess the first source of bias, we used pooled propensity-score matching.[39] For this purpose, we used logistic regression models to estimate the propensity scores (where the values of the outcome were 0 if MHH and 1 if FHH), and matched the study sample for all relevant characteristics listed above. Matching was performed using the 1–1 nearest-neighbor algorithm, including caliper = 0.01, non-replacement and common support. We examined balance in covariates using standardized differences in the characteristics of the households in the common support area.[40] Average percentage absolute biases of 20.5% before and 1.6% after matching indicated a balance between comparison groups. After computing the Mantel Haenszel test using gamma (1(0.05)2), we found that the matching estimations were insensitive to a hidden bias.[41] Sensitivity analyses were performed by contrasting the naïve model using kernel, local linear regression and radius matching algorithms (Appendices A–D).[40]

Among matched households, we used a one-stage probit model with robust standard errors and a two-stage probit model[42] to adjust the probabilities of HE>0,

CHE and EHE respectively. We also estimated the incremental risk of incurring positive HE, CHE and EHE associated with the presence of elderly members (the ratio of the differences in probability by gender of the head of the households). Lastly, we conducted post-hoc comparisons of quintiles in the overall (2000-2020) adjusted probability of EHE by state among FHHs with elderly members.

Results

The percentage of FHHs grew by 32.0%, from 21.9% to 28.9%, between the 2000–2006 period and the year 2020 (Table 1). These heads of household, mostly divorced, separated or widowed, belonged to older age brackets and had an elementary-school-level education or less. At the same time, a lower proportion than the heads of MHHs had attended college from 2000–2006, while by the end of the period, this figure had reversed. Heads of FHHs were less likely to participate in the labor market, compared with their male counterparts, who were mostly married or in union. FHHs, predominantly unipersonal or extended, were larger and more likely to include elderly family members compared to their male-headed counterparts (28.8% vs. 17.0% in 2000–2006 and 32.8% vs. 22.3% in 2020) (Table 1). In the period from 2000–2006, 47.0% of MHHs and 40.9% of FHHs enjoyed health insurance coverage. The figures rose to slightly above 92.0% in 2014–2018 and then dropped to 85.0% for MHHs and 75.3% for FHHs in 2020. While their SES was similar, more FHHs had participated in social programs by the end of this period, in spite of the fact that a greater number of MHHs had fallen below the PL. Although more FHHs than MHHs were located in urban areas, they were evenly distributed by level of municipal development and socioeconomic region.

Median quarterly TE trended downward for both types of households (Table 2): from USD $3,035 to USD $1,265 and from USD $2,745 to USD $1,168, for MHHs and FHHS, respectively, with almost 25% of expenditures consisting of non-monetary spending, on average. FE followed a similar pattern: approximately 75% were household-based and showed a smaller percentage of non-monetary spending compared to TE. CTP point estimates were also slightly higher among MHHs, whose heads were mostly married or in union and employed, living predominantly in nuclear or extended families. In households with HE>0, HEs were similar and decreased over time in both types of households, although the non-cash component of HE was higher among FHHs. HE/TE were similar but the HE/FE and HE/CTP point-estimate ratios, in particular, were higher for FHHs. From 2000-to-2020, spending on medicines and other health products increased from 56.5% to 73.6% among MHHs and from 58.0% to 74.9% among FHHs; these figures were consistently higher for FHHs with elderly members vs. comparable MHHs (Figure 1). Outpatient spending in households with elderly members, similar for MHHs and FHHs, declined over the period analyzed, dropping from 34.0% and 33.6% in 2000–2006 to 18.2% and 17.8% in 2020, respectively.

From 2000–2020, the adjusted probabilities of MHHs and FHHs experiencing HEs were 62.5% and 67.9%, respectively, $P < .001$ (Table 3), with the lowest figures observed between 2008–2012 (56.3% and 62.0%, respectively, $P < .001$). After factoring in the presence of elderly household members, the gap in the point prevalence of HEs>0 between FHHs and MHHs widened; this gap also increased over time, from 4.5 to 4.8 percentage points. Likewise, FFHs were more likely to incur CHEs than MHHs (4.7% vs. 3.9% during the entire period analyzed, $P < .001$), and this was even more probable in households with elderly members (5.8% vs. 4.9% in the aggregate period, $P < .001$). However, the likelihood to incur CHEs declined between 2000–2006 and 2008–2012 in both types of households: it was 5.9% and 4.7% in FHHs overall ($P < .001$) and 7.1% and 5.8% in those with elderly members ($P < .001$), respectively, vs. 5.0% and 3.9% in MHHs overall and 6.1% and 4.8% in those with elderly members ($P < .001$), respectively, in 2008–2012; the rates were stable for the remaining years (Table 3, Panel B).

The probability of incurring EHEs proved higher in FHHs than in MHHs (5.5% vs. 4.6%, $P < .001$), and even higher among FHHs with elderly members (6.9% vs. 5.8%, $P < .001$) during the 2000–2020 period. It declined over time, however, dropping from 6.7% in 2000–2006 to 5.4% in 2008–2012 in FHHs ($P < .001$), and from 8.2% to 6.7% in FHHs with elderly members ($P < .001$). The likelihood of experiencing EHEs also dropped among MHHs, falling from 5.8% in 2000–2006 to 4.4% in 2008–2012 ($P < .001$), and from 7.1% to 5.6% in MHHs with elderly members ($P < .001$), respectively, but rising slightly toward the end of the study period. During 2000–2020, the incremental risk for CHE and EHE associated with the presence of elderly members in FHHs equaled 14.5% and 13.1%, respectively, meaning that these households incurred greater expenses (Table 3, Panel C). During the study period (2000–2020) the adjusted probability of EHE in FHHs with elderly members varied geographically, with a gap of up to 133.3% (from 3.9% to 9.1%), separating the states with the highest from those with the lowest probabilities. EHEs were more prevalent in the less developed states in the east, north-central and southwest of the

Table 1. Main characteristics of households studied according to gender of head, Mexico, 2000-2020.

	2000-2006		2008-2012		2014-2018		2020	
	Male-Headed	Female-Headed	Male-Headed	Female-Headed	Male-Headed	Female-Headed	Male-Headed	Female-Headed
No of households	50,358	14,138	48,664	16,152	119,745	43,434	62,683	25,516
%	78.08	21.92	75.08	24.92	73.39	26.61	71.08	28.92
	Calculated average or percentage (95% CI)							
Head of Household								
Age (in yrs.), avg.[§,¥]	46.1 (45.9, 46.2)	51.9 (51.6, 52.1)***	47.4 (47.2, 47.5)	52.5 (52.3, 52.8)***	48.0 (47.9, 48.1)	52.8 (52.6, 52.9)***	49.9 (49.7, 50.0)	54.2 (54.0, 54.4)***
Schooling, %								
None[§,¥]	11.0 (10.7, 11.2)	19.2 (18.5, 19.8)***	8.6 (8.3, 8.8)	14.7 (14.2, 15.3)***	6.3 (6.2, 6.5)	11.1 (10.8, 11.4)***	5.8 (5.6, 5.9)	9.7 (9.4, 10.1)***
Elementary[§,¥]	42.3 (41.9, 42.8)	45.2 (44.4, 46.1)***	38.1 (37.7, 38.6)	40.7 (40.0, 41.5)***	33.9 (33.6, 34.2)	36.0 (35.6, 36.5)***	32.2 (31.8, 32.5)	34.9 (34.3, 35.5)***
Junior high school[§,¥]	20.8 (20.4, 21.1)	15.8 (15.2, 16.4)***	22.6 (22.3, 23.0)	17.3 (16.7, 17.9)***	28.0 (27.8, 28.3)	24.2 (23.8, 24.6)***	28.5 (28.2, 28.9)	24.8 (24.3, 25.3)***
High school[§,¥]	10.9 (10.7, 11.2)	7.5 (7.1, 8.0)***	13.9 (13.6, 14.3)	11.9 (11.4, 12.4)***	14.5 (14.3, 14.7)	10.0 (9.7, 10.2)***	15.4 (15.1, 15.7)	10.9 (10.6, 11.3)***
College[§,¥]	15.0 (14.7, 15.3)	12.2 (11.7, 12.7)***	16.7 (16.4, 17.1)	15.3 (14.7, 15.8)***	17.3 (17.1, 17.5)	18.8 (18.4, 19.1)***	18.1 (17.8, 18.4)	19.7 (19.2, 20.2)***
Employed in the last month, %[Ψ,¥]	89.0 (88.7, 89.3)	57.5 (56.7, 58.3)***	83.9 (83.6, 84.2)	52.9 (52.1, 53.7)***	86.3 (86.1, 86.5)	58.6 (58.1, 59.0)***	82.1 (81.8, 82.4)	53.8 (53.2, 54.4)***
Marital status, %								
Married/free union[§,¥]	90.5 (90.2, 90.8)	17.0 (16.3, 17.6)***	88.6 (88.3, 88.9)	20.6 (20.0, 21.2)***	86.7 (86.5, 86.9)	24.6 (24.2, 25.0)***	85.2 (84.9, 85.5)	25.3 (24.7, 25.8)***
Divorced/separated/widowed[§,¥]	5.8 (5.6, 6.1)	67.1 (66.3, 67.9)***	7.1 (6.8, 7.3)	62.7 (61.9, 63.4)***	8.5 (8.3, 8.6)	61.4 (60.9, 61.8)***	9.8 (9.5, 10.0)	61.8 (61.2, 62.4)***
Single[§,¥]	3.7 (3.5, 3.8)	16.0 (15.4, 16.6)***	4.4 (4.2, 4.5)	16.7 (16.1, 17.3)***	4.8 (4.7, 4.9)	14.0 (13.7, 14.4)***	5.1 (4.9, 5.2)	12.9 (12.5, 13.4)***
Composition, %								
Unipersonal[Ψ,¥]	5.2 (5.0, 5.4)	17.5 (16.9, 18.1)***	6.6 (6.4, 6.8)	18.0 (17.4, 18.6)***	8.4 (8.3, 8.6)	18.6 (18.2, 18.9)***	9.4 (9.2, 9.6)	18.6 (18.1, 19.0)***
Nuclear[§,¥]	73.7 (73.3, 74.1)	45.6 (44.7, 46.4)***	71.0 (70.6, 71.4)	46.8 (46.1, 47.6)***	70.1 (69.8, 70.4)	47.6 (47.1, 48.1)***	68.4 (68.1, 68.8)	47.4 (46.8, 48.0)***
Extended[§]	20.5 (20.1, 20.8)	35.3 (34.5, 36.1)**	21.5 (21.1, 21.9)	33.7 (32.9, 34.4)***	20.6 (20.3, 20.8)	32.4 (32.0, 32.9)***	21.2 (20.8, 21.5)	32.7 (32.2, 33.3)***
Composite[φ,¥]	0.7 (0.6, 0.7)	1.6 (1.4, 1.8)***	0.9 (0.8, 1.0)	1.5 (1.3, 1.7)***	0.9 (0.9, 1.0)	1.4 (1.3, 1.5)***	1.0 (0.9, 1.1)	1.3 (1.2, 1.5)***
Members aged 0-5, %[§,¥]	38.3 (37.8, 38.7)	25.8 (25.1, 26.6)***	34.0 (33.6, 34.4)	23.1 (22.5, 23.8)***	31.0 (30.8, 31.3)	22.5 (22.1, 22.9)***	26.8 (26.4, 27.1)	19.9 (19.4, 20.4)***
Members aged ≥55, %[§,¥]	31.7 (31.3, 32.1)	47.0 (46.2, 47.8)***	34.7 (34.3, 35.1)	47.5 (46.7, 48.3)***	36.2 (36.0, 36.5)	49.0 (48.5, 49.5)***	40.7 (40.3, 41.1)	52.9 (52.3, 53.5)***
Members aged ≥65, %[§,¥]	17.0 (16.7, 17.4)	28.8 (28.0, 29.5)***	18.6 (18.2, 18.9)	29.5 (28.8, 30.2)***	19.6 (19.3, 19.8)	30.1 (29.7, 30.5)***	22.3 (22.0, 22.6)	32.8 (32.2, 33.4)***
No. of equivalent adults, avg.[§,¥]	2.9 (2.9, 2.9)	2.3 (2.3, 2.3)***	2.8 (2.8, 2.8)	2.3 (2.3, 2.3)***	2.7 (2.7, 2.7)	2.3 (2.3, 2.3)***	2.6 (2.6, 2.6)	2.3 (2.3, 2.3)***
Health insurance, %								
None[§,¥]	53.0 (52.6, 53.5)	59.1 (58.3, 59.9)***	19.4 (19.1, 19.8)	19.6 (19.0, 20.2)	7.7 (7.6, 7.9)	7.4 (7.2, 7.7)*	15.0 (14.7, 15.2)	14.7 (14.3, 15.2)
Seguro Popular/INSABI[b,§,¥]	3.9 (3.7, 4.1)	4.4 (4.1, 4.8)**	26.3 (25.9, 26.7)	23.6 (22.9, 24.2)***	34.1 (33.8, 34.3)	32.8 (32.3, 33.2)***	25.8 (25.4, 26.1)	23.8 (23.3, 24.3)***
Social Security [Ψ,¥]	38.9 (38.5, 39.3)	33.1 (32.3, 33.9)***	44.2 (43.8, 44.7)	46.3 (45.6, 47.1)***	36.0 (35.7, 36.2)	36.4 (35.9, 36.8)	43.4 (43.0, 43.8)	45.0 (44.4, 45.6)***
Mixture or private[§,¥]	4.2 (4.0, 4.3)	3.4 (3.1, 3.7)***	10.0 (9.7, 10.3)	10.5 (10.0, 10.9)	22.2 (22.0, 22.5)	23.4 (23.0, 23.8)***	15.9 (15.6, 16.2)	16.4 (16.0, 16.9)[+]
SES index[c] (std.), avg.[§,¥]	-0.42 (-0.43, -0.41)	-0.34 (-0.36, -0.32)***	-0.07 (-0.08, -0.06)	0.02 (0.01, 0.04)***	0.07 (0.07, 0.08)	0.12 (0.11, 0.13)***	0.16 (0.15, 0.17)	0.21 (0.20, 0.22)***
Below poverty line (PL) [¥]	12.5 (12.2, 12.8)	9.3 (8.8, 9.7)***	11.7 (11.5, 12.0)	8.8 (8.3, 9.2)***	11.6 (11.4, 11.8)	9.7 (9.4, 10.0)***	10.7 (10.4, 10.9)	8.9 (8.5, 9.2)***
Participating in a social program[d],%[§,¥]	21.4 (21.0, 21.7)	18.2 (17.6, 18.8)***	26.4 (26.0, 26.8)	25.3 (24.7, 26.0)*	31.4 (31.2, 31.7)	34.1 (33.6, 34.5)***	30.6 (30.2, 31.0)	35.2 (34.6, 35.7)***
Area of residence								
Urban, %[§,¥]	70.8 (70.4, 71.2)	78.9 (78.2, 79.6)***	73.6 (73.2, 74.0)	81.0 (80.4, 81.6)***	61.6 (61.4, 61.9)	69.9 (69.5, 70.4)***	60.0 (59.6, 60.3)	68.3 (67.7, 68.8)***
Social deprivation index[e] (std.), avg.[§,¥]	0.8 (0.8, 0.8)	0.8 (0.7, 0.8)**	0.2 (0.2, 0.2)	0.1 (0.04, 0.1)***	-0.1 (-0.2, -0.1)	-0.2 (-0.2, -0.1)	-0.4 (-0.4, -0.4)	-0.5 (-0.5, -0.4)***
Socioeconomic Region, %								
Lowest[§,¥]	9.8 (9.6, 10.1)	10.8 (10.3, 11.3)**	12.5 (12.2, 12.8)	12.0 (11.5, 12.5)[+]	7.9 (7.7, 8.0)	8.1 (7.9, 8.4)	8.0 (7.7, 8.2)	8.4 (8.1, 8.8)*
2[§,¥]	19.8 (19.5, 20.2)	21.3 (20.6, 22.0)***	12.9 (12.6, 13.2)	12.9 (12.4, 13.4)	16.6 (16.4, 16.8)	17.2 (16.8, 17.5)**	15.5 (15.2, 15.8)	15.9 (15.5, 16.4)[+]
3	14.5 (14.2, 14.8)	14.3 (13.7, 14.9)	13.4 (13.1, 13.7)	12.9 (12.4, 13.4)[+]	14.4 (14.2, 14.6)	14.0 (13.7, 14.4)*	14.3 (14.0, 14.6)	13.6 (13.2, 14.1)**
4[§,¥]	20.9 (20.5, 21.2)	19.0 (18.3, 19.6)***	30.0 (29.6, 30.4)	28.2 (27.5, 28.9)***	25.9 (25.7, 26.2)	26.6 (26.1, 27.0)**	26.4 (26.0, 26.7)	27.6 (27.1, 28.2)***
5[§,¥]	13.0 (12.7, 13.3)	13.9 (13.3, 14.5)**	13.1 (12.8, 13.4)	14.1 (13.5, 14.6)**	17.7 (17.5, 17.9)	17.8 (17.4, 18.1)	18.3 (18.0, 18.6)	17.6 (17.1, 18.0)*
6[§,¥]	14.2 (13.9, 14.5)	11.4 (10.9, 11.9)***	10.1 (9.8, 10.3)	9.3 (8.9, 9.8)**	15.0 (14.8, 15.2)	12.8 (12.5, 13.1)***	15.0 (14.7, 15.3)	13.3 (12.9, 13.7)***
Highest[§,¥]	7.7 (7.5, 8.0)	9.3 (8.8, 9.8)***	8.0 (7.8, 8.2)	10.7 (10.2, 11.1)***	2.5 (2.4, 2.6)	3.6 (3.4, 3.7)***	2.6 (2.5, 2.8)	3.5 (3.3, 3.7)***

CI: confidence interval; Avg.: average; SES: socioeconomic status; STD: Standard Deviation; PL: poverty line.

[a]Data from the 2000, 2002, 2004, 2006, 2008, 2010, 2012, 2014, 2016, 2018 and 2020 waves of the National Household Income and Expenditure Survey, 2000-2020.

[b]Beginning January 1, 2020, the Seguro Popular Program was dismantled and replaced by the Health Institute for Wellbeing (INSABI, by its initials in Spanish). This Institute was charged with ensuring the "free delivery of health services, medicines and other associated supplies" for people without Social Security coverage at all levels of care.[43]

[c]Factorial index calculated according to the 2000 factor loadings.

[d]Refers to any government conditional/non-conditional program, in particular, the recently canceled Conditional-Cash-Transfer Program known as Prospera (formerly Progresa or Oportunidades) (POP program).

[e]Based on the 2000, 2010 and 2020 Population Censuses, as well as data from the 2005 and 2015 Intercensal Surveys,[58] we first made linear predictions for the 2002-2008 and 2012-2018 survey waves. We then estimated a factorial and standardized index based on the factor loadings for 2000.

P-for-trend among FHHs: [§] < 0.001; [Ψ] < 0.01; [φ] < 0.05. *P*-for-trend among MHHs: [¥] < 0.001; [Ω] < 0.01; [Φ] < 0.05. *P*-val for the difference between FHHs and MHHs: *** < 0.001; ** < 0.01; * < 0.05; + < 0.10.

Table 2. Trends in household healthcare expenditure according to gender of head, Mexico, 2000-2020.

	2000-2006[a]		2008-2012[a]		2014-2018[a]		2020[a]	
	Male-Headed	Female-Headed	Male-Headed	Female-Headed	Male-Headed	Female-Headed	Male-Headed	Female-Headed
No of households	50,358	14,138	48,664	16,152	119,745	43,434	62,683	25,516
%	78.08	21.92	75.08	24.92	73.39	26.61	71.08	28.92
	Calculated median (IQR) or percentage (95% CI)							
Among the total households								
TE, p50 (IQR)[b,§,¥]	3,035 (1,845, 5,070)	2,745 (1,666, 4,514)***	2,615 (1,643, 4,235)	2,437 (1,527, 3,923)***	1,500 (998, 2,331)	1,357 (901, 2,128)***	1,265 (869, 1,871)	1,168 (796, 1,746)***
Monetary, %[§,¥]	75.2 (75.0, 75.3)	69.5 (69.1, 69.8)***	75.4 (75.3, 75.6)	70.3 (70.0, 70.6)***	74.8 (74.7, 74.9)	69.3 (69.1, 69.5)***	74.0 (73.9, 74.2)	68.7 (68.5, 69.0)***
Non-monetary, %[§,¥]	24.8 (24.7, 25.0)	30.5 (30.2, 30.9)***	24.6 (24.4, 24.7)	29.7 (29.4, 30.0)***	25.2 (25.1, 25.3)	30.7 (30.5, 30.9)***	26.0 (25.8, 26.1)	31.3 (31.0, 31.5)***
FE, p50 (IQR)[b,§,¥]	1,047 (674, 1,574)	908 (578, 1,373)	963 (633, 1,435)	839 (546, 1,262)	620 (414, 913)	553 (363, 825)***	520 (351, 752)	468 (312, 684)***
Outside the household, %[§,¥]	20.7 (20.5, 20.9)	24.0 (23.5, 24.4)***	21.5 (21.3, 21.7)	24.1 (23.7, 24.5)***	24.0 (23.9, 24.2)	26.4 (26.1, 26.7)***	18.2 (18.0, 18.4)	20.0 (19.6, 20.3)***
Inside the household, %[§,¥]	79.3 (79.1, 79.5)	76.0 (75.6, 76.5)***	78.5 (78.3, 78.7)	75.9 (75.5, 76.3)***	76.0 (75.8, 76.1)	73.6 (73.3, 73.9)***	81.8 (81.6, 82.0)	80.0 (79.7, 80.4)***
Monetary, %[§,¥]	82.7 (82.5, 82.9)	78.3 (77.9, 78.8)***	83.8 (83.6, 84.0)	79.8 (79.4, 80.2)***	82.4 (82.3, 82.5)	78.2 (77.9, 78.4)***	82.3 (82.2, 82.5)	78.0 (77.7, 78.3)***
Non-monetary, %[§,¥]	17.3 (17.1, 17.5)	21.7 (21.2, 22.1)***	16.2 (16.0, 16.4)	20.2 (19.8, 20.6)***	17.6 (17.5, 17.7)	21.8 (21.6, 22.1)***	17.7 (17.5, 17.8)	22.0 (21.7, 22.3)***
CTP, p50 (IQR)[b,§,¥]	2,009 (1,056, 3,884)	1,856 (994, 3,476)	1,679 (915, 3,131)	1,604 (891, 2,918)	905 (525, 1,622)	829 (482, 1,492)	760 (461, 1,292)	711 (434, 1,218)
Reported HE>0, %[¥]	76.8 (76.4, 77.1)	76.0 (75.3, 76.7)[+]	62.0 (61.6, 62.4)	62.6 (61.9, 63.4)	62.7 (62.5, 63.0)	63.9 (63.4, 64.3)***	71.5 (71.2, 71.9)	73.7 (73.1, 74.2)***
If HE>0								
HE, p50 (IQR)[b,§,¥]	84.6 (29.9, 220.1)	87.6 (29.9, 226.5)[+]	56.0 (18.3, 155.0)	56.5 (18.8, 159.8)	30.3 (11.1, 81.4)	30.5 (11.4, 83.5)	25.8 (9.1, 72.9)	27.5 (9.5, 76.3)***
Monetary, %[§,¥]	69.6 (69.2, 70.0)	67.1 (66.3, 67.9)***	74.9 (74.5, 75.4)	72.5 (71.7, 73.3)***	72.3 (72.0, 72.6)	69.0 (68.4, 69.5)***	82.6 (82.3, 82.9)	79.5 (78.9, 80.0)***
Non-monetary, %[§,¥]	30.4 (30.0, 30.8)	32.9 (32.1, 33.7)***	25.1 (24.6, 25.5)	27.5 (26.7, 28.3)***	27.7 (27.4, 28.0)	31.0 (30.5, 31.6)***	17.4 (17.1, 17.7)	20.5 (20.0, 21.1)***
HE / TE, %[§,¥]	5.6 (5.5, 5.7)	6.2 (6.0, 6.3)***	4.7 (4.6, 4.8)	5.0 (4.8, 5.1)**	4.7 (4.7, 4.8)	5.1 (5.0, 5.2)***	4.9 (4.8, 5.0)	5.2 (5.1, 5.3)***
FE / TE, %[§,¥]	35.7 (35.6, 35.9)	34.4 (34.1, 34.7)***	37.2 (37.0, 37.3)	35.4 (35.1, 35.7)***	41.3 (41.2, 41.4)	40.7 (40.5, 40.9)***	41.8 (41.7, 42.0)	40.8 (40.6, 41.1)***
HE / FE, %[§,¥]	28.1 (26.3, 29.9)	32.6 (29.4, 35.7)*	21.4 (20.1, 22.7)	25.5 (22.3, 28.7)**	18.6 (18.0, 19.2)	20.9 (19.7, 22.0)***	19.6 (18.8, 20.4)	21.5 (20.2, 22.8)*
HE / CTP, %[φ,¥]	8.1 (8.0, 8.2)	8.7 (8.5, 9.0)***	6.9 (6.8, 7.0)	7.1 (6.9, 7.3)[+]	7.4 (7.3, 7.5)	7.8 (7.6, 7.9)***	7.6 (7.5, 7.7)	8.0 (7.8, 8.2)**

CI: confidence interval; TE: total quarterly household expenditure; p50: median; IQR: interquartile range; FE: quarterly food expenditure; CTP: quarterly capacity to pay; HE: quarterly health expenditure.
[a]Data from the 2000, 2002, 2004, 2006, 2008, 2010, 2012, 2014, 2016, 2018 and 2020 waves of the National Household Income and Expenditure Survey, 2000-2020.
[b]US$ dollars at constant 2018 prices.
P-for-trend among FHHs: [§] < 0.001; [Ψ] < 0.01; [φ] < 0.05. *P*-for-trend among MHHs: [¥] < 0.001; [Ω] < 0.01; [Φ] < 0.05. *P*-val for the difference between FHHs and MHHs: *** < 0.001; ** < 0.01; * < 0.05; + < 0.10.

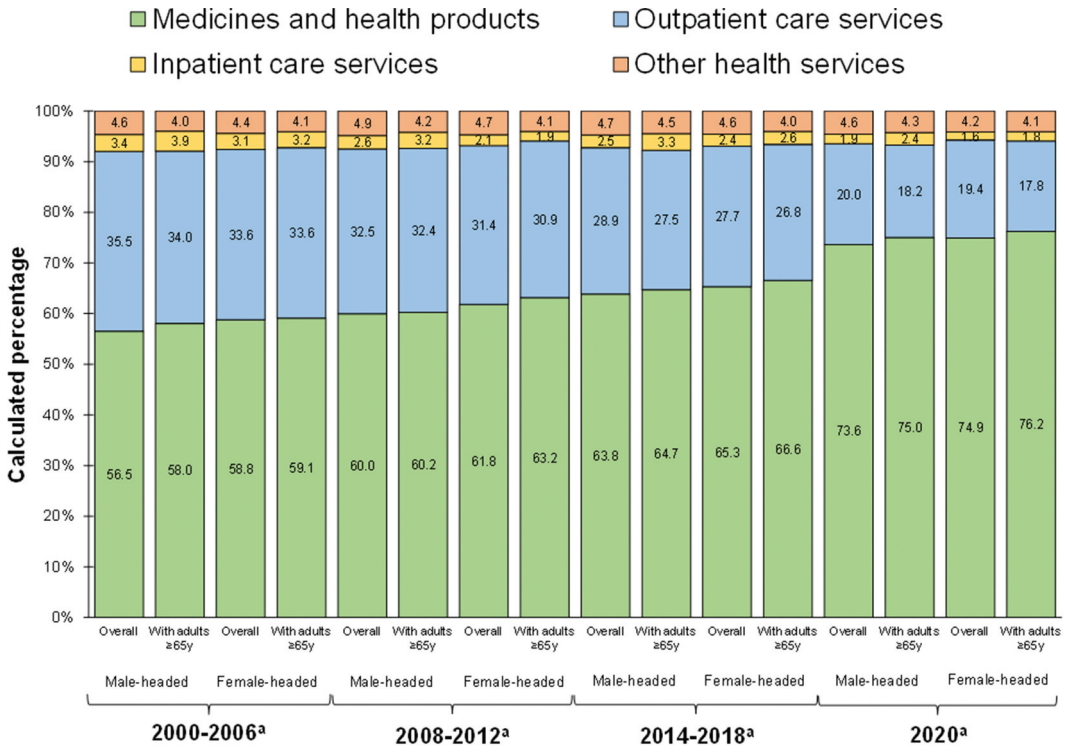

Figure 1. Trends in the distribution of health-care expenditure according to components and to gender of head in households with elderly members aged ≥65 years, Mexico, 2000–2020. [a]Data from the 2000, 2002, 2004, 2006, 2008, 2010, 2012, 2014, 2016, 2018 and 2020 waves of the National Household Income and Expenditure Survey, 2000–2020.

country, and lower in the more developed northern states (Figure 2).

Discussion

The evidence we present confirms our hypothesis that FHHs were at greater risk for health-related financial problems than MHHs in Mexico during the time period studied, possibly because of the interaction between gender and NCDs, with its direct implications for gender disparities and social inequality.[42] We provide robust evidence indicating that, from 2000 to 2020, FHHs in Mexico experienced greater health-related financial risks than MHHs, with an EHE percentage of 5.5% among FHHs compared to 4.6% for MHHs ($P < .001$). The incremental risk associated with the presence of elderly members in the household among FHHs was 13.1% greater than that for MHHs. EHE in FHHs with elderly members was not territorially random, being 133.3% higher in states with lower levels of social development.

Several gender-differentiated mechanisms shape the response to health needs, each with specific social impacts. The predominance of unpaid activities in FHHs reported in the literature stands out, with this type of work tending to increase with age and the presence of older family members. These additional pressures derive from the greater demand for health-care in these homes required to meet the needs of elderly household members. Our findings suggest that this phenomenon is associated with several vulnerability determinants.[45]

Although expenditures on medicines and other health products trended upward in both FHHs and MHHs with elderly members, from 2000 to 2020, these expenditures were higher in FHHs. Our findings are in line with other studies showing that pharmaceutical costs represent 34%-82% of health expenditures in households in LMICs, even in households with health insurance coverage.[46] Such levels of spending on medications highlight the need to review pharmaceutical coverage policies for essential drugs in Mexico. This evidence is consistent with previous findings indicating that even with the expansion of SP, the issue of access to medicines remains a pressing one, with SP proving largely unable to reduce out-of-pocket spending on medications.[47] This was particularly true with the presence of ≥2 NCDs in the household and the purchase of ≥3 prescribed medications; these conditions are more likely to be encountered in households with elderly members.[47] However, it is important to note that a discontinuity of 10 points upwards in the trend is seen after 2018 (Figure 1). The elimination of SP seems to have put even more pressure on families to spend money on medicines than before, while the current government

Table 3. Trends in adjusted probabilities of HE, CHE and EHE according to the gender of head of household and the presence of elderly aged ≥65 years, Mexico, 2000–2020.

	2000–2020[a]	2000–2006[a]	2008–2012[a]	2014–2018[a]	2020[a]
No of households	108,326	15,157	17,230	48,001	27,938
%	100	14.0	15.9	44.3	25.8
	Adjusted percentage (95% CI)				
Panel A. Health expenditure					
Overall					
Male-Headed	62.5 (62.1, 62.9)	71.9 (71.2, 72.7)	56.3 (55.4, 57.1)	57.9 (57.4, 58.4)	68.5 (67.8, 69.1)
Female-Headed	67.9 (67.5, 68.3)	76.7 (76.0, 77.4)	62.0 (61.2, 62.8)	63.6 (63.0, 64.1)	73.5 (72.9, 74.1)
Without elderly members (≥65y)					
Male-Headed	61.4 (60.9, 61.9)	71.0 (70.2, 71.8)	55.2 (54.3, 56.0)	56.8 (56.2, 57.4)	67.4 (66.8, 68.1)
Female-Headed	66.9 (66.5, 67.4)	75.8 (75.1, 76.6)	60.9 (60.1, 61.8)	62.5 (61.9, 63.1)	72.6 (71.9, 73.2)
With elderly members (≥65y)					
Male-Headed	65.1 (64.4, 65.9)	74.3 (73.3, 75.2)	59.0 (58.0, 60.1)	60.6 (59.8, 61.5)	70.9 (70.1, 71.7)
Female-Headed	70.4 (69.7, 71.1)	78.8 (77.9, 79.6)	64.6 (63.6, 65.7)	66.2 (65.4, 67.0)	75.7 (75.0, 76.5)
Incremental risk (%)	−5.9 (−6.5, −5.3)	−9.5 (−10.5, −8.5)	−3.7 (−4.1, −3.2)	−4.2 (−4.7, −3.7)	−8.1 (−9.0, −7.3)
Panel B. Catastrophic health expenditure					
Overall					
Male-Headed	3.9 (3.7, 4.2)	5.0 (4.6, 5.5)	3.9 (3.5, 4.3)	3.7 (3.4, 3.9)	3.8 (3.5, 4.1)
Female-Headed	4.7 (4.5, 4.9)	5.9 (5.4, 6.4)	4.7 (4.3, 5.2)	4.4 (4.1, 4.7)	4.6 (4.2, 4.9)
Without elderly members (≥65y)					
Male-Headed	3.6 (3.4, 3.8)	4.6 (4.2, 5.1)	3.6 (3.2, 4.0)	3.4 (3.1, 3.6)	3.5 (3.2, 3.8)
Female-Headed	4.3 (4.1, 4.6)	5.5 (4.9, 6.0)	4.3 (3.9, 4.8)	4.1 (3.8, 4.4)	4.2 (3.9, 4.5)
With elderly members (≥65y)					
Male-Headed	4.9 (4.4, 5.3)	6.1 (5.4, 6.9)	4.8 (4.2, 5.4)	4.5 (4.1, 5.0)	4.7 (4.2, 5.2)
Female-Headed	5.8 (5.3, 6.2)	7.1 (6.4, 7.9)	5.8 (5.1, 6.4)	5.4 (4.9, 5.9)	5.6 (5.0, 6.1)
Incremental risk (%)	14.5 (8.2, 20.8)	12.1 (5.8, 18.4)	15.0 (8.8, 21.3)	15.4 (9.0, 21.7)	13.9 (7.5, 20.4)
Panel C. Excessive health expenditure					
Overall					
Male-Headed	4.6 (4.4, 4.8)	5.8 (5.2, 6.3)	4.4 (4.0, 4.9)	4.3 (4.0, 4.6)	4.5 (4.2, 4.9)
Female-Headed	5.5 (5.3, 5.8)	6.7 (6.1, 7.3)	5.4 (4.9, 5.9)	5.2 (4.9, 5.6)	5.4 (5.0, 5.8)
Without elderly members (≥65y)					
Male-Headed	4.2 (3.9, 4.4)	5.3 (4.8, 5.8)	4.0 (3.6, 4.4)	3.9 (3.6, 4.2)	4.1 (3.8, 4.4)
Female-Headed	5.0 (4.8, 5.3)	6.2 (5.6, 6.7)	4.9 (4.4, 5.4)	4.8 (4.5, 5.1)	4.9 (4.5, 5.3)
With elderly members (≥65y)					
Male-Headed	5.8 (5.3, 6.3)	7.1 (6.4, 7.9)	5.6 (4.9, 6.2)	5.5 (4.9, 6.0)	5.7 (5.1, 6.2)
Female-Headed	6.9 (6.3, 7.4)	8.2 (7.4, 9.0)	6.7 (6.0, 7.4)	6.6 (6.0, 7.1)	6.7 (6.0, 7.3)
Incremental risk (%)	13.1 (7.0, 19.2)	9.5 (2.5, 16.5)	14.3 (8.4, 20.3)	14.5 (8.5, 20.4)	12.0 (5.5, 18.6)

CI: confidence interval; HE: quarterly health-care expenditure; CHE: catastrophic health-care expenditure; EHE: excessive health-care expenditure.
[a]Data from the 2000, 2002, 2004, 2006, 2008, 2010, 2012, 2014, 2016, 2018 and 2020 waves of the National Household Income and Expenditure Survey, 2000–2020.

struggles to set up an effective procurement mechanism after dismantling the previous one.[48]

Controlling for gender bias in care-seeking behavior allowed us to observe that structural conditions generate the described vulnerability. On the one hand, women often incur higher health expenditures, while at the same time having a lower income and lower total expenditures. Policies should consider the fact that women in FHHs have different priorities, needs, interests and resources than those in other households.[49] On the other hand, preferred ways of resolving health needs vary, as women tend to internalize the preferences of their family members and suffer from a lack of power or agency in family decision making. Higher levels of spending in FHHs may result from the fact that women are more inclined than men to seek services and to invest more of their own resources to obtain them.[38]

The U pattern observed in HE>0, CHE and EHE reflects a sustained decrease from 2000–2012, stagnation in 2014–2018, and a slight increase toward 2020. These changes are emblematic of two distinct periods as regards social policies and financial protection in health: the first was a time of expansion and consolidation, and the second, one of stagnation and contraction. In particular, for the first period, the positive effects of the SP on the financial protection of its affiliates have been documented,[50] as has its synergistic effects with the conditional cash transfer Progresa-Prospera-Oportunidades program.[51] Unfortunately, both programs, focused on the poorest households in Mexico, were canceled by the current administration in 2018.[50,52] This may have increased the risk of falling into or remaining in poverty, aggravating the lack of protection in social health of Mexican households and the fragmentation of the health system.[43,50,52,53] The design of effective health-system strategies specifically requires considering the role of social programs and policies in mitigating the negative impact of health expenditures. In Mexico, health-related financial risks dropped significantly during the implementation of

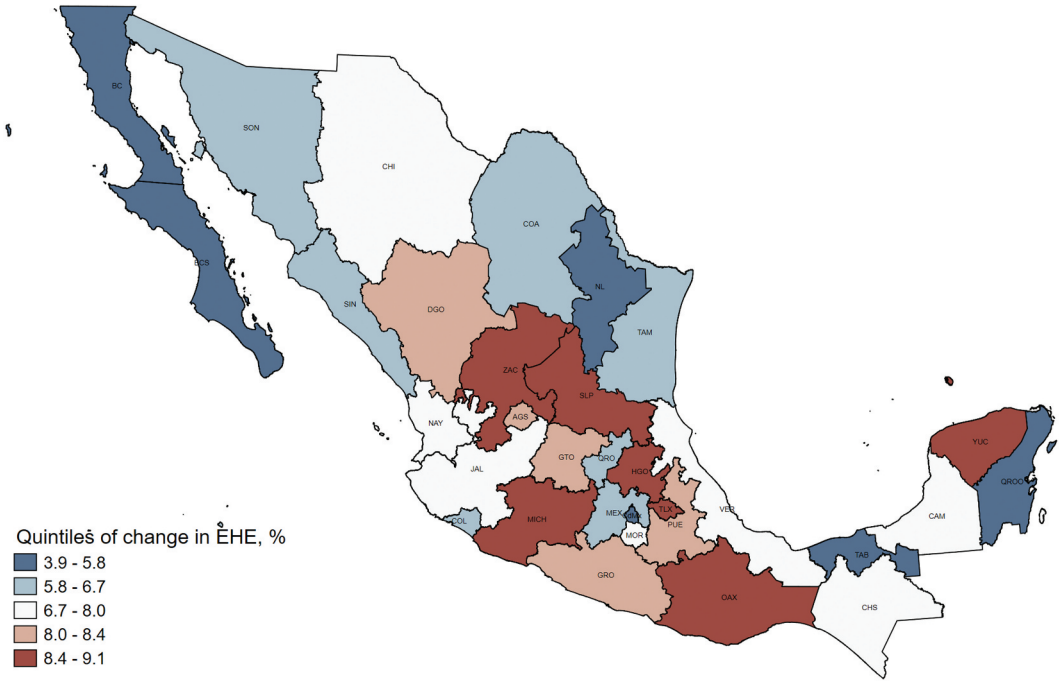

Figure 2. Quintiles of adjusted probability (2000-2020) of EHE by state among in FHHs with elderly members, Mexico. EHE: excessive health-care expenditure.

the SP from 2006 to 2012. This trend has shifted since 2013 as a result of budget cuts, lower public-health spending and the implementation of a new wave of health-system reforms.[52] In addition, the current administration has implemented social policies that have failed to meet policy goals aimed at ensuring gender equity and improving health indicators, despite increased finacial resources.[53,54] This outcome is relevant, as the greatest increase in health expenditures relates to the purchase of medicines and other health products. If the effects of the COVID-19 pandemic are included, it becomes apparent that these reforms had a recessionary effect in Mexico resulting in a lack of focus on NCDs. The increase in CHE and EHE expected in coming years, especially among vulnerable households, requires the implementation of effective financial and health social protection mechanisms that address the fundamental inequalities linked to gender from an intersectional perspective. Such initiatives must incorporate lessons learned and prioritize FHHs with elderly members or individuals suffering from ≥1 NCDs, as well as households in regions with high levels of social deprivation. In addition, policies to raise the income of FHHs are needed, whether this occurs through employment or increased subsidies.[55]

Although the survey analyzed constitutes the gold standard for measuring expenditures in Mexican households, its reliance on self-reporting entails the risk of memory bias, specifically regarding health, as relevant variables are frequently omitted. These include ethnicity, health needs and the consumption of specific medicines by household members; unfortunately, the survey from which we drew our analytical data did not systematically collect information pertaining to these variables. Despite employing a rigorous method that reduces potential gender bias in the demand preferences for health care resulting from observed factors,[56] the original sample size and its inferential power were limited. Furthermore, we do not rule out possible reverse causality between the gender of the head of household and positive spending on health. Correcting this bias would require an experimental design or the use of instrumental variables, approaches difficult to implement with the secondary data analyzed. Accordingly, our estimates should be considered conservative as regards the effect of gender on health-related financial risk.

Contrary to the methodology used by previous studies,[35,36] we adopted a comprehensive approach to measuring financial risk in health care, recognizing the relative importance of non-monetary sources and food consumption outside the home as part of total expenditures.[34] This could have reduced the potential underestimation of the financial burden on households caused by health problems and thus undermined comparability with other studies. In addition, the survey analyzed did not allow for defining a broader gender typology. Although recent surveys show that more than 99% of the Mexican population self-identifies as male or female,[57] we recognize the potential invisibility of other

genders; this aspect should be taken into account in future iterations of the survey.

Our findings support existing evidence concerning the key associations between gender and other social determinants. These connections bear on the possibility of achieving a number of SDGs, especially in the throes of a rapidly aging population, a growing burden of NCDs, and the expected exacerbation of health inequities as a result of COVID-19. All of these factors highlight the need to implement urgent measures that strengthen social protection in health incorporating a gender perspective.

The change in the nature of social policies in Mexico implemented by the current administration does not indicate a desire to redefine policy to help achieve gender equity in health, nor a commitment to allocate the needed resources. Public policies rooted in different perspectives such as anti-poverty and health programs should recognize the burden of unpaid work on women, often viewed as an inherent part of gender roles, and seek to correct the situation, while also considering the demographic composition of households.[58] Standardizing the incorporation of a gender perspective into the design and implementation of health policies would represent a significant advance toward the fulfillment of UHC. Mitigating power asymmetries between men and women is essential, as is adopting intersectional approaches. Decision makers should consider different levels of social vulnerability and incorporate lessons learned when designing, implementing or redirecting social policies and social protection systems.

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Contributors

ESM conceived the idea of the paper, led the formal analysis, and performed the data curation. EON supported the conceptual approach. ESM and EON wrote the first draft of the manuscript. CGL, JJM, SJ, LD, EF, IHP, LF, GN, RN and RL provided critical inputs on multiple iterations. ESM is the guarantor of the work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. The final version of the manuscript was revised and approved by all authors.

Data Sharing

Data analyzed were obtained from the public repository of the National Income and Expenditure Household Survey, hosted at the National Institute for Statistics and Geography (INEGI) (available at https://www.inegi.org.mx/programas/enigh/).

Ethics Approval And Informed Consent

This study was approved by the Research, Biosafety and Ethics Committees of the National Institute of Public Health in Mexico (ID: CI-507-2022/CB22-173).

Memorial Quote

We dedicate this manuscript to our colleague, professor and friend, Sandra Sosa-Rubí, PhD, who passed away in March 2021; Sandra consistently inspired us in our analysis of equity and financial protection in health during her fruitful lifetime.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

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Appendices

Appendix A. Logistic regression model of the association between gender of head of household and each covariate[a]

	Adjusted odds ratio	Robust 95% CI
Head of Household		
Age (in yrs.)	0.99	(0.99, 0.99)
Schooling		
None	1.81	(1.73, 1.90)
Elementary	1.26	(1.22, 1.30)
Secondary	1.11	(1.07, 1.14)
High school	0.82	(0.79, 0.85)
College	Ref.	
Marital status		
Married/free union	0.05	(0.04, 0.05)
Divorced/separated/widowed	2.18	(2.11, 2.25)
Single	Ref.	
Composition		
Unipersonal	0.55	(0.50, 0.60)
Nuclear	2.00	(1.83, 2.19)
Extended	2.08	(1.90, 2.27)
Composite	Ref.	
Any member aged 0–5	1.17	(1.14, 1.20)
Any member aged ≥55	1.16	(1.12, 1.21)
Any member aged ≥65	0.94	(0.91, 0.97)
No of equivalent adults	0.88	(0.87, 0.89)
Health insurance		
None	0.79	(0.76, 0.82)
Seguro Popular/INSABI[b]	1.02	(0.99, 1.06)
Social Security	0.85	(0.82, 0.88)
Mixture or private	Ref.	
SES index[c] (std)	1.27	(1.26, 1.29)
Beneficiary of any social program[d]	1.21	(1.17, 1.24)
Area of residence		
Urban	1.19	(1.16, 1.22)
Socioeconomic Region		
Lowest	1.13	(1.07, 1.19)
2	1.03	(0.98, 1.08)
3	0.96	(0.92, 1.01)
4	0.95	(0.90, 0.99)
5	0.86	(0.82, 0.90)
6	0.77	(0.73, 0.80)
Highest	Ref.	
Period		
2000–2006	0.81	(0.78, 0.83)
2008–2012	0.83	(0.81, 0.86)
2014–2018	0.89	(0.87, 0.92)
2020	Ref.	
Intercept	2.34	(2.08, 2.64)
Number of households	380,690	
Pseudo R^2	0.361	
Area under ROC curve	0.861	

CI: confidence interval; SES: socioeconomic status.

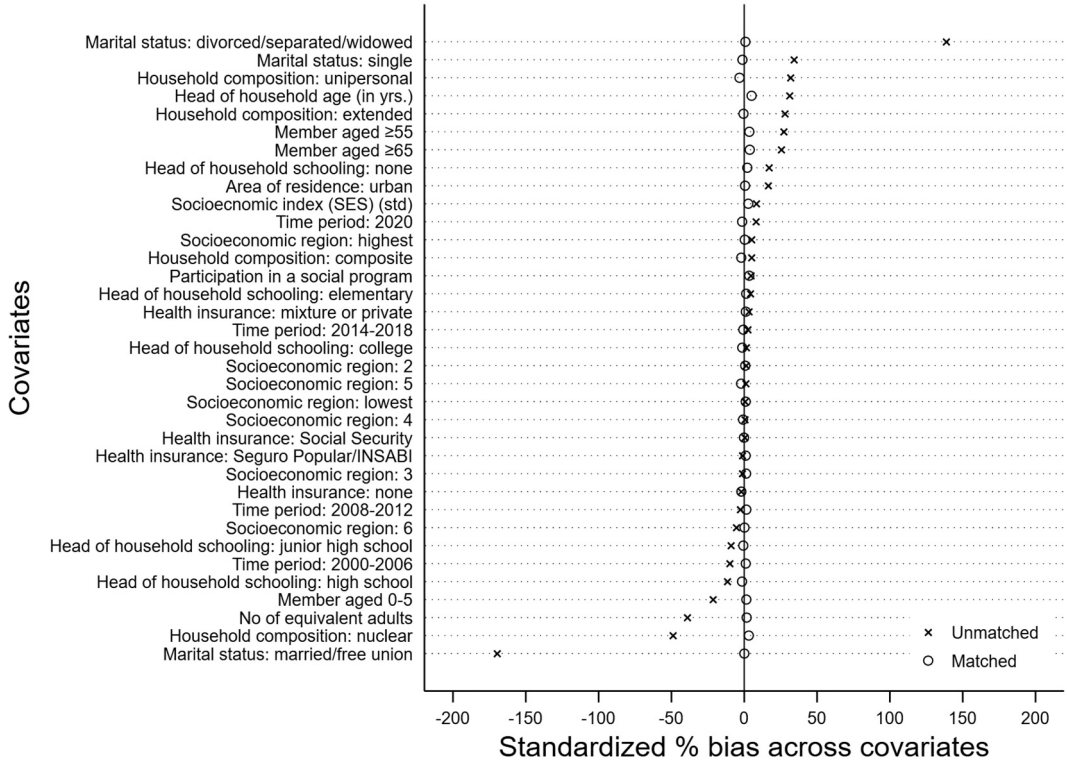
[a]Data from the 2000, 2002, 2004, 2006, 2008, 2010, 2012, 2014, 2016, 2018 and 2020 waves of the National Household Income and Expenditure Survey, 2000–2020.

[b]The Seguro Popular Program, a health-insurance scheme analogous to Social Security, has been recognized as the most important health-policy initiative implemented by Mexico in the 21st century.[53] Beginning January 1, 2020, this Program was dismantled and replaced by the Health Institute for Wellbeing (INSABI, by its initials in Spanish). The latter has been charged with ensuring the "free delivery of health services, medicines and other associated supplies" for people without Social Security coverage at all levels of care.[43] After three years of starting operations (2019–2022) INSABI was relegated to a seccondary role to garantee the provision of services, medicines and associated supplies.

[c]Factorial index calculated according to the factor loadings for 2000.

[d]Refers to any government conditional/non-conditional program, in particular, the recently canceled conditional-cash-transfer program known as Prospera (formerly Progresa and Oportunidades) (POP program).

Appendix B. Balance of covariates following propensity score matching



Note: Matching was performed using the 1:1 nearest-neighbor algorithm including caliper = 0.01, non-replacement, and common support. Average percentage absolute biases of 20.5% before and 1.5% after matching indicated a balance between comparison groups.

Appendix C. Sensitivity analysis: Mantel-Haenszel bounds for variable positive health-care expenditure

Gamma	Q_mh+	Q_mh-	p_mh+	p_mh-
1.000	19.581	19.581	0.000	0.000
1.050	15.745	23.420	0.000	0.000
1.100	12.091	27.085	0.000	0.000
1.150	8.601	30.591	0.000	0.000
1.200	5.261	33.952	0.000	0.000
1.250	2.058	37.181	0.020	0.000
1.300	1.007	40.287	0.157	0.000
1.350	3.968	43.281	0.000	0.000
1.400	6.822	46.171	0.000	0.000
1.450	9.576	48.964	0.000	0.000
1.500	12.238	51.666	0.000	0.000
1.550	14.813	54.285	0.000	0.000
1.600	17.308	56.825	0.000	0.000
1.650	19.728	59.291	0.000	0.000
1.700	22.077	61.688	0.000	0.000
1.750	24.359	64.019	0.000	0.000
1.800	26.579	66.290	0.000	0.000
1.850	28.739	68.501	0.000	0.000
1.900	30.843	70.659	0.000	0.000
1.950	32.895	72.763	0.000	0.000
2.000	34.896	74.819	0.000	0.000

Gamma: odds of differential assignment due to unobserved factors.
Q_mh+: Mantel-Haenszel statistic (assumption: overestimation of treatment effect).
Q_mh-: Mantel-Haenszel statistic (assumption: underestimation of treatment effect).
p_mh+: significance level (assumption: overestimation of treatment effect).
p_mh-: significance level (assumption: underestimation of treatment effect).
The Mantel-Haenszel (MH) statistic measured the influence of potential hidden bias on our estimations. This test calculated Rosenbaum bounds for average treatment effects on the treated in the presence of unobserved heterogeneity (hidden bias) between treatment and control cases, and provided bound estimates of significance levels at given levels of hidden bias under the assumption of either systematic over- or underestimation of treatment effects. Our results suggest that matching estimations were insensitive to a hidden bias.

Appendix D. Effect of gender of head of household on positive health-care expenditure, according to matching algorithms

		Average treatment on the treated (ATT)			
	Unmatched (naïve model)	1:1 nearest neighbor	Local linear regression	Kernel	Radius
Gender of household head: Female	0.711	0.675	0.679	0.679	0.679
Gender of household head: Male	0.668	0.619	0.630	0.628	0.629
Difference ± SE	0.043 ± 0.002	0.061 ± 0.003	0.049 ± 0.004	0.051 ± 0.003	0.050 ± 0.003

Matching included caliper = 0.01, non-replacement and common support.