geriatrics

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Association of Non-Communicable Chronic Diseases and the Use of Health Services in Mexican Older Adults

María Araceli Ortiz-Rodríguez [1], Paola Adanari Ortega Ceballos [2], Claudia Rodríguez-Leana [2], Beatriz Lizbeth Rodríguez Bahena [2], Alma Janeth Moreno-Aguirre [1], Maricela Carmona González [3], Donovan Casas Patiño [3], Miguel Ángel Sánchez-Ramos [3], María Fernanda Martínez-Salazar [4], Mariana Romero-Aguilar [5], Silvia Martínez-Valverde [6], María Vanessa Aldaz Rodríguez [7] and Rafael Antonio Villa Romero [7,*]

[1] Faculty of Human Communication, Autonomous University of the State of Morelos, Morelos 62350, Mexico
[2] Faculty of Nursing, Autonomous University of the State of Morelos, Morelos 62350, Mexico
[3] Amecameca University Center, Autonomous University of the State of Mexico, Estado de México 56900, Mexico; capo730211@yahoo.es (D.C.P.)
[4] Faculty of Sport Sciences, Autonomous University of the State of Morelos, Morelos 62210, Mexico
[5] Faculty of Chemical Sciences and Engineering, Autonomous University of the State of Morelos, Morelos 62210, Mexico
[6] Center for Economic and Social Studies in Health, Children's Hospital of Mexico Federico Gómez, Ciudad de Mexico 06720, Mexico
[7] Faculty of Medicine, National Autonomous University of Mexico, Ciudad de Mexico 04360, Mexico
* Correspondence: avilla@unam.mx

Abstract

Background: Over recent decades, there has been an increase in the demand for and use of health services of Institute of Security and Social Services for State Workers (ISSSTE) as a result of chronic non-communicable diseases (NCDs). **Objective**: The aim of this study was to analyze the association between chronic non-communicable diseases (NCDs) and the use of health services in Mexican older adults. **Methods**: An analytical cross-sectional nationally representative study was carried out on Mexican older adults (≥60 years; both sexes; n = 820). Data on NCDs (medical diagnoses of diabetes, hypertension, obesity, cancer and depression) were collected, along with data on smoking, educational level, geographical area of residence, body measurements of weight, height, BMI, and information on the use of the health services of the National Health and Nutrition Survey of ISSSTE Beneficiaries (ENSADER) 2007. **Results**: The main reasons for the use of health services by older adults were good care and service, no choice/other affiliations and good health outcomes (55.6%, 13.5% and 8.2%, respectively; $p < 0.001$). The probability of using health services was higher and statistically significant in overweight older adults (OR [CI 95%]: 1.56 (1.05–2.31); $p < 0.050$), with primary education level (OR (CI 95%): 2.13 (1.36–3.33); $p < 0.001$), older adults with diabetes (OR [CI 95%]: 1.77 (1.14–2.73); $p < 0.050$), and older adults with hypertension (OR (CI 95%): 2.19 (1.55–3.09); $p < 0.001$). **Conclusions**: In older adults using health services of ISSSTE (ENSADER, 2007), there is a positive and significant association between the use of health services and the presence of diabetes, hypertension and overweight.

Keywords: health services; NCDs; ISSSTE affiliates; Mexico

Academic Editors: Phyo Kyaw Myint

Received: 15 December 2025
Revised: 22 September 2026
Accepted: 23 September 2026
Published: 23 October 2026

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1. Introduction

The Mexican health system consists of two main sectors, the public and the private [1]. The public system includes several social security institutions such as the Mexican Institute of Social Security (IMSS) and the Social Security and Services Institute for State Workers (ISSSTE) that provide services to salaried workers in the formal sector of the economy [1,2]. In addition, within the public system there are also institutions at the federal and state levels that provide services to the population without social security, such as the Ministry of Health and Welfare (SSA) [2]. Social security institutions in Mexico provide health coverage to 62.3% of the population, of which the ISSSTE covers 8.8% [1]. The use of health services includes direct contact, through medical consultations and hospitalizations, or indirect contact through preventive and diagnostic tests [3].

The ISSSTE is the institution responsible for providing health services, pensions, and social benefits to federal and state public sector workers, retirees, and their families. Its beneficiaries share distinctive characteristics derived from formal employment trajectories in the public sector, including regular salaries, labor benefits, and entitlement to contributory pensions [4]. Social security affiliation has been associated with greater access to medical care and a lower risk of catastrophic health expenditures compared to older adults without social security or those covered by non-contributory programs [5]. In addition, ISSSTE operates specialized gerontological modules and programs for older adults, representing a differentiated service offering within the Mexican health system [6]. Older adults insured by ISSSTE constitute a population with a high prevalence of chronic non-communicable diseases and guaranteed access to services, enabling the analysis of utilization patterns and the generation of evidence relevant to public policy and the improvement in social security health services.

Chronic non-communicable diseases (NCDs), including diabetes mellitus, arterial hypertension, obesity, cancer, and depression, tend to increase in prevalence with advancing age. These conditions frequently coexist, as they share common sociodemographic, economic, and health-related risk factors [7]. Among older adults (≥60 years), NCDs often occur concomitantly, thereby heightening the risk of functional decline and disability. Furthermore, NCDs impose a substantial social and economic burden on families and on the health system in middle-income countries such as Mexico [8].

Over recent decades, there has been an increase in the demand for and use of health services due to NCDs, particularly in low- and middle-income countries, due to the physical and progressive deterioration, disability, and high comorbidities and mortality [9,10]. In Mexico, the main causes of mortality reported in 2021 were: heart diseases (20.1%), COVID-19 (18.4%), and diabetes (13.9%) [11]. Obesity, diabetes mellitus and arterial hypertension occupy the eighth, tenth and eleventh places as main causes of general morbidity [12], conditions that generate a high demand for health services at various levels of care.

There is no equivalent national survey that reports on the health characteristics and healthcare utilization patterns of older adults covered by ISSSTE. This makes ENSADER 2007 a unique, nationally representative survey and an irreplaceable source of data for understanding the health of older adults who are ISSSTE beneficiaries [13].

Data from ENSADER 2007 establish a critical baseline predating structural transformations in the Mexican health system, including the creation of the Institute of Health for Wellbeing (INSABI) in 2020 and the integration of the IMSS-Bienestar program in 2023. Furthermore, these data predate the COVID-19 pandemic, which profoundly altered healthcare utilization patterns and the epidemiology of chronic diseases. Historical national surveys are highly significant, as they allow us to establish valid benchmarks for assessing trends and making comparisons to measure the impact of health reforms. The ENSADER 2007 provides previously unpublished information on older adults who are

https://doi.org/10.3390/geriatrics11060153

ISSSTE beneficiaries, and our analysis establishes a basis for assessing trends and making comparisons that allow us to understand the impact of healthcare reforms in Mexico over recent years [13].

The aim of this study was to analyze the association between chronic non-communicable diseases (NCDs) and the use of health services in Mexican older adults.

2. Materials and Methods

2.1. Design

A secondary, cross-sectional, and analytical analysis was performed on the database of the National Health and Nutrition Survey of ISSSTE Beneficiaries (ENSADER 2007), conducted in Mexico [13]. The methodology employed in the present study, as well as the characteristics of the entire study sample, has been described previously [14]. Briefly, the original sampling design was probabilistic, multistage, stratified, and cluster-based. Participant selection considered, in the first stage, the geographic location corresponding to the 35 ISSSTE delegations (regional offices); subsequently, the delegations were stratified according to their size into two categories (<3000 and ≥3000 workers and family members) and by participants' sex. The delegations constituted the primary sampling units, and the individuals selected within them constituted the final sampling units. The design showed a cluster quality indicator of 0.8 and a size ratio of 1.22.

The theoretical sample size was calculated considering 3500 workers and 1085 retirees, with a 95% confidence level, an expected proportion of 50%, a precision of 2.027%, and a design effect of 1.5. Subjects were randomly selected from the ISSSTE affiliate sampling frame and invited by letter to an interview appointment, subsequently confirmed by telephone. When a selected subject did not respond after three phone calls or refused to participate, another subject was randomly selected from the affiliate list. The same applied in cases of involuntary non-participation due to a census error. In total, 80 subjects did not participate for the reasons noted above. A second selection of subjects was subsequently carried out following the same procedure. The final sample size was 4595 individuals (adults of both sexes aged over 20 years) [14]. For this study, a subsample of 820 adults over the age of 60 was analyzed.

2.2. Sociodemographic and Lifestyle Variables

The questionnaire included the following information: gender, age, educational level, region, smoking, information on the use of health services and diagnosis of NCDs.

The age threshold of ≥60 years was selected in accordance with the Mexican Law of the Rights of Older Adults and the criteria established by the World Health Organization for developing countries, which also aligns with the sampling structure of the ENSADER 2007 [13]. The age was stratified into three categories, 60–69 years, 70–79 years and older than 80 years. The education level was stratified into the following categories: <6 years, 6 years, 7–≤9 years, 10–≤12 years and >12 years of education. The geographical distribution was categorized into four regions: (1) north (Baja California, Baja California Sur, Chihuahua, Coahuila, Nuevo León, Sinaloa, Sonora y Tamaulipas); (2) central–west (Distrito Federal, Estado de México, Hidalgo, Morelos, Puebla, Querétaro y Tlaxcala); (3) central (Aguascalientes, Colima, Durango, Guanajuato, Jalisco, Michoacán, Nayarit, San Luis Potosí y Zacatecas), and (4) south–south east (Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco, Veracruz y Yucatán).

Regarding lifestyle and physical status, smoking was obtained by self-report and was categorized as "current" for those subjects who had smoked at least 100 cigarettes during their lifetime and who are current smokers, and "ex-smoker" for those who had smoked at least 100 cigarettes during their lifetime and who no longer smoked.

Anthropometric parameters (weight and height) were obtained by trained and standardized personnel. Height was measured using a mobile stadiometer (Seca 213, Hamburg, Germany), with an accuracy of 0.5 cm, with the subject's head in the Frankfurt plane. Body weight was determined to the nearest 100 g using a digital scale (Seca 354, Hamburg, Germany), with the subjects in an upright position, wearing light clothing. Height and body weight were measured in duplicate, and the average of each variable was used for calculations and analysis. Body mass index (BMI) was calculated as body weight (kg) divided by height squared (m). The World Health Organization (WHO) categories [15] used were normal (BMI = 18.5–24.9), overweight (BMI = 25–29.9), and obesity (BMI ≥30).

2.3. Chronic Non-Communicable Diseases (NCDs)

NCDs were defined as long-duration conditions that are not transmitted from person to person, resulting from a combination of genetic, physiological, environmental, and behavioral factors, and require ongoing medical management [16]. For this study, five NCDs were included based on their high prevalence among older adults in Mexico and their documented association with increased use of health services: diabetes mellitus, arterial hypertension, obesity, cancer (any type), and depression. Each condition was ascertained through self-reported medical diagnosis (i.e., participants reported having been previously told by a physician that they had the condition) and categorized dichotomously (yes/no), according to the original classification established by ENSADER 2007 [13].

2.4. Use of Health Services

The use of health services was defined as the self-reported utilization of any medical care provided by ISSSTE, including outpatient consultations, hospitalizations, and preventive or diagnostic services, during the 12 months prior to the survey. This variable was operationalized as a dichotomous outcome (yes/no) based on the question "Do you use the health services of the ISSSTE?", according to the original classification established by ENSADER 2007 [13].

The frequency of use of health services was obtained through a multiple-choice question with five response categories: (a) always, (b) usually, (c) sometimes, (d) rarely, and (e) never. The main reasons for using health services were classified as follows: good care and service, cheap, well-trained staff, experienced staff, treated well, medicine, material and equipment are sufficient/clean or of good quality, good health results/cured/health improvements, no money, no other option/other affiliation, and does not know/does not answer. For these variables, the categorization used was that established by the ENSADER 2007 [13].

2.5. Statistical Analysis

The analysis was conducted with the support of the specialized software SPSS v.20.0. Prevalence with 95% confidence intervals (95% CIs) are expressed in terms of percentages. Significant differences in prevalence were calculated using the $\chi 2$ test. Univariate analysis (logistic regression analysis considering the effect of one explanatory variable) and multivariate analyzes (multiple logistic regressions considering the simultaneous effect of each explanatory variable adjusted for age and sex) were performed, which were used to evaluate the association between NCDs and sociodemographic variables (independent variables), and the use of health services (dependent variable). It was considered significant when p was <0.05, while values of $p < 0.001$ were used to indicate highly significant association.

2.6. Ethical Aspects

All participants signed an informed consent. The protocol was approved on 25 June 2007 by the Research, Ethics and Biosafety Committee of the National Institute of Public Health, Cuernavaca, Morelos, Mexico (ref. 613-CI-210-2007).

3. Results

3.1. Frequency of Health Service Utilization

Regarding the study participants who indicated use of health services, 56.6% were women; the highest percentage (65.9%) belonged to the 60–69 age group, while 32.4% were from the central–west region; a total of 35.9% reported having a university education, and 67.4% mentioned that they had never smoked (Table 1).

Table 1 shows significant differences in the frequency of use of health services; the highest prevalence was observed in the "usually" category, with 36.4% ($p < 0.001$). The main reasons for using health services were: good care and service, no choice/other affiliation, and good health outcomes (55.6%, 13.5%, and 8.2%, respectively; $p < 0.001$).

The prevalence of hypertension was 49.7% in users of health services compared to 30.6% in non-users ($p < 0.000$). The prevalence of diabetes was 24.1% in users compared to 14.8% in non-users ($p = 0.002$). The prevalence of obesity was 19.3% in users compared to 12.5% in non-users ($p = 0.015$). The prevalence of depression was 19.3% in users compared to 13.6% in non-users ($p = 0.044$). The prevalence of cancer was 3.8% in users compared to 1.9% in non-users ($p = 0.146$).

Table 1. Use of healthcare services according to participants' sociodemographic characteristics, frequency of healthcare service utilization, and presence of NCDs.

		Use of Health Services		
	Total (n = 820)	**No (n = 265)**	**Yes (n = 555)**	***p*-Value ***
Sex	%	%	%	
Men	44.8	47.5	43.4	0.267
Women	55.2	52.5	56.6	
Age groups				
60–69 years	68.2	72.8	65.9	
70–79 years	24.9	22.3	26.1	0.096
≥80 years	7.0	4.9	7.9	
Region of residence (%)				
Central–west	32.9	34.0	32.4	
Central	27.5	21.1	27.9	0.208
North	21.1	23.0	20.2	
South–south east	20.2	21.9	19.5	
Education level (%)				
Primary school	24.3	17.9	27.4	
High school	20.9	22.3	20.2	0.022
Preparation for university	16.2	15.5	16.5	
University	38.6	44.2	35.9	
Smoking				
Current smoker	8.8	10.2	8.1	
Ex-smoker	24.6	24.9	24.5	0.588
Never smoked	66.6	64.9	67.4	
Frequency of health services use				
Always	19.88	-	29.2	<0.001

Usually	24.6	-	36.4	
Sometimes	23.3	-	34.4	
Rarely	24.4	75.5	-	
Never	7.9	24.5	-	
Reasons for using health services				
Good attention and service	55.6	-	34.4	<0.001
Cheap	1.2	-	1.8	
The staff is well-trained	4.1	-	6.1	
The staff are experienced	1.5	-	2.2	
They were treated well	6.5	-	9.5	
Medication, material and equipment are sufficient/clean or of good quality	6.2	-	9.2	
Good health results/cured/health improvements	8.2	-	12.1	
No money	1.3	-	2.0	
No other choice/other affiliation	13.5	-	20.0	
Do not know/no answer	1.9	-	2.6	
Non Communicable Diseases				
Hypertension				
No	56.5	69.4	50.3	<0.001
Yes	43.5	30.6	49.7	
Diabetes				
No	78.9	85.2	75.9	0.002
Yes	21.1	14.8	24.1	
Obesity				
No	82.9	87.5	80.7	0.015
Yes	17.1	12.5	19.3	
Depression				
No	82.6	86.4	80.7	0.044
Yes	17.4	13.6	19.3	
Cancer				
No	96.8	98.1	96.2	0.146
Yes	3.2	1.9	3.8	

* The *p*-values for "yes" and "no" were obtained by χ^2 test.

3.2. Association Between Healthcare Services Utilization and Sociodemographic Characteristics and NCDs in Older Adults

In a multivariable logistic regression analysis, the variables showing the strongest associations with healthcare utilization among older adults were overweight (adjusted OR: 1.56; 95% CI: 1.05–2.31; $p < 0.050$), primary education (adjusted OR: 2.13; 95% CI: 1.36–3.33; $p < 0.001$), diabetes (adjusted OR: 1.77; 95% CI: 1.14–2.73; $p < 0.050$), and hypertension (adjusted OR: 2.19; 95% CI: 1.55–3.09; $p < 0.001$) (Table 2).

Table 2. Healthcare services utilization in older Mexican adults by sociodemographic characteristics and NCDs (adjusted OR).

Healthcare Services Utilization		
	OR * (95%CI)	*p*-value
Sociodemographic Characteristics		
Sex		
Men	1.07 (0.74–1.55)	0.694
Women	1.00 (ref.)	
Age groups		
60–69 years	0.89 (0.24–3.23)	0.862
70–79 years	0.92 (0.36–2.35)	0.874
≥80 years	1.00 (ref.)	
Body mass index (BMI)		
Normal weight	1.45 (0.90–2.35)	0.123
Overweight	1.56 (1.05–2.31)	0.025
Obesity	1.00 (ref.)	
Education level		
Primary	2.13 (1.36–3.33)	0.001
High school	1.18 (0.76–1.82)	0.457
Preparation for university	1.29 (0.80–2.07)	0.281
University	1.00 (ref.)	
Smoking		
Current smoker	0.81 (0.44–1.47)	0.497
Ex-smoker	0.98 (0.65–1.46)	0.932
Never smoked	1.00 (ref.)	
Region of residence		
Central–west	0.91 (0.57–1.44)	0.698
Central	1.33 (0.82–2.17)	0.239
North	0.94 (0.57–1.52)	0.802
South–south east	1.00 (ref.)	
Chronic Non-Communicable Diseases		
Diabetes		
Yes	1.77 (1.14–2.73)	0.010
No	1.00 (ref.)	
Obesity		
Yes	1.37 (0.85–2.22)	0.194
No	1.00 (ref.)	
Hypertension		
Yes	2.19 (1.55–3.09)	<0.001
No	1.00 (ref.)	
Depression		
Yes	1.36 (0.86–2.15)	0.178
No	1.00 (ref.)	
Cancer		
Yes	1.80 (0.63–5.13)	0.271
No	1.00 (ref.)	

Univariate analysis (logistic regression analysis considering the effect of one explanatory variable) and multivariate analyses (multiple logistic regressions considering the simultaneous effect of each explanatory variable adjusted for age and sex) were performed, which were used to evaluate the

association between the use of health services (dependent variable) and NCD and sociodemographic variables (independent variables).

4. Discussion

Our research demonstrates a significant and positive association between the use of health services and the presence of diseases such as diabetes, hypertension, and overweight in older adults in Mexico. These findings align with those reported by other studies [9,17–21]. Scientific evidence indicates that the population that suffers from NCDs and that has some medical insurance uses more medical care services [22,23]. The most extensive use of medical consultation could be explained by the intensification of the symptoms of a chronic disease, the beginning of new acute processes that require medical attention, and planned check-ups [9].

It is essential to emphasize that diabetes, hypertension and overweight are chronic, progressive and medically complex conditions, and the functional deterioration that older adults present is aggravated when they suffer from more than one chronic disease, and this situation translates into a higher demand and use of healthcare services [24–26]. Furthermore, NCDs can lead to disability or leave residual sequelae, due to the absence of effective control programs. Notably, many of these diseases are preventable, but when they occur, they require prolonged, continuous care, where the care is expensive and highly complex [14].

The use of health services to control NCDs is highly important, particularly for low- and middle-income countries given their high prevalence and economic and social costs they represent, both for the health system and for families [22,23,27]. It is an indubitable fact that the consequences on the health status of older adults are largely dependent on socioeconomic status, lifestyle, nutritional status, physical activity, tobacco and alcohol consumption, self-care habits, and the use and access to health services.

A study of 420 older Mexican adults informed that women utilized health services more than men [3]. Evidence from 27 European countries also indicates that women use healthcare services more frequently than men, particularly outpatient and preventive services [23]. This greater utilization of preventive and outpatient care may contribute to differences in the detection and management of health conditions between women and men. This could be due to different factors, for example, higher symptom identification, biological differences, higher disease perception, and cultural aspects. In our study population, we also observed higher utilization among women, consistent with other reports that attribute these trends to increased symptom identification and a more proactive orientation toward preventive healthcare [23,27].

Another demographic factor of interest identified in this work was the level of education. The results of the association analysis indicate that older adults with a low educational level are more likely to use health services. This observation is similar with results reported in other studies [26,27].

A comparative study of four cohorts with participants aged 50 and over from aging surveys conducted in China, the United States, South Korea, and Europe found that the population segment using the most services is the ones with the lowest level of education [21]. In this sense, multiple authors have stated that people from the lower social class and with less education were associated with a higher use of health services [20,28–30].

For older adults, it might be convenient to have more and better information about diabetes, hypertension and obesity so that they can have better self-care of their health. Inadequate health-risk perception, harmful habits and low use of health services have been associated with poor health outcomes, culminating in adverse health outcomes

[20,29,30]. Given the significant economic and social costs these diseases impose on families and the ISSSTE system, it is essential to improve patients' risk perception and self-management knowledge.

For health service personnel, this necessitates improved strategic planning to facilitate effective intervention, as well as the incorporation of interprofessional care teams to support actions of prevention, promotion, detection, diagnosis, treatment and control of NCDs [22,29,30].

4.1. Strengths

The association between the use of health services and chronic non-communicable diseases (NCDs) in older Mexican adults who are beneficiaries of the ISSSTE (Institute for Social Security and Services for State Workers) has been described for the first time. Another strength is that the validated method and questionnaires have been used in the Mexican population, since they were created, validated and applied by the National Health and Nutrition Survey (ENSANUT). The present study was based on data from Mexican adults in the 32 states of the country, using a complex, multistage probabilistic sampling design, which gave this study a good representativeness; its findings can be considered convincing.

4.2. Limitations

However, several limitations should be considered. First, cross-sectional design limits the ability to address causal relationships between the use of health services and NCDs. Second, the prevalence of NCDs was based on a single medical assessment, which can lead to minor inaccuracies. The main limitation of this study was its use of the 2007 Health and Nutrition Survey of ISSSTE Beneficiaries (ENSADER) database. Given that more than a decade has passed since data collection, changes may have occurred in socioeconomic conditions, health policies, healthcare utilization patterns, and the epidemiology of chronic diseases in Mexico. However, this information is valuable because few national surveys have been conducted with the elderly population covered by ISSSTE. Therefore, our results could be useful for future comparisons with most recent data. Other limitations of this study included a lack of information on which services were used, the reasons for consultation, and the frequency of use of health services (number per person per month/year). It would have been desirable to know the exact number of consultations that users requested to stabilize the severity of their chronic degenerative diseases. Finally, there was selection bias because the study was conducted in ISSSTE hospitals, and the ISSSTE-affiliated population using health services was predominantly female; consequently, this explains why there were more women than men in the sample size.

5. Conclusions

In this study, we identified that among NCDs, diabetes and hypertension in particular were the most important predictors of health service utilization. More studies with representative samples of all health services in Mexico are needed to analyze the determinants of the use of and access to health services in older adults with chronic diseases. It is essential to establish strategies aimed at ensuring early follow-up of hypertension and diabetes, mainly because these conditions are the strongest drivers of service use.

Author Contributions: Conceptualization, M.A.O.-R., M.R.-A., M.V.A.R. and R.A.V.R.; methodology, M.A.O.-R., C.R.-L., B.L.R.B., A.J.M.-A., M.F.M.-S., M.R.-A., S.M.-V. and R.A.V.R.; validation, P.A.O.C., C.R.-L., B.L.R.B., A.J.M.-A., D.C.P., M.Á.S.-R. and S.M.-V.; formal analysis, M.C.G., M.F.M.-S. and S.M.-V.; investigation, M.A.O.-R., M.C.G., D.C.P., M.Á.S.-R., M.F.M.-S. and R.A.V.R.; data curation, M.A.O.-R., M.C.G., M.F.M.-S., S.M.-V. and R.A.V.R.; writing—original draft, M.A.O.-

R., P.A.O.C., D.C.P., M.Á.S.-R., M.R.-A., M.V.A.R. and R.A.V.R.; writing—review and editing, M.A.O.-R., M.C.G., M.R.-A. and R.A.V.R.; visualization, M.V.A.R.; supervision, P.A.O.C., C.R.-L., B.L.R.B., A.J.M.-A., D.C.P., M.Á.S.-R., M.V.A.R. and R.A.V.R.; project administration, P.A.O.C., C.R.-L., B.L.R.B., A.J.M.-A. and M.V.A.R. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the guidelines of the Declaration of Helsinki and the protocol was approved on 25 June 2007 by the Research, Ethics and Biosafety Committee of the National Institute of Public Health, Cuernavaca, Morelos, Mexico (ref. 613-CI-210-2007).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The original contributions presented in this study are included in the article. Further inquiries can be directed to the corresponding author.

Acknowledgments: The ChatGPT tool (GPT-5.6 Luna, a version from the ChatGPT GPT-5.6 family) was used to create the graphical abstract of the article.

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

ISSSTE	Institute of Security and Social Services for State Workers
NCDs	Chronic non-communicable diseases
ENSADER	National Health and Nutrition Survey of ISSSTE Beneficiaries
IMSS	Mexican Institute of Social Security
INSABI	Institute for Health for Wellbeing
SSA	Ministry of Health and Welfare
WHO	World Health Organization

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