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Reconstructing household financial well-being; The case of Mexican households

Reconstruyendo el bienestar financiero de los hogares; el caso de los hogares mexicanos

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Abstract

Through the application of Bayesian Network methodology, this study delves into household financial well-being in Mexico over the 2018 – 2022 period. The foundational scenario involved vital variables such as poverty-induced vulnerability, household type, education of the household head, financial education, income source (i.e., formal or informal sector employment), financial asset management, and savings as the main variables influencing household financial well-being. Subsequently, each variable was extrapolated to measure its impact on the focal point of interest. Results show that income from informal sector employment, education of the household head, financial education, and savings emerge as statistically significant factors exerting the greatest influence on household financial well-being. Economic policy recommendations to address these influential factors are discussed.

JEL Code: C11, D31, R20, P32
Keywords: bayesian analysis; income and wealth; households; financial behavior; financial inclusion

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Resumen

Por medio de la metodología de Redes Bayesianas, este estudio profundiza en el bienestar financiero de los hogares en México durante el periodo 2018 – 2022. El escenario base considera las variables como: la vulnerabilidad inducida por la pobreza, el tipo de hogar, el nivel de educación del jefe de familia, la educación financiera, la fuente de ingresos (es decir, el empleo en el sector formal o informal), la gestión de activos financieros y el ahorro como las principales variables que influyen en las finanzas del hogar. Posteriormente, se extrapoló cada variable para medir su impacto en el foco de interés. Los resultados muestran que los ingresos provenientes del empleo en el sector informal, el nivel de educación del jefe de familia, la educación financiera y el ahorro emergen como factores estadísticamente significativos que ejercen la mayor influencia en el bienestar financiero del hogar. Se proponen recomendaciones de política económica para abordar estos factores influyentes.

Código JEL: C11, D31, R20, P32
Palabras clave: análisis bayesiano; ingreso; bienestar; bienestar del hogar; coportamiento financiero e inclusion financiera

Introduction

Households are one of the least disaggregated economic agents, comprised of one or more individuals, irrespective of their relationship, who share a typical residence and collectively manage shared expenses. Members recognize either a man or a woman as head of household or household leader, while domestic workers or relatives are not considered part of a household. This economic unit is the base of the economy and constitutes the smallest entity on the demand side of the market. Household management, which refers to normative and positive approaches to how households achieve their objectives throughout the market, has become an important line of study (Gogolin et al., 2017).

It has been established that, in terms of proper management, households should have a long-term plan considering financing, liquidity, and economic restrictions (Brown & Taylor, 2013). However, some make decisions that cannot be reconciled with this advice or a standard model. For example, individuals may avoid seeking professional advice due to a lack of trust (Moya-Ponce & Madrazo-Lemaroy, 2023).

Household financial behavior is difficult to quantify due to its wide range of circumstances and real-world constraints. Thus, models often fail to capture these complexities and limitations, mainly when using financial instruments (Campbell, 2006). Therefore, the theoretical framework for studying household financial well-being stands for two main possibilities: The first is based on rational decision-making that maximizes the benefit, which we call traditional finance. The second one is based on behavioral finance, which reflects people not making decisions optimally or rationally, not having enough data, nor considering biases and preferences of who decides (Georgarakos, 2014).

The gap between these two methodologies is still wide and hard to reconcile. Consequently, this research analyzes Mexican households through the behavioral finance approach using Bayesian networks. This analysis operates under the assumption that heads of households may not consistently make optimal or rational decisions despite having access to financial information. The objective is to analyze the financial well-being of Mexican households by using information from 2018 and 2022, having data for the pre-pandemic period as well as during and after the pandemic. Moreover, we included two household financial well-being factors not considered in frameworks and studies conducted in developed economies (e.g., Brüggen et al., 2017; Roll et al., 2021; Korankye & Pearson, 2023): poverty-induced vulnerability and income source. The former is a multidimensional poverty measure, and the latter indicates whether income comes from formal or informal sector employment. Both are significant factors for a country like Mexico. We assessed household financial well-being and how easily these economic entities can access essential goods and services. Improved consumption levels often serve as a clear indicator of financial well-being.

In this study, two variables that could be relevant were not considered: the effect of accumulated inflation, as well as the increase in minimum salaries (MS) and professional minimum salaries (PMS). In some way, as we will see in a brief analysis, the inflationary effect measured through the National Consumer Price Index (INPC) may have been compensated and even surpassed by the increase in minimum and professional minimum salaries: this can be shown in Table 1, where it can be seen that the increase in the MS was more than 3.4 times the increase in inflation. In the case of the average of minimum professional salaries, this value was just over 2.6 times.

Table 1
Percentage variation of minimum and professional salaries vs. inflation

Professional minimum salaries average 2018	$ 113.57	
Professional minimum salaries average 2022	$ 197.10	
% variation in professional minimum salaries average	73.54%	
Minimum salary 2018	$ 88.36	
Minimum salary 2022*	$ 172.87	% var MS/% var INPC
% variation in minimum salary	95.64%	341.33%
* It does not consider the northern part of the country		% var PMS/% var INPC
		262.46%
INPC Jan-18**	98.795	
INPC Dec-22**	126.478	
% variation in INPC	28.02%	
** Base 2nd Q 2018		

Sources: Own elaboration with data from: https://www.gob.mx/conasami/documentos/tabla-de-salarios-minimos-generales-y-profesionales-por-areas-geograficas and https://idconline.mx/fiscal-contable/indicadores/inpc-base-2q-julio-2018-100

However, given that in parallel with the wage increase, there was an increase in the percentage of the salaried population earning one, or more than one and up to two minimum wages, as can be seen in table 2, which implies in real terms a decrease in the percentage of salaried workers with incomes higher than two minimum wages, since they went from 55.42% to 35.41%. These effects in themselves require a more in-depth study to comprehensively consider their impact on improving family well-being, which is beyond the scope of this work. Table 2 shows the percentage variation of salaried workers who received 1, 1 to 2, and up to 2 minimum salaries.

Table 2
Percentage variation of salaried workers

Date	% of salaried with 1 MS	% of salaried with more than 1 up to 2 MS	% of salaried up to 2 MS
Jan-2018	16.25%	28.33%	44.58%
Dec-2022	30.70%	33.89%	64.59%
	% var S_1 MS	% var S_1-2 MS	% var S_Up to 2 MS
	88.92%	19.61%	44.88%

Sources: Own elaboration with data from: https://www.inegi.org.mx/app/tabulados/default.html?nc=602

This study contributes to the literature by exploring to which degree household financial well-being is influenced by poverty-induced vulnerability, income source, savings capacity, educational background of the family head, financial education, effective financial asset management, and household type. Additionally, the study fills a gap in the literature by including two factors relevant to developing countries: poverty-induced vulnerability and income source. The combination of these factors results in a heightened probability of a household being financially healthy, with income from informal sector employment, education of the household head, financial education, and savings as the most significant factors. The resulting probabilities in the model reflect both direct and indirect impacts of the determinants on the purchasing power of goods and services.

The present work is structured as follows: Section 2 provides an overview of Mexican households' demographic, social, and economic situation; Section 3 delineates the methodology of Bayesian Networks as an analytical tool. In Section 4, a model is constructed to capture the influences on household financial well-being based on a set of variables, including sources of income, financial education, and savings. Various scenarios are explored through the extrapolation of these variables. Section 5 delves into the analysis of results to understand their impact on household financial well-being, which can support the development of both public and private policies, along with programs aimed at enhancing the well-being of the most vulnerable sectors of the population. Section 6 engages in a comprehensive discussion of the results, and finally, Section 7 presents the conclusions and limitations of the study.

Mexican households

Demography

According to the National Institute of Statistics and Geography (INEGI by its acronym in Spanish), the total population grew by 0.8% from 2018 to 2022, and the economically active population witnessed an increase of 3.78% over the same period. Notably, the gender composition remained unchanged in terms of variation. Table 3 provides a breakdown of the total population composition in Mexico.

Table 3
Total population composition in Mexico

	2018	2020	2022
Total population	123.836 millions	126.014 millions	128.890 millions
Women	51.4%	51.2%	52.1%
Men	48.6%	48.8%	47.9%
Households	34.40 millions	35.7 millions	37.6 millions
Average number of members per household	3.60	3.55	3.43
Household members aged 15 and above, economically active (average)	1.75	1.73	1.71

Source: Own elaboration with data from ENIGH 2018, ENIGH 2020 and ENIGH 2022.

When examining the total number of households, a difference between 2018 and 2022 indicates a 9.3% increase. Conversely, the average number of members per household experienced a decrease of 4.72% during the same period. Regarding household composition, approximately 2.38 members earned some income in 2018, but this number declined to 2.25 in 2020 and 2022. These shifts directly affect unemployment rates and the average household income, as ENIGH (2022) observed.

Household type

In Mexico, the National Survey of Household Income and Expenses (ENIGH) classifies households into three types: nuclear, comprising couples or a single parent with or without children; extended, consisting of couples or a single parent with or without children plus other relatives; and composites, where, in addition to the members of the extended household, there are individuals who are not related to the head of the household (ENIGH, 2018). On average, approximately 71% of households fall into the nuclear category.

Poverty-induced vulnerability

The National Council for the Evaluation of Social Development Policy (CONEVAL) measures poverty with a multidimensional approach, incorporating both income levels and social deprivation indicators. Income level is whether an individual's or household's income is sufficient to cover basic food needs (extreme poverty) or basic food needs plus non-food needs (moderate poverty). Social deprivation encompasses educational gap, access to health services, social security, quality and housing spaces, essential housing services, and access to food. A person is considered to be in poverty if they have an income below the welfare line and experience at least one social deprivation. A person is considered in extreme poverty if their income is below the extreme poverty line and they suffer from three or more social deprivations. A vulnerable population refers to individuals or households at risk of experiencing social deprivation or either moderate or extreme poverty.

The economic crisis in Mexico, stemming from the pandemic, led to a contraction of the middle class and a deepening of poverty. In the year 2020, households within the middle class decreased by 9.2%, while extreme poverty households increased by 5.9%. Given that the primary source of income for Mexican households is employment, the loss of a job significantly destabilizes household finances. The Global pandemic inflicted a severe impact on poverty levels in Mexico.

In the first half of April 2020, it is estimated that between 5.2 and 8.1 million people lost their jobs in Mexico. Government-imposed sanitary measures, which included the closure of businesses and companies, hindered these individuals from securing employment. Approximately 37.7% of households in Mexico experienced at least one member losing their source of income, and another 30.1% estimated a high likelihood of a household facing unemployment (CEEY, 2020).

In 2018, Mexico recorded 51.9 million people (41.9%) living in poverty, with 8.7 million individuals (7%) classified as in extreme poverty (CONEVAL, 2019). By 2020, these figures rose to 55.7 million (43.9 %) and 10.8 million (8.52%), respectively; this indicates that at the onset of the pandemic, the Mexican population in poverty increased by 2% compared to 2018, and people in extreme poverty experienced a 1.5% rise (CONEVAL, 2022). For 2022, 46.8 million people (36.3%) were reported to be in poverty, and 9.1 million (7.1%) were in extreme poverty. Despite a decrease of 9.8% in the number of people in poverty, there is an increase of 4.6% for the population living in extreme poverty for 2018-2022. Figure 1 shows the levels of poverty in Mexico from 2018 to 2022.

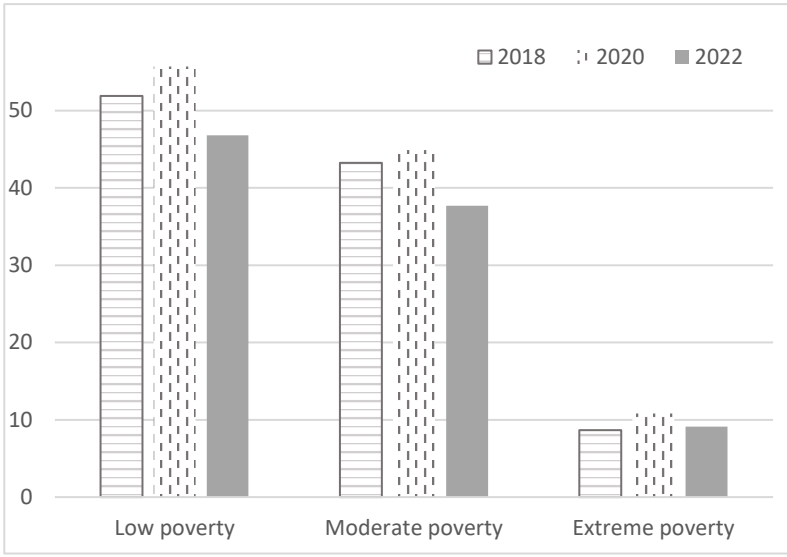

Figure 1. Level of Poverty.
Source: Own elaboration with data from CONEVAL, 2022.

The vulnerable population, characterized without any discernible social deprivation but with an income falling below the poverty line, saw an increase of 1.3 million people from 2018 to 2020. However, this number decreased to 1.9 million individuals from 2020 to 2022, reverting to the same levels observed in 2018; this suggests that, while they can secure the basic basket of goods and services with their income, they lack essential elements such as social security, access to health services (whether public or private), basic amenities, quality housing, and nutritious food, and suffer from an educational gap.

In 2020, Mexico had 30 million vulnerable individuals due to social deprivation, comprising 24% of the total population. By 2022, this number increased to 37.9 million, representing 29.4% of the population (an increase of 26.33% in just two years). While not classified as impoverished due to their income surpassing the welfare line, these individuals confront social deficiencies that impede exercising their rights (IMCO, 2022).

In 2018, 14% of the population experienced income levels below the extreme poverty line, while 49.9% had income below the general poverty line; considering 2020, there was a 3.2% increase in the percentage of the population falling below the extreme poverty line and a 2.9% rise in the population facing poverty in general. In 2022, 12.1% of the population experienced income levels below the extreme poverty line, while 43.5% fell below the income poverty line (CONEVAL, 2022). Notably, between 2018 and 2022, the number of individuals living below the extreme poverty line decreased by 1.8 million, increasing the population's economic well-being. In 2022, 84.7 million individuals contended with at least

one form of social deprivation, almost identical to the count in 2018. The most significant aspect of social deprivation among Mexicans is lack of access to social security, standing at 50.2% (CONEVAL, 2022), while the least prevalent is lack of quality and space at home, with 9.1%. Figure 2 shows levels of social deprivation during the 2018 to 2022 period.

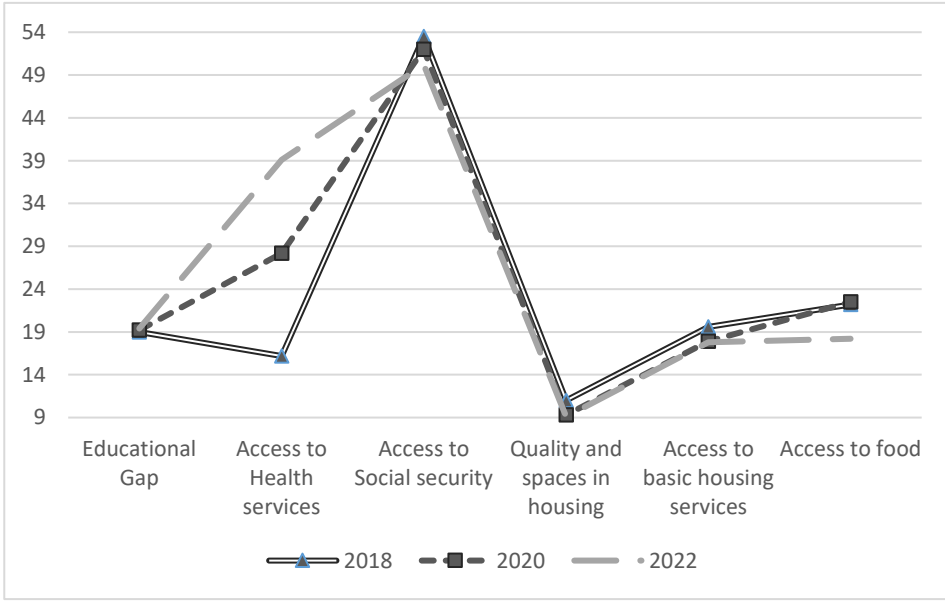

Figure 2. Social deprivation.
Source: Own elaboration with data from CONEVAL 2022.

The most severely impacted aspect is the lack of access to health, with an increase of 141% by 2022 compared to 2018. At the onset of the pandemic, over 35 million individuals reported a lack of access to health services in public or private institutions. Although there were increases in educational gap and access to food, compared to 2018, both remained below 1.3%. Conversely, the other three facets of social deprivations -i.e., Access to Social Security, Access to Basic Housing Spaces, and Quality and Spaces in Housing, saw a decline, with the last category showing the most substantial decrease at 15.5%.

During 2018-2022, there was a notable 3.4% increase in the proportion of the population characterized as neither poor nor vulnerable; this indicates the percentage of individuals who managed to enhance their socioeconomic conditions despite the challenges posed by the pandemic. However, in light of job losses, diminished household income, rising current expenditures, and the worsening of poverty among the population, coupled with the pandemic's prevailing vulnerability and economic repercussions, the imperative for robust social programs becomes evident. Specifically, targeting the lowest deciles of

the population becomes paramount, facilitating the provision of financial education, access to credit, and other enhancements in household finances. Such measures provide a tangible opportunity to enhance household living conditions.

Education and income source

In 2018, individuals who completed primary school had an average quarterly income of 8,527 pesos. This figure saw a 22% rise from 2018 to 2020, followed by a 30% increase from 2020 to 2022, resulting in an overall surge of 58.5% during the analysis period. Conversely, those with postgraduate studies earned 86,880 pesos in 2018, experiencing a decline of 21.3% in 2020. Nevertheless, a subsequent 31.7% increase from 202 to 2022 led to a modest overall increase of 3.6% during the analysis period. Notably, the gender-based income gap ranged from 44% to 88%, consistently favoring men (ENIGH 2022).

Statistics show that most of Mexico's economically active population engages in the informal sector; this situation encompasses individuals employed in economically exposed positions due to the nature of their work or those whose employment relationship or dependency is not officially recognized by their employer. In 2018, 54% of the population derived their income from an informal source of employment. While there was a 4% decrease in 2020, it rebounded 55% in 2022, as indicated by ENOE (2019, 2021). It is important to note that earnings from the informal sector lack statistical reliability. Additionally, a positive correlation exists between informality and the population's poverty condition (IMCO, 2022).

According to the ENIGH, total quarterly income per household comprises two main components: (1) current income, which includes all cash and in-kind earnings received by household members, and (2) financial and capital receipts, encompassing investment withdrawals, savings, dividends, and loans received from external sources. In 2018 and 2020, current income constituted 93.5% of the total income, with a slight 94.6% increase in 2022.

The primary income source for households is derived from employment. In 2018, it constituted 67.3% of the total household income, which decreased to 63.8% by 2020 and rose to 65.7% by 2022. The average household income from employment was $40,997in 2018, declining to $36,612 two years later and increasing to $ 41,860 in 2022. (ENIGH, 2022)

Between 2018 and 2020, the average income for Mexico's nine highest income deciles experienced a decline, rising from 2.7% to 9.2%. In contrast, the lowest income decile showed a 1.34% increase from 2020 to 2022. Notably, there is a recovery in average income across all deciles in the same 2020-2022 period. When comparing 2018 to 2022, only the highest income decile saw a decrease of

2.15%, while the first nine deciles showed percentage increases in the analysis period, the first decile showing the highest at almost 20% (ENIGH, 2022)

In 2018, 46.7% of households in Mexico were categorized as middle class. This classification implies having a computer and internet at home, spending less than 35% of their income on food, having at least one formal wage earner in the private sector, being a head of the family with at least a high school education, as well as owning a house or financing if through family sources or some form of credit. Conversely, 52% of households are classified as lower class, while only 1.3% belong to the upper class.

Expense

Household spending refers to the funds disbursed to meet needs and fulfill obligations. In Mexico, quarterly household expenditure increased by 7.8%, going from 47,205 pesos in 2018 to 50,896 in 2022 (INEGI, 2022). The current quarterly monetary expense[1] was 31,913 pesos per household in 2018 and 39,965 pesos in 2022, both on average. Regarding quarterly non-monetary expenses, households expended 8,673 pesos in 2018, while they spent 10,931 in 2022; the rest corresponds to financial and capital expenditures[2].

Regarding monetary current expenditure, the category in which Mexican households spent the most during the 2018-2022 period was Food, Beverages, and Tobacco, representing 35.2% in 2018 and 37.7% in 2022. The category with the least expenditure in 2018 was health (2.6%), and in 2022, it was Expense Transfer, i.e., financial assistance to family and friends, at 2.8%. The categories that showed the most variation during the analyzed period are health, with an increase of 30.84%; Education and Recreation, with a decrease of 17.31%; and Clothing and Footwear, with 13.17%. Figure 3 reveals the reallocation of spending resulting from the health emergency caused by the pandemic and the subsequent closure of schools and businesses, as well as the shift to remote work, to the extent that, from 2020 to 2022, the categories that experienced the highest increase were Education and Recreation with 49.7%, Clothing, and Footwear with 49.6%, while spending on health decreased by 6.8%.

[1] Income allocated during the referenced period, for the acquisition of products and services for final and private consumption, the expenditure made in money, or for the purchase of products and/or services that were paid, donated and/or given as a current transfer to persons or institutions outside the household.

[2] Those transactions aimed at the purchase of movable and immovable property, valuable objects, physical assets, which modify the home's assets. They include total concepts such as quota paid for own housing; Services and materials for home repair, maintenance and/or expansion; Deposits in savings accounts, batches, savings accounts; etc.

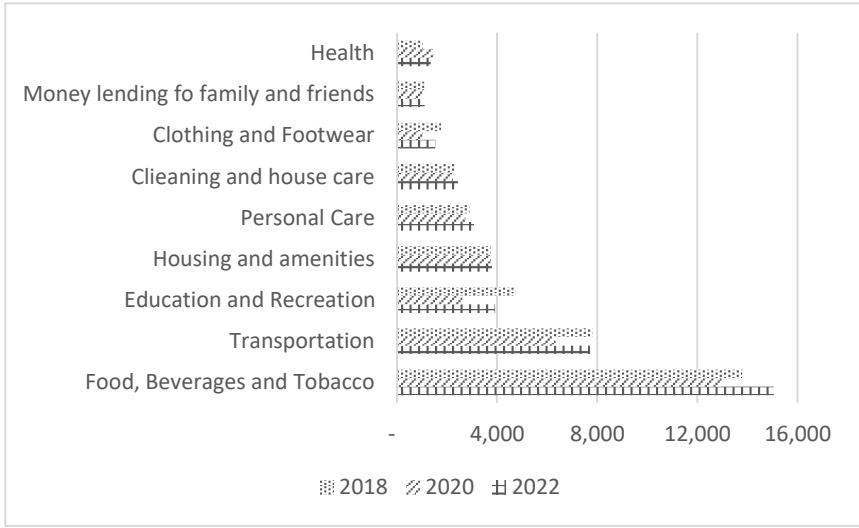

Figure 3. Current monetary expenditure.
Source: Own elaboration with data from ENIGH 2018 and ENIGH 2022.

Financial education and savings

Financial education refers to how competent individuals understand financial information to make informed decisions regarding savings, investments, borrowing, and other matters affecting their economic well-being (Lusardi & Mitchell, 2014). Empirical evidence suggests most individuals around the world are unable to perform simple calculations involving basic numeracy, interest compounding, and time value of money, as well as showing low levels of awareness of the benefits of diversification (e.g., Atkinson and Messy, 2012; Klapper et al., 2015). Low-income groups, older people, and women show lower levels of financial literacy (Roa & Villegas, 2022).

In the case of Mexico, empirical evidence suggests that only one in three Mexican adults are financially literate (Klapper et al., 2015). A study from OCDE (2017) reports similar results for Mexico, with 32% of the women answering at least five out of seven questions correctly, compared to 47% of the men. When self-assessing their financial knowledge, only 2% of Mexicans assessed it as Very high, 4% as Quite high, 40% as Above average, 39% as Quite low, and 15% as Very low (OCDE, 2017). Therefore, it is unsurprising that only 22% of Mexicans use a budget, 43% make ends meet, and 65% would rather spend than save (ENAI, 2021).

Regarding savings, according to Global Findex (2022), 49% of adults are active savers, but only 31% do so at formal financial institutions. Receiving payment into an account (e.g., domestic remittances,

wages, government transfers, or pensions), education, being a male, and living in a high-income economy increases the probability of saving (Atkinson & Messy, 2012; Global Index, 2022). In the case of Mexico, according to the ENAI (2021), 49% of Mexicans are formal savers, of which 39% came from receiving payment into an account. These results are consistent with other studies regarding Mexico (e.g., Roa and Villegas, 2022; OCDE, 2017).

Bayesian network methodology

Two methodologies exist for analyzing information on a phenomenon. One method uses estimators that use statistical data as the primary input, such as regressions and probabilistic estimates. The other method is simulation, employing techniques that operate in the total or partial absence of statistical information, such as Bayesian networks, a technique chosen for this research given the lack of statistical information on some of the variables analyzed. Bayesian networks allow reasoning to be proposed under uncertainty and combine the advantages of intuitive visual representation with a mathematical basis of Bayesian probability. In this way, it is possible to articulate dependencies between different variables and systematically propagate the impact of the evidence on the probabilities of uncertain outcomes.

They allow the combination of the statistical data available with the qualitative data of experts in a way that reflects the underlying causal structure of the same process; it is easy to understand and communicate to decision-makers. In contrast, the central debate in using Bayesian networks is the methodological bias that entails using subjective data obtained from interviews with experts as complementary information to establish their results.

Bayesian networks have been explored as a potential application tool in different fields and disciplines. Their main characteristics—the combination of experts' subjective opinions, observed data, and models of cause and effect—make them especially suitable for investigating and capturing the operation of financial phenomena. Although their use so far has been limited to specific areas, their application to business risks is increasingly documented.

Bayesian Networks (BN) are mathematical structures used to represent different variables and their dependency relationships. They allow systematic propagation of the evidence's impact based on probabilities of uncertain results. The nodes represent the variables of interest, and the edges are the causal or influential links between the variables (Madsen & Kjaerulff, 2008).

Bayesian Networks comprise a qualitative part that establishes the dependency relationships between the variables (nodes) connected by arrows. An ancestor node is called a "parent node," and the successor a "child node." The parent nodes are assigned with a marginal probability since they do not depend on any other variable. Child nodes have conditional probabilities depending on the parent nodes

(Chan et al., 2018). A probability table is associated with each node, a statistical distribution, or a parameterized function. In the case of a node probability table, the relationship is governed by a set of conditional probability values that model the uncertain relationship between the node and its parent nodes, together with any uncertainties present in that relationship.

Bayesian methods are one of the techniques that have been most used in artificial intelligence, machine learning, and data mining problems (Mitchell, 1997). The preceding is because they constitute a very valid and practical method for making inferences with the available data; this implies inducing probabilistic models that, once calculated, can be used with other data mining techniques (Beltrán et al., 2014). Therefore, BN is a potential tool for including the subjective opinions of experts and observed data in models of cause and effect. Combining qualitative data from experts with statistical data makes it possible to reflect an underlying causal structure of the analysis topic.

The purpose of the research is to explore the impact of poverty-induced vulnerability, income source, saving capacity, educational background of the family head, financial education, financial asset management, and household type on household financial well-being. Employing an appropriate methodology is crucial. Federal institutions, government organizations, or statistical agencies in Mexico do not fully quantify these phenomena. In such instances, using targeted in-depth interviews with a panel of experts serves as a viable solution to overcome the lack of information. Despite the latter, some statistical information from Mexican agencies was introduced simultaneously with information from the experts into the Bayesian Network to solve the lack of information limitation.

To fulfill research objectives, the Bayesian Network methodology was employed to assess the financial well-being of Mexican households, drawing comparisons between the conditions in 2018 and the first quarter of 2020. Bayesian networks allow the use of statistical data while also providing a means to reason under uncertainty, facilitating the generation of subjective estimates by experts when statistical data is lacking.

A group of household finance experts was consulted; the group was composed of financial advisers from private banking in Mexico: Santander, BBVA, Scotiabank, and Citibanamex; financial education instructors and INEGI collaborators who participate in the development of the ENIF and the ENIGH surveys. The selection process included two stages: the first was based on the experience, labor sector, and hierarchical position; the second was defining the network. From a set of 24 possible experts, the preselection process gave eight people who fulfilled the necessary conditions to be part of the final group. Their expertise in the research topic, experience in household finances, and hierarchical positions within financial organizations make them a reliable source of information to define the core variables. In this sense, their main contribution was identifying the interrelation among all the household finance phenomena, which is the base for the designed network.

Experts did not provide statistics when considering data and information, particularly regarding poverty-induced vulnerability, population growth, household classification, and the education level of the family head. However, they did offer approximations for the interactions between nodes. Experts defined those probabilities based on the statistical information obtained from ENIF and ENIGH surveys. The criteria and intuition of this group were the key to achieving a general and rational consensus that would allow the initial quantification of the network. The definitions of the nodes are based on the information provided by both ENIF and ENIGH surveys. Combining data and subjective weighting of variables gives the Bayesian method a high reliability.

A challenge in analyzing and measuring household finances is the lack of information on families' investment behavior, particularly in the context of Mexico. Households have more than one source of income, investments or savings in different banking institutions, informal loans, and expenses, among other factors. The intricate nature of these elements and the confidentiality surrounding such information makes it impossible to have accurate statistical information for that variable.

Mexico's National Banking and Securities Commission (CNVB), through the General Directorate for Access to Financial Services, 2018, prepares the National Financial Inclusion Survey (ENIF) to measure financial inclusion. Outcomes are reported through the National Report on Financial Inclusion. Nevertheless, it is essential to notice that information is reported individually rather than at a household level.

As described above, BN is a potential tool to include the subjective opinion of experts, in this case from ENIF, and observed data in models of cause and effect. Combining qualitative data from experts with statistical data makes it possible to reflect an underlying causal structure on household financial well-being. Their main advantage is that they allow reasoning under uncertainty and combine the benefits of intuitive visual representation with a mathematical basis of Bayesian probability (Uusitalo, 2007); with BN, it is possible to articulate dependencies between different variables and systematically propagate the impact of the evidence on the probabilities of uncertain results. (Neil, Fenton, and Tailor, 2005).

The key to successful Bayesian network design is the meaningful decomposition of the problem domain into a set of causal or conditional statements. It is divided, and the partial specifications of the model that are significant in the expert domain are taken (Chonawee et al., 2006). Subsequently, the probability table of the node is modeled for each variable (node), which can be done using historical data and, in the absence of these, asking an expert to provide a series of subjective estimates, which will ideally be based on the knowledge and experience, according to Cowell, Dawid, Lauritzen & Spiegelhalter (1999).

Modeling

A Bayesian network is an acyclic-directed graph; the nodes represent the variables of interest, and the edges are the causal or influence links between the variables. A node probability table, statistical distribution, or a parameterized function is associated with each node (see Cardozo and Fuentes (2011). In the case of a node probability table, the relationship is ruled by a set of conditional probability values that model the uncertain relationship between the node and its parent nodes, along with any uncertainties present in that relationship.

To create a BN, it is necessary to set the domain of the problem, define the network's purpose, and identify the causality between the variables that affect household finances. Then, the variables or essential nodes for the problem domain are identified. The process of identifying variables that define the nodes is a core part of the network design. It implies full knowledge of the problem to be modeled in order to later break it down into all its phases, select the nodes, and establish the relationships between them. Once the variables were identified, the experts in the process were consulted, and ten variables were defined for the network design, see Table 4.

Table 4
Variables for the Bayesian Network

Variable	Dimension
Poverty-induced vulnerability	Non-vulnerable
	Vulnerable
	Poverty
Household type	Nuclear
	Extended
	Composite
Education Household head	Professional
	Medium
	Basic
Financial education	High
	Medium
	Null
Income source	Formal
	Informal
Financial Assets Management	Proper
	Non-proper
Saving capacity	High
	Medium
	Null
Household financial well-being	Healthy
	Non-healthy

Source: Own elaboration.

Information from the ENIF and ENIGH surveys was used to quantify the network design. The group of experts, already defined above, considered their experience, the sensitivity in their sector, and the information from the surveys and defined the interactions and base probabilities for all the phenomena considered in the network. The set of probabilities is defined under the assumption that there is a likelihood of future events happening. By a confidentiality agreement, their names and functions cannot be disclosed.

With the selected variables, the graphic model of the Bayesian Network was established, defining the causal relationships in a network with one parent node and seven child nodes. The graph was obtained to measure the household finance variable. The resulting graph is represented in Figure 4.

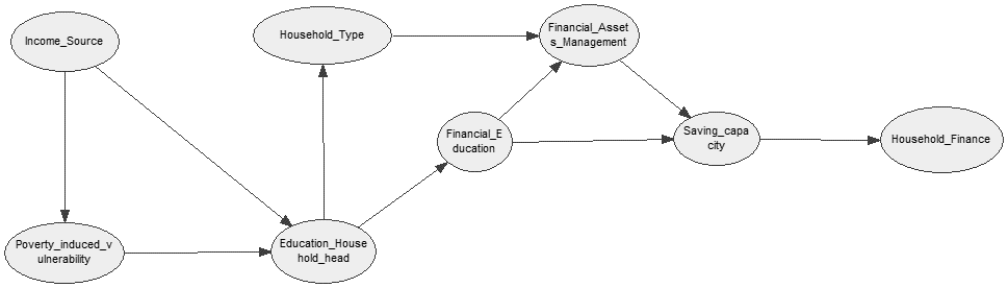

Figure 4. Graphic model of the BN.
Source: Own elaboration.

Once the graphic model of the Bayesian Network was defined, the next step was to validate the model with a group of experts in household finances, for which a focus group was carried out, and the prior probabilities were determined. The model explains that the state of household finances depends on the savings capacity of its members, who in turn depend on the financial education of its members and the management of their financial assets. The management of financial assets depends on financial education and the household's composition; financial education depends on the level of education on whom the composition of the household also depends. The parent node corresponds to the income source variable, and there are two child nodes: poverty-induced vulnerability and education level.

Bayesian network quantification

To quantify the Bayesian Network, each node has an associated conditional probability table that determines the level of interrelation of the nodes. These probabilities were constructed from official INEGI information, for which statistics were unavailable, and household finance experts were consulted based on their degree of belief regarding the behavior of the random parameter. The official statistics

provide data to start the quantification; however, there is no information on the conditional probabilities for each node.

An advantage of Bayesian statistics is that it allows the parameters to be random variables. Therefore, the statements regarding the characteristics of a variable depend not only on statistical data but also on any prior knowledge of the statistician (subjective opinion of the experts). From the quantification of the network with the prior probabilities, the posterior probabilities were obtained for the network nodes in Figure 4, and the probability of household finances was obtained.

The initial scenario, the year 2018 in Mexico, indicates that 46% of income came from formal sector employment, with a probability of 11.4% not belonging to vulnerable sectors of the population and with a probability of 24.2% that the head of the family has professional level studies. At the same time, being in a nuclear household with a probability of 22.6% and having financial education with a probability of 5.4% leads to a probability of 39.9% that he appropriately manages financial assets. A proper financial asset management probability of 39.9%, next to a 5.43% probability of having financial education, leads to a 13.3% probability of having a savings ratio, which also results in a 61.8% possibility of having healthy household finances.

The same model, with 2020 data, indicates that 44% of income came from formal sector employment, with a probability of 10.9% not belonging to vulnerable sectors. Also, there is a 23% probability that the head of a family will have professional-level studies and a 21.5% probability that the family will have a nuclear household. At the same time, having a financial education with a probability of 4.1% leads to a probability of 34% in managing financial assets properly and a high savings capacity of 17%, resulting in a probability of 57.61% of having healthy household finances. Consequently, the social and economic effects of the pandemic during 2020 directly impacted household financial well-being; the probability of having healthy household finances decreased by 4.2% concerning the base period of analysis, as shown in Figure 5 and Figure 6.

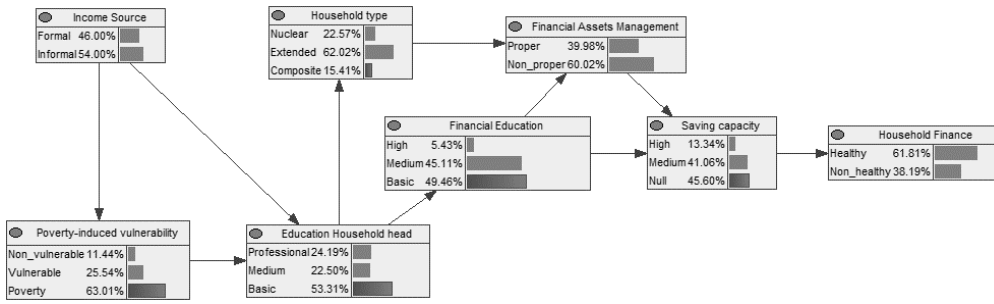

Figure 5. Bayesian Network for 2018.
Source: Own elaboration.

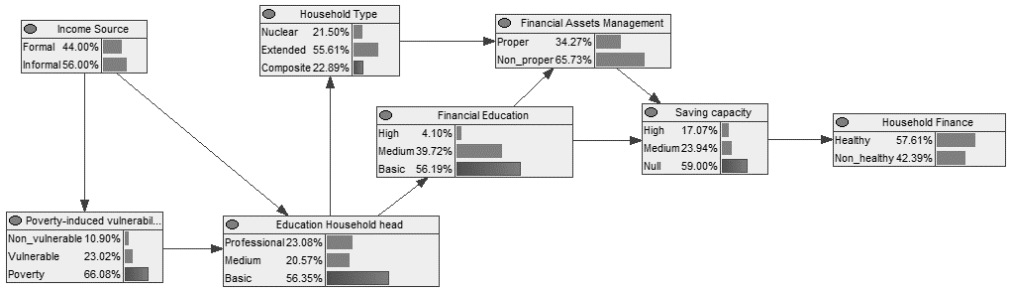

Figure 6. Bayesian Network for 2020.
Source: Own elaboration.

The same model, with 2022 data, indicates that 45% of income came from formal sector employment, with a probability of 11.5% not belonging to vulnerable sectors. Also, there is a probability of 24% for the head of a family to have professional-level studies, and a nuclear household has a 23.5% probability. At the same time, having a financial education with a probability of 5.3% leads to a probability of 40% in managing financial assets properly and a high savings capacity of 21%, resulting in a probability of 58.58% of having healthy household finances. Consequently, the social and economic effects observed during the pandemic begin to decrease without the ability to recover the levels prior to it, see Figure 7.

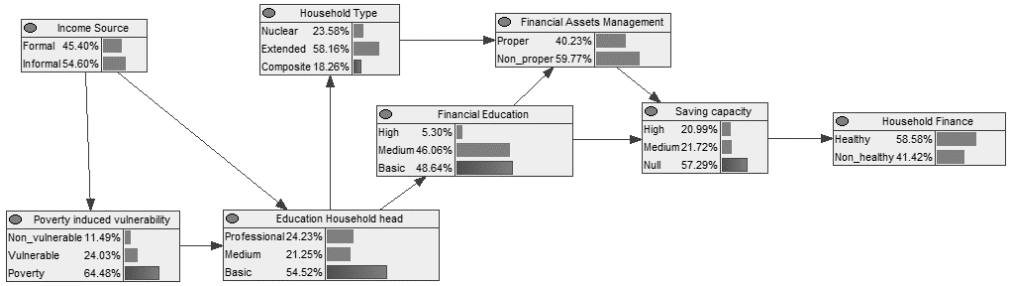

Figure 7. Bayesian Network for 2022.
Source: Own elaboration.

Under the proposed model, the probability of healthy household finances depends mainly: (1) on the household member's income coming from formal sector employment, (2) the degree to which the household experiences poverty-induced vulnerability, (3) the education level of the head of household and (4) savings capacity of household members.

Scenario analysis

Scenarios describe circumstances that may occur and allow different options to be explored (Banuls & Salmeron, 2007). One of the significant advantages of using Bayesian Networks is performing scenario analysis, which considers the causal interaction between the different variables that make up the network. The data entered at each node is propagated throughout the network in the downward direction, and the marginal distribution of each node is updated.

In the Bayesian Network, when evaluating one of the variables with a probability of 100%, an exogenous shock is caused that eliminates the direct relationship with the immediately superior node, and the arc that joins them in the model disappears. The analysis is carried out to identify the variables that increase the probability of having healthy financial households and to apply resources and efforts to them, with the restriction that sometimes implies a structural change in the country's policy.

The source of income of household members, formal or informal, the level of education for the head of the family, and financial education are fundamental variables in a household's finances. Nonetheless, assuming that the composition will be 100% in none of the variables is impossible. However, it is essential to mention that the higher the proportion of households with formal employment, the greater the access to financial education and higher savings capacity.

Acknowledging the recent surge in poverty, the widespread loss of formal employment, and the decline in family investment in education — leading to a concerning number of young individuals abandoning schooling to assist their households, often relying on informal income sources — underscores the urgent need to prioritize the development of social programs. Thus, facilitating students' return to classrooms and their departure from the informal market becomes imperative. However, this transition hinges on heads of families securing income, preferably from formal employment sources. The quantified model utilizes 2022 data for scenario analysis, aiming to identify variables that notably influence the financial health of households.

Figure 8 shows the favorable effects of a formal income source, with the probability of healthy household financial well-being increasing by 17.68%. If all family jobs were informal, then household financial well-being decreased by 13.08% (see Figure 9).

Although income sources cannot be 100% informal, in such a scenario, there would be neither savings capacity for household members nor sufficient financial education for household finances to improve. The fact that income from informal sector employment is the main source of income in Mexican households stresses the importance of economic policy programs to assess informal sources of income.

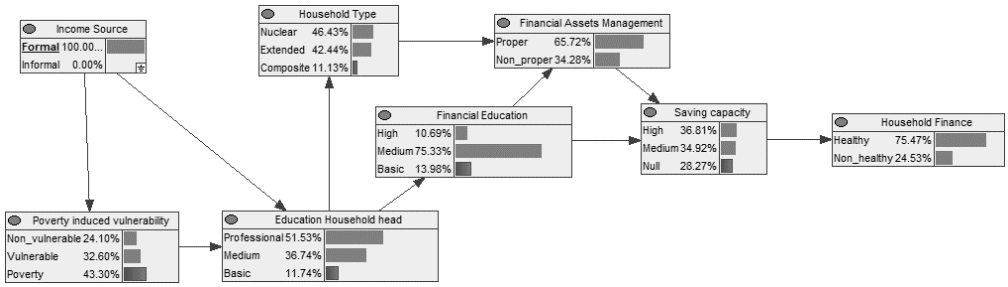

Figure 8. Favorable effects of income from formal sector employment.
Source: Own elaboration.

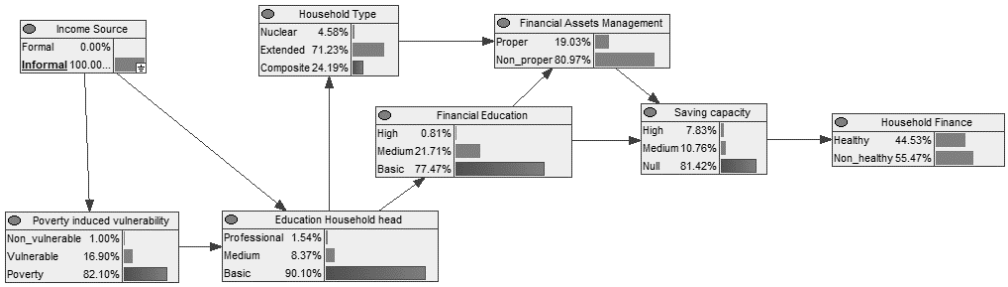

Figure 9. Unfavorable effects of income from informal sector employment.
Source: Own elaboration.

The household spending analysis examined the effect of recent years on the education and leisure category of current average expenditure, revealing a significant decrease of over 32%. Until the country rebounds to at least pre-pandemic levels, education at all levels will not hold the priority it deserves. Notably, if all heads of households held a professional bachelor's degree, the likelihood of achieving healthy household finances would surpass 80%, as depicted in Figure 10.

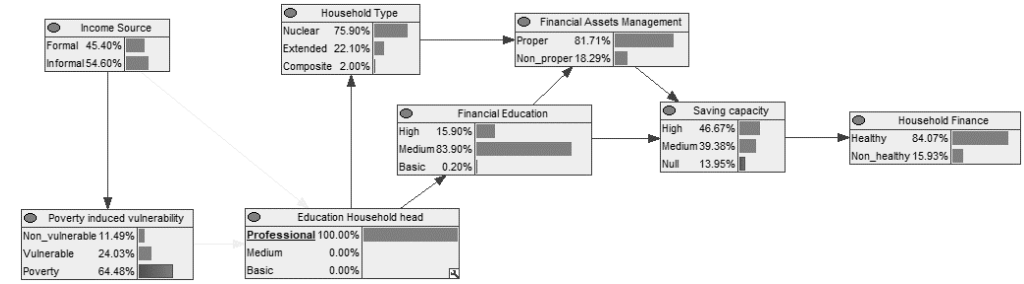

Figure 10. Education household head.
Source: Own elaboration.

A variable that can be modeled efficiently in the medium term is financial education. Presently, household decisions are primarily made by the heads of households, indicating that young individuals will soon assume these responsibilities. It is crucial to provide them with financial literacy early on, covering topics such as interest rates, credit card usage, and various types of credit, including consumption, mortgage, and automobile loans. Moreover, instilling the importance of maintaining a favorable credit history can empower them to make informed decisions. Extrapolating the impact of financial education reveals a notable 38% increase in the probability of achieving healthy household finances when the household is composed of financially sophisticated individuals, as illustrated in Figure 11. Conversely, the absence of financial education exacerbates household financial distress, significantly increasing from the baseline unhealthy state of 42.39% (Figure 7) to 65% (Figure 12).

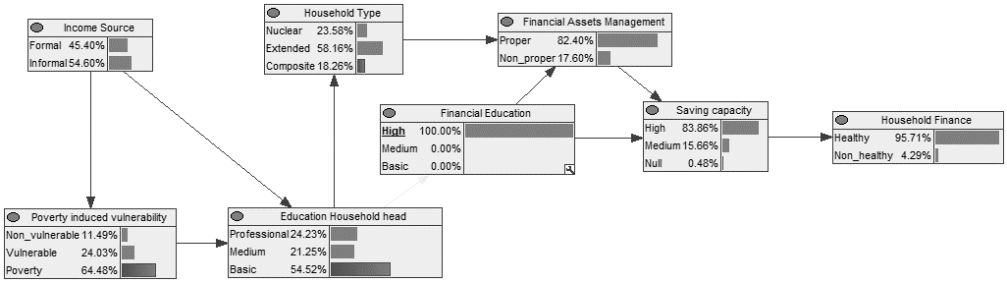

Figure 11. Financially sophisticated household members.
Source: Own elaboration.

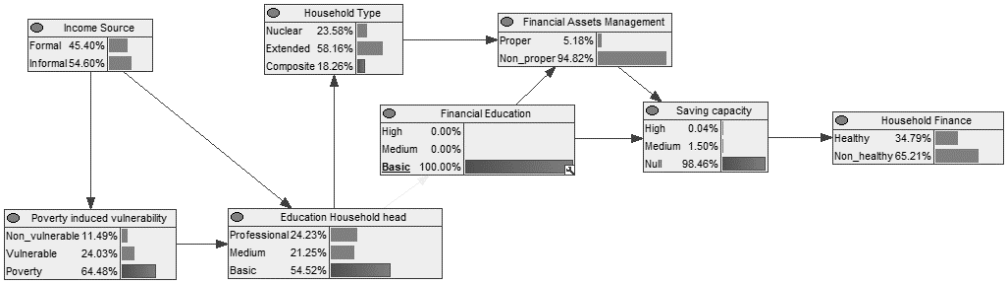

Figure 12. Financial education.
Source: Own elaboration.

The savings capacity of households is not a variable that can be directly influenced. However, increasing formal jobs can improve households' living conditions. This might directly impact the less vulnerable and deprived population since they could allocate time and income to education, including

financial ones. Consequently, people can manage their assets better and allocate part of their income to savings, generating healthy finances with 98% of probabilities (see Figure 13).

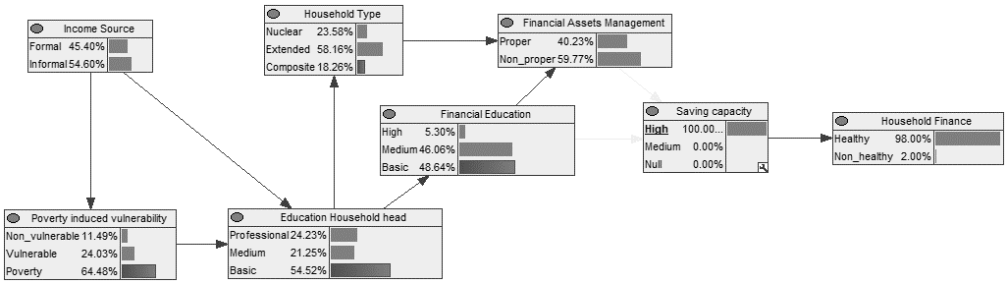

Figure 13. Savings.
Source: Own elaboration.

Scenario analyses were also performed with the rest of the variables within the network, but their impacts on household finances were not significant, so those results are not presented.

Discussion

The present analysis shows that the health of household income has decreased from 2018 to 2020 and had a slow recovery by 2022. One of the main drivers is income source, i.e., whether income comes from formal or informal sector employment. Results show that having informal sources of income leads to an unhealthy status for households. Thus, the importance of formal sector employment recovers to at least pre-pandemic levels, and one way to do so is for the government to promote job creation. Historically, public spending has been the tool to foster economic activities; nonetheless, applying that policy could be counter-productive due to the current lower level of economic growth worldwide and the low tax collection. Therefore, subsidies and temporary deferrals in tax payments might be a solution. On the monetary side, reducing interest rates is always a good choice since productive credits become less expensive, and companies are willing to invest. If this path is chosen, monetary policy must be carefully conducted to avoid inflation, a current phenomenon worldwide. Nevertheless, significant economic, financial, and certainty market conditions are critical for companies to grow.

Another crucial determinant is the educational level of the head of the household. It is widely recognized that higher levels of education correlate with higher income potential. A robust education system has historically underpinned elevated income levels in most, if not all, developed countries. Moreover, substantial evidence indicates education's positive impact on income in developing nations. In

light of this, the government must provide educational opportunities to low-income households, irrespective of their income sources. The education system in Mexico still requires significant improvement, and investing in its enhancement is undoubtedly a necessary course of action.

Similarly, there is a pressing need for financial education. A critical barrier to adequate financial literacy is financial exclusion. Lower-income households often encounter difficulties accessing financial instruments, primarily due to limited assets, a scarcity of formal employment opportunities, and insufficient access to clear information about financial products.

The financial system has been an economic agent that has conducted economic activities with many restrictions for most of the population for a long time. Commercial banks must reassess and properly tune their market penetration strategies, recognizing the inherent complexity of accessing financial instruments to extend access to low-income households. This implies providing clear and ample information about financial services to clients. Moreover, financial costs associated with these instruments should align with the interest rate levels mandated by the monetary authority and the economic conditions of households. In the context of savings, the financial system should create improved saving instruments tailored to assist low-income households in enhancing their financial well-being. Addressing these challenges is essential for enhancing household finances in Mexico.

Conclusions

This study aimed to examine the extent to which household financial well-being is influenced by various factors, including poverty-induced vulnerability, income source, savings capacity, the educational background of the family head, financial education, effective financial asset management, and household type. Additionally, it sought to address a gap in the literature by incorporating two factors particularly relevant to developing countries: poverty-induced vulnerability and income source. Results suggest that income from informal sector employment, the education level of the household head, financial education, and savings are the most significant determinants of a household's financial health.

Mexico must enhance its competitiveness, which implies reducing poverty levels and vulnerability among its populace. Individuals with their basic needs met are better positioned to seize new opportunities and adapt to unforeseen challenges, such as the global upheaval witnessed during the recent COVID-19 pandemic or any similar event occurring in the future. Encouraging economic growth, mainly through creating formal employment opportunities, is paramount. The objective is to alleviate poverty by implementing inclusive public policies across all sectors. By explicitly targeting vulnerable and impoverished populations, developing comprehensive programs that enhance the school curriculum and

incorporate financial education is essential. Another crucial aspect is emphasizing the significance of sound credit management for every household, particularly those with limited financial resources.

The preceding concepts find robust support in the findings of the current research. For instance, when the probability of formal sector employment as an income source reaches 100%, household financial well-being sees a notable increase from 58.58% to 75.47% in terms of probability. Conversely, if the income source is informal sector employment, household financial well-being diminishes to 44.53%. Similarly, concerning education, households benefit significantly when the head possesses professional education, with the probability of achieving financial health rising to 84.07%. The absence of financial education results in a substantial decline in household financial well-being to 35%.

Conversely, households with financially literate members witness a remarkable surge in financial well-being to 96%. Another noteworthy finding stresses the role of savings, as an enhancement in savings capacity corresponds to an increase in financial well-being, reaching up to 98%. These results underscore the specific determinants of household financial well-being, illustrating transparent causal relationships that can be leveraged to comprehend the primary objectives of the research better.

It is crucial to emphasize that neither the vulnerable population nor individuals experiencing poverty decreased but instead experienced a marginal 0.2% increase during 2020. This signifies an apparent setback, albeit a slight one. Additionally, individuals not classified as poor or vulnerable in 2018 have transitioned into such conditions. Consequently, social programs are imperative to rectify the economic impacts of the pandemic on households, particularly in the face of job losses and income reductions. There is a pressing need to increase current spending to alleviate poverty among the population.

Economic policy recommendations are centered on fostering attractive and stable conditions within the domestic market to spur investment and employment. Simultaneously, there is a pressing need for government investment in education and expanded financial literacy initiatives, particularly given that financial education often revolves around promoting savings. By prioritizing these objectives, the reconstruction of household financial well-being becomes achievable. Two approaches warrant consideration. Firstly, implementing an expansive fiscal policy entailing tax exemptions for companies, augmented government expenditure, and targeted transfers to stimulate the establishment of new businesses while bolstering educational initiatives. Alternatively, a monetary policy focus could be directed towards encouraging savings by raising interest rates. However, the latter strategy may precipitate potential inflationary pressures as the cost of all types of credit escalates, leading to a contraction in supply. Nonetheless, this scenario gains particular relevance in the current global landscape, particularly in Mexico, where demand persists despite increases in interest rates.

The results are limited to several assumptions. First, household financial well-being cannot be affected by other variables, such as inflation, consumption, economic growth, and others. It would be expected to assume that household financial well-being relies on the amount of assets they possess, which is related to their purchase power and how it is affected by inflation and income growth. Therefore, considering those effects is necessary, mainly because the pandemic has impacted inflation and growth. At the same time, savings are also influenced by inflation and growth, so indirectly, it will alter financial health.

Consequently, interactions between variables, probabilities, and direct or indirect effects in the network could change. Second, expert opinions are impartial and represent a source of the most pragmatic information available. However, expanding the sample size among experts may modify the order for the interactions and even the associated variables, consequently altering the conditional probabilities within the network. Third, the network design closely mirrors the phenomenon's reality based on the experts' insights. Nevertheless, other factors may gain prominence and impact financial health, e.g., out-of-pocket health expenses resulting from the pandemic.

As mentioned before, another limitation of this work is that it does not consider inflation rates or the increase in minimum wages. Since these require a thorough analysis of their effects, this could be considered in a later study.

Finally, movements in the independent variables are considered exogenous. However, it might be possible that the dynamics in these variables are interconnected or shaped by additional economic or financial conditions, potentially altering the network. In that sense, these constitute the primary limitations of the research, thus unlocking them to broaden and deepen the analysis, which represents the pending agenda.

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Annex

Interview script

Preselection stage

1. Name, gender, academic degrees
2. Experience in the financial sector (years)
3. Experience analyzing household behavior (years)
4. Labor sector: public or private
5. Hierarchical position in the organization

After selection – For expert group

1. Form the 15 variables proposed, which are the ones that mainly affect the health of households?
2. Based on the previous question, what is the causal relationship between all the variables?
3. Discussion for network definition
4. What would be the states for each of the defined variables?
5. Occurrence probabilities

a. $P(Population\ nonvulnerable|income\ source\ formal)$
b. $P(Population\ non\ vulnerable|income\ source\ \ informal)$
c. $P(Population\ vulnerable|income\ source\ \ formal)$
d. $P(Population\ vulnerable|income\ source\ \ informal)$
e. $P(Population\ poverty|income\ source\ \ formal)$
f. $P(Population\ poverty|income\ source\ \ informal)$
g. $P(Head\ family\ education\ professional|income\ source\ formal\ and\ population\ non\ vulnerable)$
h. $P(Head\ family\ education\ professional|income\ source\ formal\ and\ population\ vulnerable)$
i. $P(Head\ family\ education\ professional|income\ source\ formal\ and\ population\ poverty)$
j. $P(Head\ family\ education\ professional|income\ source\ informal\ and\ population\ non\ vulnerable)$
k. $P(Head\ family\ education\ professional|income\ source\ informal\ and\ population\ vulnerable)$
l. $P(Head\ family\ education\ professional|income\ source\ informal\ and\ population\ poverty)$
m. $P(Head\ family\ education\ medium|income\ source\ formal\ and\ population\ non\ vulnerable)$
n. $P(Head\ family\ education\ medium|income\ source\ formal\ and\ population\ vulnerable)$
o. $P(Head\ family\ education\ medium|income\ source\ formal\ and\ population\ poverty)$
p. $P(Head\ family\ education\ medium|income\ source\ informal\ and\ population\ non\ vulnerable)$
q. $P(Head\ family\ education\ medium|income\ source\ informal\ and\ population\ vulnerable)$
r. $P(Head\ family\ education\ medium|income\ source\ informal\ and\ population\ poverty)$
s. $P(Head\ family\ education\ basic|income\ source\ formal\ and\ population\ non\ vulnerable)$
t. $P(Head\ family\ education\ basic|income\ source\ formal\ and\ population\ vulnerable)$
u. $P(Head\ family\ education\ basic|income\ source\ formal\ and\ population\ poverty)$
v. $P(Head\ family\ education\ basic|income\ source\ informal\ and\ population\ non\ vulnerable)$
w. $P(Head\ family\ education\ basic|income\ source\ informal\ and\ population\ vulnerable)$
x. $P(Head\ family\ education\ basic|income\ source\ informal\ and\ population\ poverty)$
y. $P(Household\ type\ nuclear|head\ family\ education\ professional)$
z. $P(Household\ type\ nuclear|head\ family\ education\ medium)$
aa. $P(Household\ type\ nuclear|head\ family\ education\ basic)$
bb. $P(Household\ type\ extended|head\ family\ education\ professional)$
cc. $P(Household\ type\ extended|head\ family\ education\ medium)$
dd. $P(Household\ type\ extended|head\ family\ education\ basic)$
ee. $P(Household\ type\ composite|head\ family\ education\ professional)$
ff. $P(Household\ type\ composite|head\ family\ education\ medium)$
gg. $P(Household\ type\ composite|head\ family\ education\ basic)$
hh. $P(Financial\ education\ high|head\ family\ education\ professional)$
ii. $P(Financial\ education\ high|head\ family\ education\ medium)$
jj. $P(Financial\ education\ high|head\ family\ education\ basic)$
kk. $P(Financial\ education\ medium|head\ family\ education\ professional)$
ll. $P(Financial\ education\ medium|head\ family\ education\ medium)$
mm. $P(Financial\ education\ medium|head\ family\ education\ basic)$
nn. $P(Financial\ education\ basic|head\ family\ education\ professional)$

oo. $P(Financial\ education\ basic|head\ family\ education\ medium)$
pp. $P(Financial\ education\ basic|head\ family\ education\ basic)$
qq. $P(Financial\ assets\ management\ proper|financial\ education\ high\ and\ household\ type\ nuclear)$
rr. $P(Financial\ assets\ management\ proper|financial\ education\ high\ and\ household\ type\ extended)$
ss. $P(Financial\ assets\ management\ proper|financial\ education\ high\ and\ household\ type\ composite)$
tt. $P(Financial\ assets\ management\ proper|financial\ education\ medium\ and\ household\ type\ nuclear)$
uu. $P(Financial\ assets\ management\ proper|financial\ education\ medium\ and\ household\ type\ extended)$
vv. $P(Financial\ assets\ management\ proper|financial\ education\ medium\ and\ household\ type\ composite)$
ww. $P(Financial\ assets\ management\ proper|financial\ education\ basic\ and\ household\ type\ nuclear)$
xx. $P(Financial\ assets\ management\ proper|financial\ education\ basic\ and\ household\ type\ extended)$
yy. $P(Financial\ assets\ management\ proper|financial\ education\ basic\ and\ household\ type\ composite)$
zz. $P(Financial\ assets\ management\ non\ proper|financial\ education\ high\ and\ household\ type\ nuclear)$
aaa. $P(Financial\ assets\ management\ non\ proper|financial\ education\ high\ and\ household\ type\ extended)$
bbb. $P(Financial\ assets\ management\ non\ proper|financial\ education\ high\ and\ household\ type\ composite)$
ccc. $P(Financial\ assets\ management\ non\ proper|financial\ education\ medium\ and\ household\ type\ nuclear)$
ddd. $P(Financial\ assets\ management\ non\ proper|financial\ education\ medium\ and\ household\ type\ extended)$
eee. $P(Financial\ assets\ management\ non\ proper|financial\ education\ medium\ and\ household\ type\ composite)$
fff. $P(Financial\ assets\ management\ non\ proper|financial\ education\ basic\ and\ household\ type\ nuclear)$
ggg. $P(Financial\ assets\ management\ non\ proper|financial\ education\ basic\ and\ household\ type\ extended)$
hhh. $P(Financial\ assets\ management\ non\ proper|financial\ education\ basic\ and\ household\ type\ composite)$
iii. $P(Saving\ capacity\ high|financial\ education\ high\ and\ financial\ asset\ management\ proper)$
jjj. $P(Saving\ capacity\ high|financial\ education\ high\ and\ financial\ asset\ management\ non\ proper)$
kkk. $P(Saving\ capacity\ high|financial\ education\ medium\ and\ financial\ asset\ management\ proper)$
lll. $P(Saving\ capacity\ high|financial\ education\ medium\ and\ financial\ asset\ management\ non\ proper)$
mmm. $P(Saving\ capacity\ high|financial\ education\ basic\ and\ financial\ asset\ management\ proper)$
nnn. $P(Saving\ capacity\ high|financial\ education\ basic\ and\ financial\ asset\ management\ non\ proper)$
ooo. $P(Saving\ capacity\ medium|financial\ education\ high\ and\ financial\ asset\ management\ proper)$
ppp. $P(Saving\ capacity\ medium|financial\ education\ high\ and\ financial\ asset\ management\ non\ proper)$
qqq. $P(Saving\ capacity\ medium|financial\ education\ medium\ and\ financial\ asset\ management\ proper)$
rrr. $P(Saving\ capacity\ medium|financial\ education\ medium\ and\ financial\ asset\ management\ non\ proper)$
sss. $P(Saving\ capacity\ medium|financial\ education\ basic\ and\ financial\ asset\ management\ proper)$
ttt. $P(Saving\ capacity\ medium|financial\ education\ basic\ and\ financial\ asset\ management\ non\ proper)$
uuu. $P(Saving\ capacity\ null|financial\ education\ high\ and\ financial\ asset\ management\ proper)$
vvv. $P(Saving\ capacity\ null|financial\ education\ high\ and\ financial\ asset\ management\ non\ proper)$
www. $P(Saving\ capacity\ null|financial\ education\ medium\ and\ financial\ asset\ management\ proper)$
xxx. $P(Saving\ capacity\ null|financial\ education\ medium\ and\ financial\ asset\ management\ non\ proper)$
yyy. $P(Saving\ capacity\ null|financial\ education\ basic\ and\ financial\ asset\ management\ proper)$
zzz. $P(Saving\ capacity\ null|financial\ education\ basic\ and\ financial\ asset\ management\ non\ proper)$