QUBAHAN ACADEMIC JOURNAL
VOL. 5, NO. 3, August 2025
https://doi.org/10.48161/qaj.v5n3a1942

Measuring Socioeconomic Disparities in Out-of-Pocket Healthcare Expenditure: Evidence from Saudi Arabia

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ABSTRACT: This study aims to identify the determinants of healthcare expenditures and their impacts on the livelihoods of urban populations in Riyadh in Saudi Arabia. Employing quantitative econometric methods, specifically ordinary least squares (OLS) regression on data from the 2018 Saudi Arabia Household Income and Expenditure Survey (HIES) and is further supported by the WHO-based Global Health Reviews Living Standard Measurement Survey (LSMS) the findings reveal that insurance membership does not significantly lower out-of-pocket healthcare expenditure (OOPHE), which reflects limitations in existing programs such as high deductibles, cost-sharing requirements, and restricted coverage that leave households exposed to substantial healthcare costs. In addition, the study finds that higher average monthly income is associated with increased OOPHE, indicating that wealthier households tend to utilize a broader range of both essential and elective healthcare services, leading to higher expenditures despite their greater financial capacity. Healthcare spending variation is also driven by demographic factors. Further, male-headed households do not show a statistically significant effect but female-headed, households with young children, and larger households incur more OOPHE. Indeed, it indicates that other factors such as socioeconomic and familial dynamics are instrumental in shaping the healthcare costs. These findings thus emphasize the imperative for policymakers not only to increase insurance coverage but also to reframe insurance designs to be more protective and financially comprehensive. Possibilities include the reduction of cost-sharing requirements, lowering deductibles, and expanding the range of services covered to better protect vulnerable populations. Research using longitudinal data should examine whether improvements in insurance design contribute to reductions in OOPHE over time.

Keywords: healthcare expenditures, OOPHE, insurance membership, average monthly income, demographic factors.
JEL: I13, I18, D12.

I. INTRODUCTION

In recent years, healthcare expenditure in Saudi Arabia has seen significant growth, reaching approximately 282 billion SAR (USD 75 billion) in 2022, representing nearly 7% of the national budget, as part of the country's ambitious Vision 2030 reforms aimed at improving health service delivery and accessibility [1]. Despite these substantial investments, disparities persist in healthcare access and financial protection, particularly among low-income households, female-headed families, and urban poor populations. Out-of-pocket healthcare expenditures (OOPHE) continue to account for over 30% of total health spending in Saudi Arabia, a level that poses risks of financial hardship for vulnerable groups [2].

These figures highlight a critical challenge: while service availability has improved, the financial burden of care remains unevenly distributed.

Universal Health Coverage (UHC) is a global priority for health systems, providing access to quality essential health services without causing financial hardship to the population [3]. Health care delivery in this regard has greatly improved in Saudi Arabia due to extensive governmental reforms and investments as part of Vision 2030 [4]. However, while advances in any uHc have been made in terms of availability and quality, many challenges exist in measuring uHc, particularly due to the complex interplay of social and economic determinants of access to care. A persistent issue is that UHC measurement frameworks also severely underutilise indicators representing social and economic status. The conventional measures of coverage of health services and financial risk protection are often inefficient in detailing the socioeconomic determinants that can have an impact on health in the population [5,6]. If not appropriately tackled, this translates into a considerable under-explored space with the existing literature, especially in the case of Saudi Arabia, which has undergone substantial social and economic relays that necessitate a more subtle viewpoint towards health coverage measurement. The main objective of this study is:

- To identify and analyze the key socioeconomic and demographic determinants of out-of-pocket healthcare expenditures (OOPHE) among urban households in Riyadh, Saudi Arabia.
- To develop a multidimensional framework for measuring Universal Health Coverage (UHC) that integrates conventional health indicators with social and economic variables, providing more accurate insights for health policy and financial protection reforms.

The methodology additionally involves quantitative econometric methods such as OLS (Ordinary Least Square) regression using a 2018 dataset based on the Saudi Arabia Household Income and Expenditure Survey (HIES) heightened by the inclusion of LSMS based on WHO referred Global Health Reviews. This narrative review aims to provide an inclusive evaluation that measures the extent of health service coverage while also recognizing the root socioeconomic enablers or barriers to access to care. This study seeks to use data from government reports, demographic surveys, and health statistics to provide a more nuanced and empirically rigorous measurement of UHC.

This research is significant as it critically elevates the importance of socioeconomic and demographic determinants of health expenditure in Riyadh, Saudi Arabia, ensuring there are sensible insights derived so as to test the effectiveness of existing programs in place and their contributions to the well-being of households financially. The study highlights systemic gaps in current health financing architectures, especially highlighting the shortcomings of even well-intentioned insurance schemes in reducing OOPHE, by identifying major widespread determinants leading to high OOPHE. These findings are critical for informing health policy reforms to reduce healthcare cost burdens, particularly among at-risk groups, including female-headed households, families with young children, and lower-income populations. This study provides valuable insights for policymakers to enhance health system sustainability and equity in Saudi Arabia while highlighting the significance of ongoing research in these areas to ensure the alignment of health systems with national health and social goals as outlined by Saudi Arabia's Vision 2030.

Additionally, the methodological integration of social and economic metrics complemented with the classic UHC indicators adds to the novelty of this study, which has been relatively underexplored in the Saudi context. We hope that this novel approach will enrich the global conversation on UHC, showcasing changes in health system performance in ever-volatile socio-economic settings and how multidimensional evaluation tools can enhance our understanding of them. The results are expected to provide useful information to further improve health system design and policies, and move a step closer to Universal Health Coverage in the Kingdom. This study also contributes to the literature by empirically identifying the significant socio-economic and demographic determinants of out- of-pocket healthcare expenditures (OOPHE) within urban Saudi Arabia using a nationally representative sample. It is also useful to policymaking, as it identifies the limitations of existing insurance schemes and highlights reforms to enhance both financial protection and access to health care among vulnerable populations.

This study advances theoretical understanding of Universal Health Coverage by integrating socioeconomic and demographic determinants into conventional health expenditure models, thereby challenging existing frameworks that overlook the multidimensional and structural factors influencing

equitable healthcare access in rapidly evolving contexts like urban Saudi Arabia. These findings inform international healthcare policy debates by demonstrating the need for UHC frameworks to incorporate socioeconomic and demographic factors, emphasizing that equitable access and financial protection require context-sensitive, multidimensional approaches beyond service availability and insurance coverage alone.

While numerous studies have explored Universal Health Coverage (UHC) globally, the vast majority have focused on either service availability or financial protection in isolation, often neglecting the complex and layered influence of socioeconomic and demographic factors on healthcare access. In the context of Saudi Arabia, existing literature predominantly centers on healthcare infrastructure development, insurance expansion, and epidemiological trends [7,8]. However, there is a conspicuous gap in empirical studies that integrate household-level economic determinants, such as income, education, employment status, and household composition, with UHC outcome metrics like out-of-pocket health expenditures (OOPHE). Furthermore, few studies have employed nationally representative microdata —such as the HIES— combined with econometric methods to rigorously quantify these relationships. Even fewer have focused specifically on Riyadh, the country's most populous urban center undergoing rapid socioeconomic transition. This study addresses this critical gap by introducing a multidimensional framework that combines conventional UHC indicators with socioeconomic and demographic variables, providing a richer, more granular understanding of health coverage dynamics. This not only advances the methodological rigor in UHC research but also contributes context-specific evidence essential for designing equitable and financially protective health policies in the Saudi context.

II. LITERATURE REVIEW

The literature on determinants of out-of-pocket healthcare expenditures (OOPHE) and catastrophic health expenditures (CHE), have gained grounds in both developed and developing nations; contributing to the improving understanding of how these determinants, affect individuals. However, results tend to be context-dependent, because the characteristics of healthcare systems determine both the determinants and effects of healthcare costs. For instance, in the context of developing nations, [9] applied the ordinary least squares (OLS) regression method to data from the Household Integrated Economic Survey (HIES) and the Pakistan Living Standards Measurement Survey (PSLM) to analyze the socio-economic determinants of household OOPHE in Pakistan [10, 11, 12]. According to their results for the poor, non-food expenses, the literacy rate between the head of household and the spouse (married), the use of unsafe excretion, recent childbirth, the use of unsafe water, and living in Pakhtunkhwa (Khyber) played an important role in the use of health. They found the incidence of infection to be among the most important determinants of OOPHE. Similarly, [13] also showed that in Indian households, the education level of the household head has a significant influence on OOPHE. In a similar way, [14] identified household solvency as an important driver of OOPHE in Vietnam.

Besides studying the proximate determinants of OOPHE, several researchers have also examined the relationship between health insurance coverage and individual healthcare expenditures [15, 16, 17]. An example is the study of Johnson and Krishnaswamy (2012) [62], who used data from the 2009 Indian National Sample Survey Organization (NSS) to analyze the effects of India national health insurance program Rashtriya Swasthya Bima Yojana (RSBY) on hospital admissions and out-of-pocket health expenditures (OOPHE). Following a difference-in-diffs methodology, their results suggested that while the program led to a statistically significant reduction in OOPHE with respect to ambulatory care services, the overall effect was limited. Conversely, [15] used nationally representative longitudinal household survey data to study RSBY's effect on per capita and per-patient OOPHE and contested their findings. The findings indicated that RSBY failed to show a statistically significant reduction in per capita OOPHE and so by this measure, has limited effect on financial protection.

OOPHE is designated "catastrophic" (CHE) if it exceeds a specific percentage of household income (or the ability to pay)27. There are some studies to identify the predictors that drive OOPHE to catastrophic level. [18, 19] studied CHE determinants in Lucknow, India using survey data from 400 households in a cluster. Higher CHE levels were associated with both prolonged hospitalization and lack of hospitalization.

Study [66] adopted probit regression techniques to examine the covariates of CHE incidence in Colombia, exploring the 2011 Colombian National Quality of Life Survey data. She categorized CHE as OOPHE equal or greater than to 20% of a household's ability to pay and estimated that CHE prevalence was around 9.6% for Colombian households. Additionally, her study found large household size, presence of children or elderly members, living in a rural area, and lack of insurance as significant determinants for CHE incidence.

Beyond examining the formal determinants of healthcare costs, numerous studies have explored how OOPHE and CHE rarely help alleviate poverty. Study [20] investigate the role of OOPHE in economic vulnerability and poverty in Chilean households. Their analyses also found that 4% of households in Chile experienced CHE (defined as OOPHE exceeding 30% of a household's capacity to pay), although fewer than 1% of households moved to poverty as a result of CHE. Likewise, using data from the 2009 Saudi Arabia National Baseline Household Survey, [21] investigated the predictors of OOPHE among national, urban, and rural households of Saudi Arabia. The key factors affecting households OOPHE included disease incidence, household income, literacy of household head, household size, and the number of household children aged 5 years or less or 65 years or older [22]. Additionally, they discovered that households with a higher percentage of older or very young individuals from the bottom income quintile bore a heavier burden of OOPHE, indicating a potential financial vulnerability in healthcare accessibility.

In addition, SES plays a major role in financial protection in health, with either consumption or wealth quintile being the most frequently used SES indicators. Households are typically divided into five equal segments, from the poorest to the richest. SES is a direct measure of consumption from longitudinal household surveys, aggregated via millions of commodities into food, non-food, durable goods and housing [23, 24]. A very important application of this approach is the World Bank's Living Standards Measurement System, which has developed a consistent methodology that can be used in the analysis of consumption data. In contrast, wealth-related interventions typically use the asset index—a composite measure of assets and services to evaluate their effectiveness [25, 26]. The Demographic and Health Surveys (DHS) also uses this approach to classify households by ownership of assets.

Both the consumption and wealth approaches have their advantages and disadvantages, however. Consumption-based approaches to wealth estimation are theoretically strong and consistent with economic foundations but rely on complex data collection and are vulnerable to measurement error in light of the complexity of household expenditure surveys [24]. However, this homogeneity within quintiles of consumption can also obscure differences in socioeconomics. Nonetheless, this approach is the most commonly used long-term SES indicator owing to its reliability despite the aforementioned issues. On the other hand, the wealth-based approach is comparatively simple, as we can collect the required asset ownership data easily, and statistical tools such as Stata can be used to compute asset indices. This approach has been criticized for its lack of robust theoretical foundation as principal components analysis (PCA) method, mostly used to compute asset indices, does not necessarily lead to the best measure of economic well-being. There are often big differences between classifications based on consumption and wealth, so when deciding to use one or the other you have to think carefully.

The Countdown to the Millennium Development Goals (MDGs) study group have used wealth quintiles to stratify the data and assess inequalities in healthcare access. Two important measures of inequality Population Attributable Risk (PAR) and Slope of Inequality Index (SII) are commonly utilized in quantifying socioeconomic disparities in healthcare. PAR (the gap index of the entire population compared to the gap index of the richest quintile) is an epidemiological measure of inequality in health coverage [27, 28]. Then coverage gap ratio is calculated by dividing the coverage gap in the richest quintile by national coverage gap, showing the national coverage gap reduction needed to achieve national health equity. Likewise, SII represents the slope of the regression line that describes the association between health status and socioeconomic rank; thus it provides an absolute measure of health inequalities [29].

One of the most commonly used fairness indicators is the concentration curve and concentration index originally produced by World Bank researchers, and now as part of the ADePT program. Concentration curves plot cumulative health variables by cumulative population proportions sorted by income or standard of living to visualize health inequality. The closer the curve is to the line of equality the diagonal line that runs from your bottom left corner to top right corner — the fairer the distribution of health services. The

concentration index is a numerical measure of concentration curve comparisons, calculated as 1 minus two times the area between the concentration curve and the line of equality. or as the covariance between health and socioeconomic status [30].

Multiple empirical studies have examined the association between SES and out-of-pocket healthcare expenditure (OOPHE). Study [31] conducted bivariate and multivariate analysis, using data from the WHO Study on Global Aging and Adult Health, to explore socioeconomic differentials of OOPHE's association with poverty in China and India. Their estimates reveal that OOPHE pushes 7% of the Chinese and 8% of the Indian population below the poverty line. Furthermore, multivariate regression analysis revealed that low wealth, inpatient and outpatient healthcare expenditure as well as hospitalization rate were positively associated with the odds of falling into poverty of the household. Similarly, [32] utilized data from a cross-sectional household survey in Rajshahi to examine financial risk factors linked to high healthcare expenditures in Bangladesh. They found that the risk of catastrophic health expenditures (CHE) was four times higher for the poorest households compared to the richest households. Furthermore, the study pointed out that reliance on insurance services sharply increased the chances of financial hardship from both public and private healthcare services.

Universal Health Coverage (UHC) has become one of the pillars of health policies worldwide and this applies also for Saudi Arabia where numerous studies evaluate its implementations and outcomes. Study [33] investigated healthcare access of Nepalese migrant workers living in Saudi Arabia, the UAE, and Qatar, and identified barriers that led to failure to receive medical services. In a more analytical perspective, [34] critically evaluated the primary healthcare system in Saudi Arabia, pointing to the underlying challenges and highlighting several policy reforms. Similarly, [35] examined the effect of health insurance on health-seeking behavior, using the Family Health Survey data, while [34], studied the perceptions of UHC policies among students from Alfaisal University. These studies illustrate public transparency and participation in UHC initiatives within the Kingdom.

Various researchers have examined healthcare system reform within the framework of Saudi Arabia's Vision 2030. In another study, [36] emphasized the pertinent concept of organizational resilience by exploring the relationship between high-performance work practices in human resource management and the health output efficiency at healthcare dispensaries. Work [37] explored the association between health insurance and OOPHE with respect to income inequality. Meanwhile, [38] assessed the progress toward healthcare transformation under the Vision 2030 strategy, highlighting policy changes in financial protection and service accessibility. [35] helped the field of healthcare by establishing hematologic reference intervals for adult Saudis in the city of Riyadh that serve to establish helpful clinical benchmarks. Finally, [34] investigated differences in OOPHE between people with and without chronic illnesses and found that individuals with chronic diseases spent significantly more on healthcare services.

III. CONCEPT OF UNIVERSAL HEALTH COVERAGE (UHC)

UHC is a hallmark goal of health systems worldwide, seeking to guarantee that all people have access to needed health services, with no one suffering financial hardship as a result of paying for them. This focus includes multiple health system goals and intermediate objectives, but particularly covers health financing reforms that incentivize progress towards UHC [39]. Effective coverage one of the key measures to assess UHC initiatives combines the need, use and quality aspects to assess the actual benefit delivered [40]. Looking back at historical examples, organized labor groups were critical to advocating for financial protection in countries including Germany, the United Kingdom, and the United States; these groups helped determine early policy pathways for UHC [41].

There are various interpretations of UHC that underscore its multidimensional nature and the importance of the interconnections between the different health systems components. In other perspectives, UHC is constructed as a legal human rights concern, thus it creates the grounds for equal access to medical care service [42]. Moreover, there is increasing recognition of the incorporation of infection prevention and control (IPC) in universal healthcare (UHC) policies as an important component of providing quality care.

[67], proposed a theory of change model showing how IPC measures can be integrated into UHC efforts to enhance the quality of the care provided while also preventing potential disease transmission.

To assist with progressive realization of UHC, proponents of such a process have developed procedural guidance to assist policymakers in framing decision-making processes and prioritizing essential health services on the basis of available evidence [43]. These remarkable strides notwithstanding, challenges continue to persist for UHC through community-based health planning and service delivery approaches particularly, in low and middle-income countries. And although the implementation of UHC must not be constrained to ease towards solutions in the determinants and systemic sphere, Ghana has had its macro experience with implementing UHC which has had to do with the financing of services and workforce shortages working from within existing infrastructure [44].

Equity remains at the core of UHC policy discussion. Both international and country-specific analyses underscore the multidimensionality of equity and that these dimensions should be viewed in tandem to realize fair distribution of health services: financial risk protection, access to care and quality of care [45]. With middle-income countries such as Indonesia, the demographic diversity and fragmented health systems the country faces will also require sensitivity to regional inequities when implementing UHC [46]. Similar is the case of India, where researchers have analysed the mechanism and other driving forces behind UHC and the role it played on health systems, with particular education on the resillience of strong health infrastructure and a scale implementation of UHC amidst other complex scenarios and emerging global health challenges such as COVID-19 pandemic [47].

Saudi Arabia's health care system is proliferating, with government investment leading to increased access to higher quality health care services. However, challenges with equitable access and financial sustainability persist in the country's journey towards Universal Health Coverage (UHC). NHIS is being explored as one of the options. [48] examined NHIS feasibility in Saudi Arabia: enablers as well as barriers for attaining UHC within this model. These include the financing of health-care systems, whether regulatory frameworks are in place and the chance to improve the efficiency of services through models driven by insurance, the report found.

Work [49] used Theoretical Domains Framework to assess knowledge, perception and attitudes of Alfaisal University students towards Universal Health Coverage (UHC) policies in Saudi Arabia. The research provided insights into public understanding, perceived effectiveness in existing health coverage systems, and the role of education in understanding UHC reform. Moreover, Saudi Arabia is gradually investing the state funds to develop the health care and also restructuring and organizing the services delivery [7]. Its dual track approach of free public healthcare services supplemented with mandatory mutual health insurance reflects the commitment of the country towards achieving equitable/sustainable UHC [34].

Saudi Arabia has also been a vocal participant of the global health community on UHC. At the 71st World Health Assembly (WHA) side event, representatives from the Kingdom of Saudi Arabia participated in international discussions focusing on effective UHC implementation and these discussions reaffirmed the country's importance in both shaping and influencing global healthcare policies [50]. This type of international engagement also shows how vigorously Saudi Arabia is striving to ensure that the legacy of its healthcare transformation is one that meets best practice models globally while guaranteeing that its own healthcare system achieves international standards.

IV. HYPOTHESIS DEVELOPMENT

1. INSURANCE MEMBERSHIP

Health insurance lessens the sting of health care costs by transferring part of those costs to a third party, ultimately reducing the share paid out of pocket by households. Studies have consistently shown that insured people spend substantially less on healthcare than those lacking insurance. An example comes from Vietnam, where a study estimated that health insurance reduced out-of-pocket payments by around 13% [65]. Similarly, Indonesia's Askeskin and Askes programs were found to significantly reduce household OOPHE [51].

H1: Households with health insurance are expected to have lower out-of-pocket healthcare expenditures (OOPHE) compared to uninsured households.

2. AVERAGE MONTHLY INCOME

As income rises, households are more capable of accessing and affording quality healthcare, leading to increased utilization and expenditures. According to Engel's Law, while the proportion of income spent on necessities (such as food) decreases, expenditure on discretionary items like healthcare increases with income [52].

H2: Higher household income is associated with increased OOPHE.

3. GENDER OF HOUSEHOLD HEAD (MALE/FEMALE)

Gender dynamics affect healthcare-seeking behavior and cost. A Deloitte report revealed that women in the U.S. incur $15.4 billion more annually in out-of-pocket costs than men, due to higher service utilization and cost of care [53]. Though based in the U.S., the trend suggests gender may influence OOPHE globally.

H3: Households headed by females may experience higher OOPHE compared to male-headed households.

4. PRESENCE OF CHILDREN UNDER 5 YEARS (WITH U-5 CHILDREN)

Children under five require regular healthcare, such as immunizations and treatment for common illnesses. Households with young children tend to seek healthcare more frequently, thus incurring higher expenses [54].

H4: Households with children under five are likely to have higher OOPHE.

5. DISTANCE TO HEALTHCARE FACILITY (>5 KM / <5 KM)

Greater distances often increase transportation costs and may result in delayed or less frequent healthcare, leading to more severe illness and higher treatment costs. Ilboudo et al. (2021) found that proximity to healthcare services strongly affects healthcare-seeking behavior, especially in households with children.

H5: Households located more than 5 km from healthcare facilities are expected to have higher OOPHE.

6. PRESENCE OF ADULTS AGED 65 AND ABOVE (WITH A-65 ADULTS)

Older adults generally require more healthcare due to chronic diseases and age-related health conditions. A study in Bangladesh found that older individuals had significantly higher healthcare expenditures [55].

H6: Households with elderly members are expected to have higher OOPHE.

7. HOUSEHOLD SIZE

Rationale: More household members increase the probability of someone needing medical attention. However, economies of scale might reduce per capita costs. Thus, while total OOPHE may rise, the effect may not be linear [56].

H7: Larger households may have higher total OOPHE.

V. METHODOLOGY AND DATA SOURCE

The descriptive research method is employed in this investigation, and to answer the research objective comprehensively, both primary and secondary sources of data are used. Accessing a wide range of materials, including books, earlier research, magazines, and reports, the study is well prepared to grasp the multitude of drivers of out-of-pocket healthcare spending (OOPHE). Figure 1 illustrates the conceptual framework of the study.

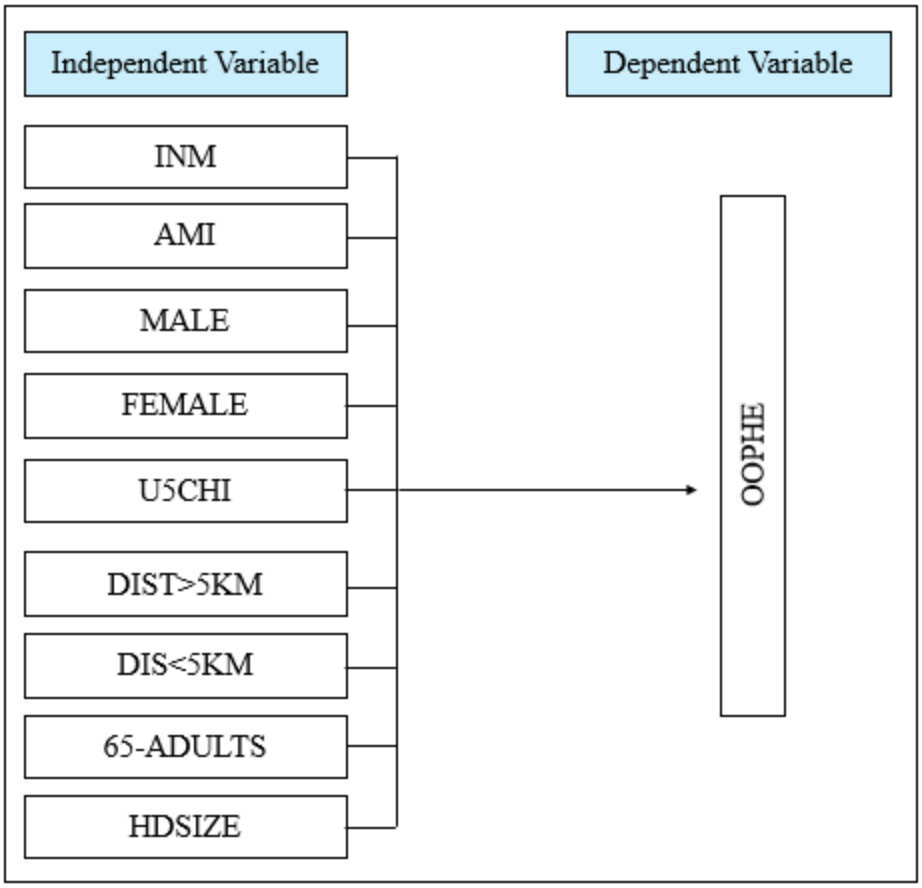

FIGURE 1. Conceptual framework.

Data was mainly extracted from the official records and reports of the Ministry of Health, the Ministry of Economy, and the Central Bureau of Statistics in the Kingdom of Saudi Arabia. They offer valuable evidence of the state of health care spending and socio-economic conditions at the present time. Secondary data were also used from academic books, academic journals, and credible periodicals, to support the analysis and locate the data in the wider academic data.

The study employs quantitative econometric methods (OLS regression) to analyze the data. The ordinary least squares (OLS) regression was used to model continuous outcomes, to explore the role of different socioeconomic factors on OOPHE. The empirical analysis is based on the 2018 Saudi Arabia Household Income and Expenditure Survey (HIES) with additional supporting evidence from WHO-based Global Health Reviews Living Standard Measurement Survey (LSMS). Such econometric techniques are known to be robust in exploring relationships among economic variables [57, 58], and are able to offer a nuanced understanding of the interaction of household characteristics in healthcare expenditure. Based on the above reviewed literature and following the steps of [59, 60, 61], the Structural equation model for determinants of OOPHE incurred by urban households in the Red Sea, Kassala, Gadarif, Sinnar and South Darfur states can be written as follows:

$OOPHE$i = α0 + α1INMi + α2AMIi + α3MALEi + α4FEMALEi + α5U5CHIi + α6DIST > 5KMi + α7DIS < 5KMi + α865 - ADULTSi + α9HDSIZEi + μI

1. DESCRIPTION OF VARIABLES

The study operationalizes a set of variables to examine the determinants of out-of-pocket healthcare expenditures (OOPHE) among urban households presented in Table 1. The dependent variable, OOPHE, is measured as the natural logarithm of the healthcare expenditures incurred by an urban household during the month preceding the survey, serving as the outcome of interest, although its expected directional effect is not predetermined.

Table 1. Measurement of variables.

Variable	Measurement	Expected Result
OOPHE	OOPHE is the natural logarithm of healthcare expenditures undertaken by an urban household during the month preceding the survey	?
INM	Insurance Membership= stands for a household's health insurance status and takes a value of 1 if the household is insured (and 0 otherwise)	-/+
AMI	Average Monthly Income	-/+
MALE	Male indicates the gender of the head of household and takes a value of 1 if male and 0 if female	-/+
FEMALE	Female indicates the gender of the head of household and takes a value of 1 if female and 0 if male	-/+
U5CHI	With U-5 Children	-/+
DIST>5KM	Distance > 5 km	-/+
DIS<5KM	Distance < 5km	-/+
65-ADULTS	With A-65 Adults	-/+
HDSIZE	Household Size	-/+

Independent variables include insurance membership (INM), a binary indicator where a value of 1 denotes that the household is insured and 0 indicates no insurance; its expected impact on OOPHE is ambiguous, potentially reducing expenditures through financial protection or, alternatively, increasing them due to higher service utilization. Average Monthly Income (AMI) captures the economic capacity of the household, with its influence on OOPHE anticipated to be ambiguous, as higher income may enable greater healthcare spending while also affording better insurance. The gender of the household head is represented by two binary variables: MALE (1 if male) and FEMALE (1 if female), each expected to exert an ambiguous effect on OOPHE, reflecting complex gender-related healthcare utilization patterns. Additional demographic and geographic variables include U5CHI, indicating the presence of children under the age of five, DIST>5KM and DIS<5KM, which capture whether the household is located at a distance greater than or less than 5 km from healthcare facilities, respectively, as well as 65-ADULTS (households with adults aged 65 and above) and HDSIZE (household size); the expected impacts of these factors on OOPHE remain ambiguous, suggesting that further empirical investigation is required to elucidate their roles in determining healthcare expenditures.

VI. RESULTS AND DISCUSSION

Table 2 represents the result of descriptive statistics where Out-of-pocket healthcare expenditures (OOPHE) are measured as the natural logarithm of the healthcare costs incurred by an urban household in the month prior to the survey. The mean value is 192.39, with a standard deviation of 89.23, indicating a

moderate spread around the average. Values range from 67 to 353, suggesting that while some regions experience relatively low expenditures, others incur significantly higher costs. The insurance membership variable (INM) has a mean of 9.05 and a standard deviation of 7.60, with values spanning from 2.5 to 26.4. This indicates considerable variability in insurance coverage levels across the regions. Average Monthly Income (AMI) exhibits a mean of 13,603.08 with a standard deviation of 2,136.67, and it ranges from 11,024 to 17,872. These figures reflect moderate differences in economic conditions among the regions.

Table 2. Descriptive statistics.

Variable	Obs.	Mean	Std. Dev.	Min	Max
OOPHE	13	192.385	89.228	67	353
INM	13	9.046	7.595	2.5	26.4
AMI	13	13603.077	2136.67	11024	17872
MALE	13	101.403	225.491	1.23	650
FEMALE	13	218.202	231.397	32.8	689.75
U5CHI	13	40	7.11	29.2	53.3
DIST>5KM	13	29.115	8.545	13.3	49.4
DIS<5KM	13	70.885	8.545	50.6	86.7
65-ADULTS	13	4.054	1.01	2.8	6.3
HDSIZE	13	59.208	8.179	43	67.7

Demographic characteristics reveal substantial variation. The MALE variable has a mean of 101.40 with a high standard deviation of 225.49, ranging from 1.23 to 650, while the FEMALE variable shows a mean of 218.20 and a standard deviation of 231.40, with values from 32.8 to 689.75. These wide ranges suggest diverse gender distributions across the observations. In contrast, the variable U5CHI, which indicates households with children under the age of five, shows less variability with a mean of 40, a standard deviation of 7.11, and a range from 29.2 to 53.3. Geographical accessibility is captured by two distance measures. DIST>5KM has a mean of 29.12 and a standard deviation of 8.55, with values between 13.3 and 49.4, indicating the extent to which regions are situated more than 5 kilometers away from a key facility. On the other hand, DIS< 5KM, measuring distances less than 5 kilometers, has a mean of 70.89 with the same standard deviation of 8.55, ranging from 50.6 to 86.7. These figures imply that a larger proportion of the population in these regions is located within 5 kilometers of the facility. Finally, the variable 65-ADULTS, representing the count (or proportion) of adults aged 65 and above, has a mean of 4.05, a standard deviation of 1.01, and values ranging from 2.8 to 6.3, indicating relatively modest variability in the elderly population across the regions. The household size (HDSIZE) variable, with a mean of 59.21, a standard deviation of 8.18, and a range from 43 to 67.7, suggests that there is a consistent pattern in household composition among the observed regions.

The correlation analysis in Table 3 reveals that insurance membership (INM) is strongly and positively correlated with the variable FEMALE (r = 0.843) and with average monthly income (AMI) (r = 0.748), suggesting that households with higher insurance coverage tend to be associated with female-headed households and higher income levels. Conversely, INM shows a strong negative correlation with household size (HDSIZE) (r = -0.772) and with the presence of children under five (U5CHI) (r = -0.703), indicating that households with greater insurance coverage may have smaller sizes and fewer young children.

Table 3. Matrix of correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
INM	1.000								
AMI	0.748	1.000							
MALE	-0.277	-0.101	1.000						
FEMALE	0.843	0.572	-0.318	1.000					
U5CHI	-0.703	-0.502	0.659	-0.822	1.000				

DIST5KM	-0.491	-0.513	-0.271	-0.254	0.018	1.000			
DIS5KM	0.491	0.513	0.271	0.254	-0.018	-1.000	1.000		
A65ADULTS	-0.358	-0.191	-0.260	-0.281	0.093	0.497	-0.497	1.000	
HDSIZE	-0.772	-0.493	0.342	-0.902	0.776	0.186	-0.186	0.511	1.000

Further examination shows that the gender indicators are inversely related, as evidenced by the negative correlation between MALE and FEMALE (r = -0.318), which is expected given their binary coding. The MALE variable also has a positive correlation with U5CHI (r = 0.659) and a moderate positive correlation with HDSIZE (r = 0.342), implying that male-headed households might tend to have larger families with more young children. In terms of geographical accessibility, the two distance measures (DIST>5KM and DIS<5KM) are perfectly negatively correlated (r = -1.000), confirming that they are complementary. DIST>5KM is moderately negatively correlated with both INM (r = -0.491) and AMI (r = -0.513), while DIS<5KM shows positive correlations with these variables (r = 0.491 and r = 0.513, respectively), suggesting that higher-income and insured households are more likely to be located within a shorter distance to key facilities. Additionally, the variable representing households with adults aged 65 and above (A65ADULTS) is negatively correlated with INM (r = -0.358) and AMI (r = -0.191) but positively correlated with HDSIZE (r = 0.511), indicating that larger households may include more elderly members. Overall, these correlations provide valuable insights into the interrelationships among the economic, demographic, and accessibility factors within the dataset, laying the groundwork for more detailed analyses in subsequent research.

The finding in Table 4 shows that insurance membership (INM) has no significant impact on out-of-pocket healthcare expenditures (OOPHE) aligns with the study of [62] they found that, while health insurance programs like India's RSBY provided some reduction in OOPHE for specific services, their overall impact on financial protection was limited. Work [15] stated that there were no significant reductions in OOPHE because of insurance coverage, indicating that the design of such programs does not significantly decrease out-of-pocket costs. Together with our current analysis, these studies support the view that enrollment per se does not equate to health care expenditures. Cost-sharing arrangements, deductibles, and gaps in coverage often expose households to the risk of substantial out-of-pocket costs. Moreover, the availability and adequacy of health insurance plans are such that they do not appear to mitigate the financial risks resulting from using health services. Therefore, the finding of this study highlights that the existing gap goes beyond the expansion of insurance coverage, and emphasizes the need of improving the design of health insurance and its depth in terms of coverage, in order to better protect households from the financial risks of health care.

As the AMI rises, OOPHE can also be expected to increase, as higher-income households generally spend more on healthcare services. This result aligns with prior studies showing that income is positively correlated with health expenditure. Inflated-income families have a relatively good ability to afford medical services, and consequently, they phenomena can occur for necessary and elective health-care services. Consequently, households are more susceptible to high out-of-pocket healthcare expenditures despite insurance coverage [21]. Additionally, higher income may create new demands for quality and specialized health care services and/or the need for services not fully covered by existing insurance schemes and public health care provisions, further encouraging the development of this sector. For instance, [31] found that higher socioeconomic status increased the likelihood of using healthcare services, leading to higher probability of OOPHE. According to these studies, the role of income is crucial when considering healthcare consumption decisions and the resulting impacts on spending patterns, as it drives both the demand for healthcare services as well as the type of services people decide to utilize.

The absence of a finding of significant influence of male-headed household on OOPHE confirms previous work to the extent that socioeconomic factors are consistently related to OOPHE rather than gender differences as such. For example, [13] found that while there may be differences in gender utilization of health care, these differences tend to disappear after controlling for major confounding variables such as income, insurance status, etc. In the same vein, [21] show that, once they account for confounding factors

(like average monthly income and membership of insurance), the gender of the head of the household does not even become a statistically significant predictor of OOPHE at any stage. These studies suggest that the householder's gender per se does not have much influence on healthcare spending decisions; they are predominantly determined by economic capacity and whether the household can afford health insurance. These results suggest that initiatives designed to alleviate the cost of healthcare should target differences in income and insurance coverage, not just gender-based differences. In settings where male and female parent-heads are subject to similar economic constraints as well as to similar healthcare needs, gender may not play a direct role in expenditure differentials. To understand and mitigate OOPHE, it is important to take a systematic approach by simultaneously considering the association of several socioeconomic determinants.

Table 4. Linear regression.

OOPHE	Coef.	St. Err.	t-value	p-value	[95% Conf	Interval]	Sig
INM	-9.909	7.73	-1.28	.269	-31.371	11.554	
AMI	.04	.013	2.95	.042	.002	.077	**
MALE	-.366	.24	-1.52	.203	-1.032	.301	
FEMALE	1.013	.353	2.87	.046	.032	1.995	**
U5CHI	1.068	10.764	1.97	.121	8.717	51.052	***
DIST5KM	18.217	6.67	-2.73	.052	-36.736	.302	*
DIS5KM	19.896	4.619	-4.31	.013	-32.719	-7.073	**
A65ADULTS	-50.048	39.346	-1.27	.272	-159.291	59.194	
HDSIZE	1.034	10.7	1.35	.049	15.276	44.143	***

Mean dependent var	192.385	SD dependent var	89.228
R-squared	0.956	Number of obs.	13
F-test	53.039	Prob > F	0.001
Akaike crit. (AIC)	153.262	Bayesian crit. (BIC)	158.346

*** p<.01, ** p<.05, * p<.1

Households led by women tend to experience higher out-of-pocket healthcare expenditures (OOPHE); this result is in line with existing literature that demonstrates that there are major gender-induced differences in terms of health care utilization and expenditure. Research has shown that women as heads of households enforce preventive care and health, leading to more healthcare consumption and thus out-of-pocket expenditure, than their male counterparts [13]. For example, according to [13], female-headed households are proactive toward medical care, leading to higher spending on preventive and curative services. In areas where formal insurance or universal public health care services are in short supply, households headed by women might spend a bigger portion of their scarce resources on health care [21]. Such preventive healthcare measures, although better for long-term health outcomes, may come with higher immediate expenses that are paid out of pocket by the household. These findings underscore the importance of factoring in gender dynamics into health policy design, with targeted interventions being needed so as to ease the financial burden on female-headed households.

The observation that households with at least one child under five years of age (U5CHI) incur higher out-of-pocket health expenditures (OOPHE) agrees with earlier findings from the field of health economics. Households with young children tend to have more frequent medical consultations, vaccinations and treatment for common pediatric illnesses, leading to higher usage of health care and costs. For example, study [14] found a strong relationship with whether there are young children living in a household, largely driven by increased demand for child specific health services. Similarly, [32] showed that households with

young dependents are at a higher risk of catastrophic health expenditure, indicating the financial burden of pediatric care. These findings indicate that the beneficial association between U5CHI and OOPHE is largely a function of clinics/healthcare facilities that treat the intrinsic healthcare needs of young children, underscoring the value of targeted health financing policies directed to families with young children.

That households located more than 5 km from a healthcare facility (DIST>5KM) incur higher out-of-pocket healthcare expenditures (OOPHE) is consistent with prior work that highlights the financial burdens posed by geographic barriers. Jobs further from home increase transportation costs and delay getting timely medical care. These delays can contribute to more serious health problems, which necessitate more intensive and expensive treatment, thereby increasing OOPHE. [63], for instance, found that the longer the distances traveled by rural Medicare beneficiaries the higher the health care expenditures, which were not only impacted by added transportation costs but also the time lost in transport (indirect costs). Similarly, [64] explained how geographic accessibility significantly raised households' likelihood of incurring catastrophic health expenditures, as the added expenses associated with travel and delays in seeking care exacerbated pre-existing financial challenges. These studies indicate that distance is both a logistical barrier and an increasingly economic one, especially for households in rural or underserved areas. At the same time, our finding stresses the idea that enhancing the access to health services, in terms of less travelling to health facilities, may be an effective approach to reduce OOPHE and have an impact on the financial burden suffered by households.

The fact that the results show households that are within 5 km of a healthcare facility (DIS<5KM) incur more out-of-pocket healthcare expenditures (OOPHE) implies easier access to care may lead to increased utilization of healthcare services. That is, households that live close to healthcare providers may be more likely to seek medical care early on and this may correspond to a greater frequency of services utilized and, as a result, increased direct expenditures. This result is consistent with previous studies reporting the importance of spatial accessibility for the use of healthcare services. [65] showed, for example, that less geographic barriers to care are associated with higher use of primary care services, which can result in higher healthcare spending overall. In a similar vein, [63] found that improved access from shorter travel distances resulted in higher utilization rates, even controlling for reduced transport expenses. These studies lend weight that closeness to healthcare facilities reduces certain indirect costs but does not mitigate the OOPHE that ultimately drives up healthcare costs due to more health-seeking behaviour and subsequent use of healthcare.

The result that 65-ADULTS has no statistically significant association in OOPHE is in line with multiple branches of past work. Despite expectations that households with a higher share of older people would spend more on health care because older people consume more medical care the relationship is not always straightforward, some studies have found. After controlling for variables like income and insurance coverage, for example, [21] found that age composition of the household did not independently lead to higher OOPHE. If such systems of health protection exist, they would act as a cushion against the yet additional medical expenses often associated with older adults, and thus help reduce the probably anticipated effect on out-of-pocket spending. Analogous to this idea, [13] also pointed out that demographic variables, such as age, might affect health care utilization; however, their impact on direct expenses is dwarfed by socioeconomic variables. In systems ensuring access to permanent public health insurance or comprehensive coverage for the elderly, the household burden may not grow as sharply in the presence of older adults. This moderating effect of insurance and public healthcare provision may account for our not seeing any significant association of the proportion of adults aged 65 and above and OOPHE in our analysis.

The result that household size (HDSIZE) is positively correlated with OOP (out-of-pocket healthcare expenditures) is consistent with previous literature showing that larger households often have higher health expenditures. Because larger households typically have more dependents and diverse health needs, they use healthcare more frequently, potentially leading to higher cumulative out-of-pocket spending. For instance, according to [13], the chances of higher healthcare expenses rose with an increase in the number of household members because of the accumulating demand for both preventive and healing services. In a similar vein, [21] found that larger households in Saudi Arabia suffer more financial burdens concerning health care, as the aggregate health needs of household members can result in higher out-of-pocket expenditures.

VII. POLICY RECOMMENDATIONS

The lack of importance of insurance membership for out-of-pocket clinical spending implies that merely expanding insurance coverage to expand coverage of clinical services will not significantly reduce healthcare expenditure impacts on households. Such evidence suggests that existing insurance schemes may not be sufficiently comprehensive to ensure that households could benefit from their insurance in an encounter due to high deductibles, cost-sharing arrangements, and other restrictive coverage arrangements. As a partial solution, policymakers should rework health insurance programs to feature richer benefits, lower deductibles and less cost-sharing to strengthen the ability of insurance to not just provide coverage but also to effectively insulate individuals from the direct costs of care.

The study finds that the average monthly income and the out-of-pocket expenses are positively associated with each other, which also indicates that higher-income households are more likely to spend on healthcare services. This trend may indicate both a greater ability to afford more extensive or specialized care, and greater demand for quality health services, among wealthier households. Yet, although higher income may allow more broadband access to healthcare, it also suggests a growing need for progressive financing techniques that will help spread healthcare costs more evenly through the various income brackets, protecting lower-income households from financial strain.

Similarly, the recognition of non-random patterns of both healthcare expenditure and household characteristics emphasizes the need for targeted public health interventions. Households with young children, female-headed households, and those with significant geographic barriers are major affected groups that may be more vulnerable to high out-of-pocket costs, for example. A movement towards policies that seek to improve healthcare access to underserved communities, increase the quality and comprehensiveness of insurance benefits, and extend targeted support measures to those most vulnerable could together help reduce the aggregate cost burdens of households in the US healthcare system, thereby creating a system that functions equitably and efficiently.

VIII. CONCLUSION

The study contributes to the growing body of literature that indicates limited benefits associated with insurance membership in the healthcare domain (OOPHE) and that the country needs to do more in order to improve access to care. Even with increasing coverage, the potential for high health care costs still exists for households due to cost-sharing, deductibles, and other restrictions on coverage. Our results also suggest that higher average monthly income is linked to higher OOPHE as wealthier households are more likely to make use of wider healthcare goods and services, including both necessary and elective care. Demographic factors also play a crucial role; while male-headed households show no significant impact on OOPHE, female-headed households, households with young children, and larger households incur higher expenditures, suggesting that socioeconomic and familial dynamics influence healthcare spending patterns. These results emphasize the importance of revisiting and refining health insurance design. Rather than merely expanding coverage, policymakers must focus on creating more comprehensive and financially protective insurance schemes that address the inherent limitations in current programs. Strategies such as reducing cost-sharing requirements, lowering deductibles, and broadening the scope of covered services could help mitigate the financial burden on households, especially for those with vulnerable demographic profiles. Future research should examine the effects of improved insurance design on OOPHE by utilizing longitudinal data to capture dynamic changes over time. Further studies might also explore the interaction between income levels, demographic factors, and healthcare utilization to identify targeted policy interventions.

Funding Statement

This Project is sponsored by Prince Sattam bin Abdulaziz University (PSAU).

Conflicts of Interest

The author declare that he has no relevant financial or non-financial interests to disclose.

Data Availability Statement

The author disclose that the datasets used or produced in this study are available from corresponding author on reasonable request.

Acknowledgements

This study is supported via funding from Prince Sattam bin Abdulaziz University project number PSAU (2023/02/25869).

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