Research

Healthcare access and deprivation in low-income urban households

Adrino Mazenda[1] · Moses Lubinga[2]

© The Author(s) 2024   OPEN

Abstract

The financial situation of households is related to their access to healthcare and their level of deprivation. This study analysed the factors that influence access to healthcare among low-income households in Gauteng, South Africa. A quantitative cross-sectional design was adopted using the binary logistic regression technique, drawing on the Gauteng City-Region Observatory Quality of Life 2020/2021 data, consisting of 9700 observations randomly drawn from eight municipalities. Based on marginal effects, the study findings revealed that seven factors significantly influenced access to healthcare. That is, healthcare source, nonuse of public facilities, proximity to a healthcare facility, satisfaction with healthcare services, medical aid, health status, health work, social health activities, and chronic illness. More effort is needed to harness Gauteng's economic progress towards alleviating poverty and increasing opportunities to lift low-income households out of the poverty trap. Investment in an advanced public health care system, public–private sector coordination, improved health budget allocation, and doctor-patient ratio will reduce the out-of-pocket costs of poor households.

Keywords Binary logistic model · Household poverty · Health Care · Urban municipalities · Gauteng · South Africa

1 Background

The Sustainable Development Goal 1 (SDG) aims to eliminate all forms of poverty for all people while improving the lives of the poor and marginalised [1]. Poverty is defined as the living standards of a population being lower than they should be due to low birth rates, low educational attainment, and low per capita real GDP [2]. Approximately half a billion people worldwide are impoverished due to healthcare-related costs [2]. Rising healthcare prices cause people to cut back on necessities such as food and clothing. This can create debt, harm family welfare, and lead to poverty. Catastrophic health costs are the term used to describe this kind of expense caused by health problems that push households into poverty [3]. Households are classified as poor based on their education, income, and employment. Income substantially impacts households' lives [3]. Poverty lines measure the poverty status of households, with most lower-class/low-income households earning below the upper-bound poverty income. The upper-bound poverty income in South Africa is R1335 [4]. Lower-class households have limited financial resources and cannot afford health care [5]. For low-income groups, the risk of major diseases and poverty influence one another. Low income causes households to sink when they face high medical expenses, often choosing to skip treatment, worsening their health status, and causing them to fall into a vicious cycle of poverty [6]. At times, chronically ill people will quit treatment and have "suicidal tendencies" [7].

✉ Adrino Mazenda, adrino.mazenda@up.ac.za | [1]School of Public Management and Administration, University of Pretoria, P. Bag X28 Hatfield, Pretoria, South Africa. [2]National Agricultural Marketing Council, 536 Francis Baard, Pretoria, Arcadia, South Africa.

About 80% of the South African population relies on public health care due to limited income and unemployment [8]. The Constitution of the Republic of South Africa Sect. 27(1) provides the right to healthcare services (including reproductive health), adequate social security, water, and food. Consequently, the National Health Insurance (NHI) aims to ensure that all South Africans, regardless of socioeconomic status, have access to high-quality public and private health facilities, removing financial barriers to health care [8]. These provisions are violated, especially in Gauteng, South Africa, where the healthcare sector is underfunded and poorly managed. The Gauteng province did not meet the human rights obligations that ensure safeguarding, advancement and access to satisfactory healthcare services for residents of the area: Only 12% of the 54 public health facilities examined operated at or above 50% capacity. Only one clinic performed above the required standards to claim acceptable care. This has a detrimental impact on people since they cannot afford private health care due to the increasing cost of living despite stagnant earnings, poor social services, and the high unemployment rate (32.9%) [9].

The study answers the following questions:

o   What are the factors that influence low-income households' access to healthcare?
o   What are the policy implications for low-income households' access to healthcare?

A quantitative case study design was adopted, using the binary logistic model drawing on Observatory Quality of Life data from eight municipalities in Gauteng. The study hypothesises that low-income households earning below the lower bound poverty income tier are more likely to have limited access to healthcare than households earning above the upper bound income category (healthcare source, non-use of public facilities, proximity to health care, health satisfaction, medical aid, health status, health work, social health social activities and chronic health illness).

Numerous studies have demonstrated that the socioeconomic class of an individual can significantly impact their health and well-being [10, 11]. Generally, people in the upper class tend to live longer, enjoy better health, and suffer fewer physical disabilities than those in the lower class [12]. Previous research in Gauteng has focused on socioeconomic factors as determinants of healthcare access in specific municipalities [13, 14] and hospitals [15, 16]. Finally, some studies have targeted all Gauteng municipalities, where households were not classified based on poverty status [17, 18]. This study aims to contribute to the existing literature on access and healthcare care deprivation by targeting vulnerable low-income households classified through deprivation in the eight urban municipalities of Gauteng.

The article is structured as follows: introduction, literature review, materials and methods, results, discussion, conclusions, and policy recommendations.

1.1 Theoretical position

Poverty is 'the absence of basic resources or the lack of one or more factors that enable individuals and families to assume basic resources and enjoy fundamental rights (these are non-monetary or direct measures)" [19]. The literature on poverty has classified individuals based on their education, income, and occupation. These elements can influence class structure [20]. The lower income class, which is the subject of this study, includes households earning less than the upper-bound poverty income [21]. In South Africa, the lower poverty line as of April 2021 was estimated at R624, and R1335 as the upper-bound poverty line [4]. A poverty line estimates the minimum income level needed to secure necessities [4]. Low-income households are susceptible to poverty and various indicators related to health poverty, since most of these households are in debt and spend a lot on transport and food with lesser savings [22].

The human capital theory perceives health as a long-term capital stock that produces healthy time. Individuals inherit a portion of this stock, which depreciates with age and can be augmented by investment. Health is a long-term asset that brings benefits through direct utility (such as feeling better when we are healthier). By allowing us to invest healthy time in the market (such as producing goods and services through employment or starting a business) and non-market activities (such as leisure time) [23], The "shadow price" of health is determined by several factors other than the cost of medical care. It is demonstrated that the shadow price grows with age if the rate of depreciation on the stock of health rises across the life cycle and reduces with education if more educated persons are more efficient producers of health. A rise in the shadow price can decrease the demand for health services while increasing the required inputs [23]. According to this study, human capital is positively correlated with income inequality, indicating unequal economic opportunities and an unequal education system. [24]. Chronic diseases influence the structure and revenue generation [25].

1.2 Empirical literature

Socioeconomic determinants of health are one of the major domains of poverty, reflecting unfavourable social disadvantages [26]. The empirical literature shows that health poverty is influenced by socioeconomic factors, such as geographical differences, income and employment status, and infrastructure amenities [27]. For those who live in poverty, social determinants of health can be attributed to childcare and education, parental health literacy, physical environment, family social support, intimate partner violence, family mental illness, domestic drug use, exposure to firearms and family finances and physical environment [28]. Factors that influence the health status of low-income households include various elements other than medical aid: low educational achievement, unstable housing, lack of employment, health insurance and access to care [26, 29, 30].

Low-income households struggle to buy enough food. Furthermore, the food they can afford is poor quality, high in calories, and low in nutrients. Healthy and rich in nutrients are typically more than unhealthy foods [31], which determines the quality of their health [32].

Other factors include fewer opportunities to exercise in urban areas, limited availability of affordable healthy foods in the local food environment, visible marketing of fast-food products (including sugar-sweetened beverages), unfair access to efficient, high-quality, and all-inclusive health services (with an emphasis on wellness promotion, disease prevention, and cure-care referrals) are prevalent in South Africa [32]. Access to health and social services is affected by poverty, racism, and social stigma. These are among several examples of complex factors that impact population health due to their complicated interactions with individual characteristics, behaviors, and outcomes of disease prevention and treatment in South Africa [33].

However, several studies showed that socioeconomic classes could predict individual health [10, 11]. Compared to the lower class, the upper classes have longer life expectancies, better health statuses, and less possibility of physical disability [12]. Lower socioeconomic status is associated with poor health and shorter life expectancy [34]. Lower-class household members are 1.5 times more likely to die before age 85 than the affluent. Being of a lower socioeconomic status can reduce life expectancy by 2.1 years (41% for males and 27% for females). This is due to health risks such as hypertension, obesity, excessive alcohol consumption, and a sedentary lifestyle [12]. Low income can also have severe consequences for low-income households [7].

This study bridges the gap through methodological and context contributions to the literature on healthcare access targeting low-income households vulnerable to extreme poverty in urban municipalities in developing countries.

2 Methods

This section presents the materials and methods used in the study: data and sampling methods, and the empirical model.

2.1 Data and sampling

The study used primary data from the Gauteng City Region Observatory (GCRO) Quality of Life (QoL) collected in 2020 and 2021 as a sampling frame for the head of household. A four-multistage stratified cluster sampling approach was employed to collect GCRO QoL data (2020/21) from selected adult individuals as respondents. Multistage stratified cluster sampling is advantageous over pure random sampling in terms of the logistic viability and economic efficiency [35]. During the first two stages, the Enumerator Areas (EA) within each ward were randomly selected using a probability proportional to size (PPS) sampling technique to serve as clusters for visiting locations. Subsequently (step 2), residential housing units as points of interest were selected using simple random selection [36]. The next stage involved choosing a home at the visitation point and choosing an adult respondent residing in that household [37].

All respondents were personally interviewed at their residences. The study allowed a random sample of 13616 respondents from 529 districts in the Gauteng City Region (i.e., City of Ekurhuleni; City of Johannesburg Metropolitan Municipality; City of Tshwane Metropolitan Municipality; Emfuleni Local Municipality; Lesedi Local Municipality; Merafong Local Municipality; Midvaal Local Municipality; Mogale City Local Municipality). The study retained 9700 households classified under the two income categories (lower-bound and upper-bound poverty income). All data from the QoL surveys are publicly available under a CC BY-SA 4.0 license.

2.2 Empirical model

In this study, the dependent variable was the level of poverty among Gauteng households, denoted by the poverty income in the lower and upper bound. To investigate such data, we used a binary logistic model, drawing on previous literature [12, 38, 39].

The binary logistic model can model a binary dependent variable with multinomial results, eg, $y = 1, 2, …, m$. The structural model can be expressed as.

$$y *= xi\beta + \varepsilon i \tag{1}$$

where y = household income with two levels, lower bound poverty income,1 and upper bound poverty income 2; x_i = vector of nonrandom explanatory variables observed of healthcare determinants; and ε_i = an error of random term with mean 0 and variance 1.

Assuming that the error term is normally distributed, the likelihood of observing a specific value of y is;

$$Pij = P(yi = j) = \phi(\mu j - xi\beta) - \phi(\mu j - 1 - xi\beta) \tag{2}$$

where $\Phi(\cdot)$ is the standard normal distribution function.

Individuals need R624 monthly to meet their basic needs (food poverty line) in South Africa. In this paper, we use two poverty lines, that is, R890 for the lower bound poverty line and R1335 for the upper-bound poverty line [4]. Given the structure of the income ranges used in the GCRO QoL (2020/2021) dataset, the closest income range used as a threshold between the lower and upper bound poverty lines corresponds to R801-R1600. The dependent variable (poverty level) is examined according to exogenous variables observed (healthcare determinant captured in the GCRO QoL (2020/2021); source of healthcare, non-use of public facilities, healthcare proximity, health satisfaction, medical aid, health status, health work, social health activities and chronic diseases as defined in Table 1. These factors are exhaustive of the Quality of Life Survey and are adopted based on the World Health Organisation [40]. These factors are categorised into five broad categories: genetics, behaviour, environmental and physical influences, medical care, and social factors, all with significant impacts on health and access and use of health care services.

3 Results

This section presents the results of the study. The first section presents descriptive statistics, diagnostic tests, and findings based on marginal effects.

3.1 Descriptive statistics

About 2975 (30.7%) respondents earned below the upper-bound threshold poverty line -R1600). Most respondents (66.4%) obtain health care from public health facilities, followed by 23.5% from private facilities. Only 0.6% and 0.3% receive health care services from traditional and spiritual healers. Of the respondents who do not use public health facilities, the majority (54.8%) indicated that the quality of care provided is the key deterrent, followed by the long queues at the facilities (18.9%), while the cost of health services (1.0%) was the least of the hindrances reported. Around 73.8% of the respondents use healthcare facilities in their communities and 65.5% were satisfied with the services rendered.

In particular, 16.5% of the respondents also reported dissatisfaction with the services received in healthcare facilities within Gauteng. Most (77.8%) of the respondents were not covered by any form of medical assistance or medical insurance, but at least more than 50% expressed that their health in the past four weeks was good. The excellent health status corresponds to the high proportion (66.2%) of the respondents who never or rarely get interrupted from doing work. Regarding chronic diseases, it is hypertension and diabetes, which respondents or a member of their family had been sick the most, with 22.7% and 10.7%, respectively. For all other chronic diseases, less than 10% of the respondents indicated that they had suffered from any of the diseases or were a member of the household.

Table 2 summarises poverty and health indicators in the Gauteng City Region in South Africa.

Table 1 Measurement of variables. Source:Authors

Variable	Description
Poverty line	Total amount of household money per month received 1. Respondent who received more than the poverty-line threshold (R1600) (Upper-Bound Poverty line); and 1. Respondent who received below the poverty-line threshold (Lower-Bound Poverty line)
Healthcare	Where do you usually go for health care? 1. Private healthcare facilities 2. Public healthcare facilities 3. Use public and private facilities 4. Traditional healer (Sangoma) 5. Spiritual healer (e.g., faith-related) 6. Not applicable, don't usually need health care
Non-use of public Healthcare	What is the MAIN reason that you do not use public health facilities? 1. Cost 2. Quality of care 3. No public health care facilities close by 4. The queues are usually too long 5. I have been before, and they could not help me 6. The staff is too unfriendly or unhelpful 7. The clinic often does not have the medicine I need 8. Other
Health proximity	Are the healthcare facilities you usually use in the area where you live 1. Yes 1. No
Health satisfaction	How satisfied are you with the health services you usually use? 1. Very satisfied 2. Satisfied 3. Neither satisfied nor dissatisfied 4. Dissatisfied 5. Very dissatisfied
Medical aid	Are you personally covered by any form of medical aid or other medical? 1. No 2. Yes 3. Don't Know
Health Status	Would you describe the state of your health in the past 4 weeks as: 1. Excellent 2. Good 3. Poor 4. Very Poor
Health work	How often, if ever, does the state of your health prevent you from doing 1. Always 2. Some of the time 3. Hardly ever 4. Never
Health status and participation in social activities	How often, if ever, does your health prevent you from participating in social activities? 1. Always 2. Some of the time 3. Hardly ever 4. Never
Cancer	Have you or any other member of this household had cancer in the last year? 1. Yes 1. No
Diabetes	Have you or any other household member had diabetes in the last year? 1. Yes 1. No
Asthma	Have you or any other household member had Asthma in the last year? 1. Yes 1. No

Table 1 (continued)

Variable	Description
Pneumonia	Have you or any other household member had pneumonia in the last year? 1. Yes 1. No
Heart	Have you or any other household member had heart disease in the last year? 1. Yes 1. No
Hypertension	Have you or any other member of this household had hypertension in the last year? 1. Yes 1. No
HIV	Have you or any other member of this household had HIV in the last year? 1. Yes 1. No
Tuberculosis	Have you or any other household member had tuberculosis in the last year? 1. Yes 1. No
COVID-19	Have you or any other household member had Covid-19 in the last year? 1. Yes 1. No

3.2 Diagnostic test

Table 3 presents the goodness of fit for the adopted model using the likelihood ratio test, where the focus is on the Pseudo R^2 as an indicator to measure the goodness of fit.

The Pseudo R^2 shows the percentage of variance in the dependent variable that the chosen dependent variables could account for. The model and the dependent variable are significantly related, according to the Cox and Snell R^2 of 0.469 [41].

3.3 Marginal-effects findings

This section presents the findings of the marginal effects analysis. The study adopted seventeen explanatory variables that influence the access to healthcare for low-income households in Gauteng. The study findings presented in Table 4 reveal that seven variables/factors significantly influenced access to healthcare among deprived households in Gauteng, that is, (type of health care, non-use of public facilities, satisfaction with health care, medical aid, and being diagnosed with the following diseases (Diabetes, Asthma, and COVID-19).

Using the lower bound poverty line (LBPL) households as a reference point, there is a 1.3% probability of respondents obtaining healthcare services (healthcare *access*) from public health facilities. Similarly, there is a 0.4% likelihood that the respondents in the lower bound poverty line income category will not use public health facilities (non-use *public facilities*) due to factors such as limited access to good quality care services provided in public health facilities.

Regarding the extent to which the respondents were satisfied with the often used health services often used (health *satisfaction), the* results show a 1.3% likelihood that low-income households were dissatisfied with the health services rendered. On the contrary, respondents covered by medical aid *(Medical Aid)* exhibited a 9.8% probability of earning above the upper income poverty line. If a household had a member with diabetes *(Diabetes),* there was a 3% chance that the member was in the lower-bound income category. In comparison, a household with an asthmatic *(Asthma)* member was 3.7% likely to be within the upper poverty income category. The results of a household member who has COVID-19 reveal a 6.7% probability that such a household lives below the lower poverty line.

4 Discussion

As presented in Table 4, the study identified seven variables that significantly influence healthcare access in low-income Gauteng households. These are healthcare sources, non-use of public facilities, health satisfaction, medical aid, diabetes, asthma, and COVID-19.

Table 2 Descriptive analysis. Source:Authors

Variable	Category	Observations	Frequency	%
Poverty line (Poverty Income/month)	Lower-Bound Poverty line	9700	2975	30.67
	Upper-Bound Poverty line		6725	69.33
Healthcare	Private healthcare facilities	9700	2279	23.49
	Public healthcare facilities		6443	66.42
	Use public and private facilities		509	5.25
	Traditional healer (Sangoma)		53	0.55
	Spiritual healer (e.g., faith-related)		31	0.32
	Not applicable, don't usually need health care		385	3.97
Non-use of public Healthcare	Cost	2363	24	1.02
	Quality of care		1294	54.76
	No public health care facilities close by		93	3.94
	The queues are usually too long		447	18.92
	I have been before, and they could not help me		64	2.71
	The staff are too unfriendly or unhelpful		102	4.32
	The clinic often does not have the medicine I need		84	3.55
	Other		255	10.79
Health proximity	No	9315	2437	26.16
	Yes		6878	73.84
Health satisfaction	Very satisfied	9700	1905	20.45
	Satisfied		4195	45.03
	Neither satisfied nor dissatisfied		741	7.95
	Dissatisfied		1540	16.53
	Very dissatisfied		934	10.03
Medical aid	No	9700	7549	77.82
	Yes		2116	21.81
	Don't Know		35	0.36
Health Status	Excellent	9700	3182	32.80
	Good		5331	54.96
	Poor		1068	11.01
	Very Poor		119	1.23
Health work	Always	9700	227	2.34
	Some of the time		2073	21.37
	Hardly ever		2419	24.94
	Never		4981	51.35
Health status and participation in social activities	Always	9700	220	2.27
	Some of the time		1977	20.38
	Hardly ever		2519	25.97
	Never		4984	51.38
Cancer	No	9700	9478	97.71
	Yes		222	2.29
Diabetes	No	9700	8662	89.30
	Yes		1038	10.70
Asthma	No	9700	8977	92.55
	Yes		723	7.45
Pneumonia	No	9700	9588	98.85
	Yes		112	1.15
Heart	No	9700	9245	95.31
	Yes		455	4.69
Hypertension	No	9700	7495	77.27
	Yes		2205	22.73

Table 2 (continued)

Variable	Category	Observations	Frequency	%
HIV	No	9700	8856	91.30
	Yes		844	8.70
Tuberculosis	No	9700	9505	97.99
	Yes		195	2.01
COVID-19	No	9700	9401	96.92
	Yes		299	3.08

Table 3 Likelihood Ratio Test. **Source**:Authors

Step2	Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	95.172a	0.469	0.819

For healthcare, there is a likelihood that respondents will return to the low-bound poverty income category due to overreliance on public health care. Similarly, there is a likelihood that respondents will return to the lower-bound poverty line due to several reasons for not using public health facilities (nonuse *public),* including the limited access to good-quality care services provided at public health facilities. The acceptability of services and service providers for patients is a factor that determines access to healthcare [42]. Some characteristics of public care facilities include long waiting times, the nonchalant attitude of service providers, insufficient diagnostic equipment, inadequate basic amenities, and an inadequate workforce [42]. Issues such as fragmentation of health services, inadequate infrastructure, poor quality of service, poor human resources personnel, and insufficient staff members' attitudes towards patients prevent patients from visiting public healthcare facilities. Some of the challenges encountered by households in access to public health facilities include; appointment delays, long waiting times, and a shortage of healthcare personnel [43].

Regarding the degree to which the respondents were satisfied with the health services often used (health satisfaction); results show a lower likelihood that low-income households are dissatisfied with the health services rendered[15].Healthcare satisfaction is directly related to proximity to health care facilities, health care services (lack of personnel), overcrowding, long waiting times, lack of medication and infrastructure, which negatively impact health in the Gauteng [18, 44, 45]. Further highlights indicate that South Africa's health care system is considered highly unequal, reflecting poverty and lifestyle factors within different households. The private sector is primarily funded through medical aid schemes, while the public sector is state funded and provides for most of the population of Gauteng [15]. On the contrary, respondents covered by any medical assistance (*medical aid)* had a smaller chance of being considered in the upper-income poverty line category. Higher-income households are more likely to have private medical insurance than lower-income households, which can help people access and use healthcare. It can be difficult for low-income families to pay for prescription medications and medical treatment [46].

If a household had a member with diabetes (*diabetes),* there was a 3% probability that that household would be classified into the low-bound poverty line category. The crucial risk factors for the onset and progression of preventable chronic diseases include poor food choices, lack of exercise, smoking, excessive alcohol consumption and ongoing stress [47]. A household with a member who was asthmatic (*asthmatic)* was less likely to be in the upper poverty line income category. Substandard housing and indoor environmental exposures have been associated with higher indoor allergen intake and asthma morbidity and death in low-income urban households [48]. Excess moisture promotes an increase in mites, mould, and cockroaches [49]. In addition to indoor environmental exposures, low-income neighbourhoods are often located near highways and bus stops; proximity to high-traffic areas results in ambient particulate matter and diesel fumes permeating from the outside and high lead contamination of plants and dirt [50]. The results of a household member having COVID-19 showed a high likelihood that such a household is in the low income poverty line category. Low-income households lack the financial resources to cover their living and medical expenses while in the hospital, increasing their economic vulnerability [51]. As the recovery from the labour market has been slow, households liquidated their tiny reserves and defaulted on insurance payments, which had long-term effects on household income [52].

Table 4 Marginal effects findings

Variable	dy/dx	SE	z	P > z	[95% conf. interval]	
Healthcare type						
UBPL	0.013	0.006	2.160	0.031**	0.001	0.025
LBPL	−0.013	0.006	−2.160	0.031**	−0.025	−0.001
Non-use public facilities						
UBPL	0.004	0.002	1.650	0.099*	−0.001	0.009
LBPL	−0.004	0.002	−1.650	0.099*	−0.009	0.001
Health proximity						
UBPL	−0.006	0.011	−0.510	0.613	−0.028	0.016
LBPL	0.006	0.011	0.510	0.613	−0.016	0.028
Health satisfaction						
UBPL	0.013	0.007	1.950	0.051*	−0.000	0.027
LBPL	−0.013	0.007	−1.950	0.051*	−0.027	0.000
Medical aid						
UBPL	−0.098	0.011	−8.670	0.000***	−0.120	−0.076
LBPL	0.098	0.011	8.670	0.000***	0.076	0.120
Health Status						
UBPL	−0.009	0.009	−0.960	0.340	−0.027	0.009
LBPL	0.009	0.009	0.960	0.340	−0.009	0.027
Health work						
UBPL	−0.015	0.012	−1.280	0.202	−0.037	0.008
LBPL	0.015	0.012	1.280	0.202	−0.008	0.037
Health Social activities						
UBPL	0.004	0.012	0.360	0.717	−0.019	0.028
LBPL	−0.004	0.012	−0.360	0.717	−0.028	0.019
Cancer						
UBPL	0.009	0.029	0.310	0.755	−0.048	0.066
LBPL	−0.009	0.029	−0.310	0.755	−0.066	0.048
Diabetes						
UBPL	0.030	0.017	1.840	0.066*	−0.002	0.063
LBPL	−0.030	0.017	−1.840	0.066*	−0.063	0.002
Asthma						
UBPL	−0.037	0.021	−1.790	0.074*	−0.078	0.004
LBPL	0.037	0.021	1.790	0.074*	−0.004	0.078
Pneumonia						
UBPL	0.043	0.040	1.080	0.280	−0.035	0.121
LBPL	−0.043	0.040	−1.080	0.280	−0.121	0.035
Heart						
UBPL	0.011	0.023	0.470	0.638	−0.035	0.057
LBPL	−0.011	0.023	−0.470	0.638	−0.057	0.035
Hypertension						
UBPL	−0.017	0.014	−1.190	0.233	−0.044	0.011
LBPL	0.017	0.014	1.190	0.233	−0.011	0.044
HIV						
UBPL	−0.004	0.034	−0.110	0.911	−0.070	0.062
LBPL	0.004	0.034	0.110	0.911	−0.062	0.070
Tuberculosis						
UBPL	0.032	0.051	0.630	0.527	−0.067	0.131
LBPL	−0.032	0.051	−0.630	0.527	−0.131	0.067
COVID-19						
UBPL	−0.067	0.033	−2.050	0.041**	−0.132	−0.003
LBPL	0.067	0.033	2.050	0.041**	0.003	0.132

Table 4 (continued)   *. **, *** denote significance at 1%, 5% and 10% significance levels; LBPL is the lower-bound poverty line, while UBPL represents that upper-bound poverty line

5 Conclusions

The study used the binary logistic model to analyse the factors that influence healthcare access among low-income households in eight urban municipalities of Gauteng in South Africa. About 2975 households earned below the lower-bound poverty income threshold of lower than R1600 using the STATS SA poverty income thresholding. Based on the binary logistic model, the study findings revealed seven health variables that significantly influence low-income households' access to healthcare. That includes health care sources, non-use of public facilities, health satisfaction, medical aid, and household members suffering from chronic diseases in the past year, such as diabetes, asthma, and COVID-19. The marginal effects did not show much difference in the influence of the identified factors on the healthcare of households above the upper bound poverty threshold.

6 Policy implications

Regardless of income status, most households in Gauteng are affected by various factors that affect access to health-care. As such, these households are more dependent on public health facilities without access to medical aid. Explicit prioritisation of healthcare is critical. Given the levels of poverty and inequality in the country, the provincial government should set a precise priority in determining who accesses vital services such as surgery and when. People with the least coverage should be prioritized in Gauteng health facilities before expanding access to others with more access to care. A comprehensive primary health care package should prioritise services where lower income groups enjoy the least access. The Gauteng health system must be more responsive at the levels where the majority will likely access it. This means moving services out of facilities and proactively engaging people through lower-level workers, such as community health workers.

Access to medical schemes should not lead to negligence in public health care. Patients should not be treated better simply because they can afford to pay more. The high remuneration of private care has detrimental effects on public health care; as most doctors focus on the private sector, there will be a limited number of physicians working there. These two markets affect each other. If private healthcare costs are reduced, there will be a reduction in costs for everyone. This means that the public health sector will suffer long-term as it struggles to keep up with the cost of care.

There is also a need to improve access to healthcare through convenience. This includes investing in mobile clinics, which reduce the burden on outpatient services at hospitals for primary health care, including family planning, and partnering with ambulatory surgical centers and four high-volume, low-acuity surgeries, including gastroenterology, ophthalmology, and endoscopy services. All these initiatives are without out-of-pocket costs in security and safety in societies where crime is rife. As such, the provincial government should consider investing in security.

Gauteng municipalities should also consider a commitment to better environmental management and to comply with climate action goals to reduce the effects of pollution from exhaust fumes, dirt, and other health hazards in poor urban communities. Reduce brain drain and increase the doctor-patient ratio through improved allocation of provincial health budget is also necessary. In addition, Gauteng's private and public health sectors should be improved on specific deliverables to build a better healthcare system.

Finally, Gauteng cities need more effort to harness the province's economic progress toward alleviating poverty and increasing opportunities to lift low-income households out of the poverty trap. Investment in an advanced public health care system, that is, public hospitals and clinics in Gauteng, can protect households from the potentially disastrous effects of out-of-pocket health care costs.

Data availability The study used primary data from the Gauteng City-Region Observatory (GCRO) Quality of Life (QoL) 2020/ 2021. All data from the QoL surveys are publicly available under a CC BY-SA 4.0 license. DOI: https://doi.org/https://doi.org/10.25828/wemz-vf31

Declarations

Ethics approval and consent to participate Not applicable.

Competing interests The authors declare no competing interests.

References

1. Dawson N, Martin A, Camfield L. Can agricultural intensification help attain sustainable development goals? evidence from Africa and Asia. Third World Quarterly. 2019;40(5):926–46.
2. World Bank, *Understanding Poverty.* 2021.
3. Lu J, et al. Can health poverty alleviation project reduce the economic vulnerability of poor households? evidence from Chifeng City. China Comput Indust Eng. 2021;162: 107762.
4. Stats SA. National poverty lines (2021), department of statistics South Africa. Government Printers: Pretoria; 2021.
5. Lazar M, Davenport L. Barriers to health care access for low income families: a review of literature. J Community Health Nurs. 2018;35(1):28–37.
6. Zhang DD, et al. Association between socioeconomic status and chronic obstructive pulmonary disease in Jiangsu province, China: a population-based study. Chin Med J. 2021;134(13):1552–60.
7. Vuong Q-H, et al. Near-Suicide phenomenon: an investigation into the psychology of patients with serious illnesses withdrawing from treatment. Int J Environ Res Public Health. 2023. https://doi.org/10.3390/ijerph20065173.
8. International Citizens Insurance. *Understanding South Africa's Healthcare System.* 2022; Available from: https://www.internationalinsurance.com/health/systems/southafrica.php.
9. South African Human Rights Commission. *Gauteng is still failing the poor*. 2020; Available from: https://www.sahrc.org.za/index.php/sahrc-media/news/item/2291-gauteng-still-failing-the-poor-sahrc-report.
10. Simandan D. Rethinking the health consequences of social class and social mobility. Soc Sci Med. 2018;200:258–61.
11. Muntaner C. Whither occupational class health gradients?: why we need more social class theory, mechanisms, indicators, and scientific realism. Epidemiology. 2019;30(3):445–8.
12. Hu X, et al. Impact of social class on health: the mediating role of health self-management. PLoS ONE. 2021;16(7): e0254692.
13. Moeti T, et al. Factors affecting access to public healthcare facilities in the city of Tshwane, South Africa. Int J Environ Res Public Health. 2023. https://doi.org/10.3390/ijerph20043651.
14. Gordon T, Booysen F, Mbonigaba J. Socio-economic inequalities in the multiple dimensions of access to healthcare: the case of South Africa. BMC Public Health. 2020;20(1):289.
15. Mukwena NV, Manyisa ZM. Factors influencing the preparedness for the implementation of the national health insurance scheme at a selected hospital in Gauteng Province, South Africa. BMC Health Serv Res. 2022;22(1):1006.
16. Malakoane B, et al. Public health system challenges in the free State, South Africa: a situation appraisal to inform health system strengthening. BMC Health Serv Res. 2020;20(1):58.
17. Ngobeni V, Breitenbach MC, Aye GC. Technical efficiency of provincial public healthcare in South Africa. Cost Eff Resour Alloc. 2020;18:3.
18. Abera Abaerei A, Ncayiyana J, Levin J. Health-care utilization and associated factors in Gauteng province South Africa. Glob Health Action. 2017;10(1):1305765.
19. Lister R. Poverty. John Wiley Sons: Hoboken; 2021.
20. Rutter H, et al. The need for a complex systems model of evidence for public health. The lancet. 2017;390(10112):2602–4.
21. Decerf B. Combining absolute and relative poverty: income poverty measurement with two poverty lines. Soc Choice Welfare. 2021;56(2):325–62.
22. Koďousková H, Lehotský L. Energy poverty in the Czech Republic: Individual responsibility or structural issue? Energy Res Soc Sci. 2021;72: 101877.
23. Grossman M, *The human capital model of the demand for health*. National Bureau of Economic Research. 1999
24. Roddy Á. Income and conversion handicaps: estimating the impact of child chronic illness/disability on family income and the extra cost of child chronic illness/child disability in Ireland using a standard of living approach. Eur J Health Econ. 2022;23(3):467–83.
25. Liao W, et al. Chronic illness and income diversification in Rural China. Int J Environ Res Public Health. 2021. https://doi.org/10.3390/ijerph18073350.
26. Norris KC, Beech BM. Social determinants of kidney health: focus on poverty. Clin J Am Soc Nephrol. 2021;16(5):809–11.

27. Iqbal N, Nawaz S. Spatial differences and socioeconomic determinants of health poverty. Pak Dev Rev. 2017;56(3):221–48.
28. Chung EK, et al. Screening for social determinants of health among children and families living in poverty: a guide for clinicians. Curr Probl Pediatr Adolesc Health Care. 2016;46(5):135–53.
29. Schmalbach B, et al. Psychological and socio-economical determinants of health: the case of inner German migration. Front Public Health. 2021. https://doi.org/10.3389/fpubh.2021.691680.
30. Samuel LJ, et al. Race, ethnicity, poverty and the social determinants of the coronavirus divide: U.S. county-level disparities and risk factors. BMC Public Health. 2021;21(1):1250.
31. Thomson RM, et al. How do income changes impact on mental health and wellbeing for working-age adults? a systematic review and meta-analysis. Lancet Public Health. 2022;7(6):e515–28.
32. Scott V, et al. Addressing social determinants of health in South Africa: the journey continues. South African Health Review. 2017;2017(1):77–87.
33. Hogan JW, Galai N, Davis WW. Modeling the impact of social determinants of health on HIV. AIDS Behav. 2021;25(Suppl 2):215–24.
34. Stringhini S, et al. Socioeconomic status and the 25 × 25 risk factors as determinants of premature mortality: a multicohort study and meta-analysis of 1·7 million men and women. Lancet. 2017;389(10075):1229–37.
35. Orkin M. Technical review of the GCRO QoL surveys: synthesis report. Gauteng City-Region Observatory: Johannesburg; 2020.
36. Hamann C, de Kadt J, Hassall C. GCRO quality of life survey 6 (2020/21): sample design. Gauteng City-Region Observatory: Johannesburg, South Africa; 2021.
37. GeoSpace International. Quality of life survey 6 (2020/21): fieldwork report. Gauteng City-Region Observatory: Johannesburg; 2021.
38. Greve B. Routledge international handbook of poverty. London: Routledge; 2019.
39. Greene WH, Hensher DA. Modeling ordered choices: a primer. Cambridge: Cambridge University Press; 2010.
40. World Health Organisation. Determinants of Poverty. Geneva: World Health Organisation; 2017.
41. Cox DR, Snell EJ. Analysis of binary data. Florida: CRC Press; 1989.
42. Ritter R, et al. Coping with ill-health while lacking access to health care: Acceptability of health service provision in rural Malawi - a qualitative study. Glob Health Action. 2022;15(1):2062174.
43. Luu K, et al. Exploring the role of social networks in facilitating health service access among low-income women in the Philippines: a qualitative study. Health Serv Insights. 2022;15:11786329211068916.
44. Kokatnur UV, Pilli SC. The quality of healthcare delivery in primary health centers under public-private participation. IUP J Operat Manag. 2018;17(4):7.
45. Nyashanu M, Simbanegavi P, Gibson L. Exploring the impact of COVID-19 pandemic lockdown on informal settlements in Tshwane Gauteng Province. South Africa Global Public Health. 2020;15(10):1443–53.
46. Osei Afriyie D, et al. Equity in health insurance schemes enrollment in low and middle-income countries: a systematic review and meta-analysis. Int J Equity Health. 2022;21(1):1–12.
47. Kaviany P, et al. Patterns and predictors of air purifier adherence in children with asthma living in low-income, urban households. J Asthma. 2022;59(5):946–55.
48. Northridge J, et al. The role of housing type and housing quality in urban children with asthma. J Urban Health. 2010;87(2):211–24.
49. Bryant-Stephens T. Asthma disparities in urban environments. J Allergy Clin Immunol. 2009;123(6):1199–206.
50. Matsui EC, et al. Indoor pollutant exposures modify the effect of airborne endotoxin on asthma in urban children. Am J Respir Crit Care Med. 2013;188(10):1210–5.
51. Wu X, et al. Two tales of one city: unequal vulnerability and resilience to COVID-19 by socioeconomic status in Wuhan. China Res Soc Stratif Mobil. 2021;72: 100584.
52. Schotte S, Zizzamia R. The livelihood impacts of COVID-19 in urban South Africa: a view from below. Soc Indic Res. 2023;165(1):1–30.