

Determinants of Out-of-Network Utilization of Care Among Insured Clients Under the National Health Insurance Fund of Sudan

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Purpose: Knowledge of insured clients' utilization behavior is essential for developing evidence-based interventions for reform activities. This study explored the magnitude and determinants of voluntary out-of-network physician visit utilization among an insured population under the National Health Insurance Fund (NHIF) of Sudan.

Methods: This study was a cross-sectional survey conducted at the primary healthcare centers of NHIF in Al Jazirah state in Sudan. A structured interview questionnaire was used to collect data related to socio-economic and health insurance characteristics of NHIF clients and to assess their utilization behavior. Data were collected from September to October 2021.

Results: Of 768 NHIF clients who were interviewed (mean age 46 years, 55.1% females), 63.2% reported using out-of-network physician visits during the last six months prior to the interview. The median out-of-pocket payment for the last out-of-network physician visit was 5000 Sudanese pounds. The regression analysis revealed that clients' gender, marital status, self-reported health, overall rating of the quality of care, rating of the general practitioner care, and ease of referral to a specialist were the significant determinants for seeking out-of-network physician care.

Conclusion: A high magnitude of out-of-network physician visit utilization was found among the insured NHIF clients of Al Jazirah state in Sudan. Policymakers should address issues identified in the current study to reduce patients' leakage to out-of-network services.

Keywords: out-of-network, physician visit, health insurance, healthcare utilization, Sudan

Introduction

Sudan is a low- middle-income country that spends about 6.5% of its gross domestic product and 8.2% of the general government expenditure on health.¹ The main sources of general government health expenditures are federal (5.49%) and state (20.84%) shares. While the total private health expenditure represents 73.14% of the total health expenditures (THEs), 70% of the THEs are out-of-pocket and this translates to 84.24 US\$ per capita, which implies low government expenditure on health.²

There are different health insurance schemes in Sudan: the National Health Insurance Fund (NHIF), which covers all states of Sudan except the capital Khartoum, Khartoum State Health Insurance, and Police and Military Insurances.³ The NHIF is a governmental organization that was established in Sudan in 1995.⁴ By 2021, the NHIF covered 81.7% of the Sudanese population. The beneficiaries of Al Jazirah state, located in east-central Sudan, represent 27% of NHIF clients and enjoy comprehensive coverage of health services through the NHIF primary healthcare clinics and hospitals.⁵

Out-of-network use of health services results when patients within a health system's designated population receive care from providers outside of that system.⁶ The conceptualization and measurement of using out-of-network care differ among studies. Kyanko et al provided a conceptual framework that classified out-of-network care into voluntary choice and involuntary use of an out-of-network physician, and both were said to be influenced by three domains; patient, encounter,

and system.⁷ Involuntary searching for out-of-network care occurs in situations where the patients are unaware of the provider-network status at the time of service use (eg; unconscious patients), while voluntary out-of-network utilization of care implies individual preferences play a role in choosing a healthcare provider outside the health insurance coverage plan.⁷ The latter differs in that the insured client voluntarily chooses to obtain health services from outside-network providers even though the service was available and would have been covered in-network at lower or no cost.^{8,9} While both lead to an increase in out-of-pocket payments among the insured population, involuntary out-of-network utilization is associated with unexpected expenses; that is, “surprise billing,” which has serious implications on the financial security of insured clients and is most common among privately insured clients.^{9–11} On the other hand, seeking voluntary out-of-network care includes a dimension of client satisfaction with their health plans.⁸ Utilization of out-of-network services has been described with different synonyms including out-of-plan utilization, outside utilization, and leakage.^{8,12–14}

The reported reasons for such utilization behaviors include the urgency and seriousness of the need for care, perceived quality of care, relationship with the physician, lack of confidence in a physician’s competence, and needed care during non-working hours of health insurance clinics.⁸ Additionally, among adolescent Health Maintenance Organization (HMO) enrollees in the United States, the main reported reasons for utilizing reproductive health services outside the HMO network were lack of convenience and physical inaccessibility.¹⁵ Insurance transition was reported to influence the pattern of care utilization, as out-of-network physician visit utilization increases when beneficiaries have recently resigned from a plan or changed their health insurance.¹⁶ In Medicare accountable care organizations in the United States, out-of-network care utilization was associated with higher spending in outpatient settings.¹⁴ Out-of-network utilization can lead to further decline in the quality of health insurance facilities, decreasing public support for the facilities used by government employees, and increases in out-of-pocket payments.^{8,17}

The World Health Organization defined out-of-pocket payments (OOP) as:

The direct payments made by individuals to health care providers at the time of service, excluding any prepayment for health services in the form of taxes or specific insurance premiums or contributions and, when possible, net of any reimbursements to the individual who made the payments.¹⁸

High OOP is a marker of health system performance.¹⁹ Previous research has shown that OOP is prevalent among insured populations, especially in low and middle-income countries; for instance, in the population with health insurance in Indonesia, 18% of patients experienced catastrophic medical costs.²⁰ This was also true in the population of India with National Health Insurance in that 66.0% of the beneficiaries incurred OOP.²¹

In our search, there were no previous studies in Sudan that investigated the utilization behavior of insured clients in general and clients seeking out-of-network care in particular. This study aimed to investigate the magnitude and determinants of out-of-network physician visit utilization among a representative sample of insured clients in Al Jazirah state in east-central Sudan.

Materials and Methods

This study is part of a comprehensive survey that explored the magnitude and determinants of out-of-network primary health care utilization among an insured population under the NHIF in Sudan.²²

Study Design, Setting, and Population

This was a cross-sectional survey conducted at the primary healthcare centers of the NHIF (Direct Services Provision Centers-DPCs) in Al Jazirah state in east-central Sudan. There are eight primary DPCs of NHIF distributed throughout seven districts in Al Jazirah state. The target population consisted of insured clients, 18 years or older, attending NHIF primary care clinics in Al Jazirah state at the time of data collection. Only patients visiting a general practitioner (GP) were included in the current study. Patients who were referred to a specialist consultation were excluded due to the higher severity of their illness.

Sampling Design

According to the NHIF statistical report of 2021, the total estimated number of beneficiaries in Al Jazirah state was 3,568,079 clients, assuming a 50% expected magnitude for out-of-network physician visit utilization. Using an alpha error of 0.05, the design effect equaled 2, and the margin of error was 5%; the minimum required sample size was found to be 768 NHIF clients. The sample size was calculated using Epi info 7 software.²³ All eight DPCs of the NHIF in Al Jazirah state were included in the study. Proportional sampling was used to determine the required number of beneficiaries at each of the DPCs, based on average monthly visits. The eight DPCs were visited sequentially. When the required number of clients was reached, the investigators shifted to the next DPC. At each DPC, rooms assigned to GPs were listed to obtain a sampling frame of rooms. Each day the investigators randomly selected one of the rooms from the sampling frame using folded papers. Patients were examined in the selected room during GP clinic working hours and patients who agreed to participate in the study were interviewed.

Study Outcomes

The main outcomes of this study were the prevalence and determinants of seeking out-of-network physician care during the six months prior to the interview. Participants were coded as (out-of-network users = 0) and (NHIF users only = 1).

- Out-of-network users: NHIF clients who reported seeking out-of-network physician care during the six months prior to the interview.
- NHIF users only: NHIF clients seeking care only within the NHIF physicians' network during the six months prior to the interview.

Data Collection

A pre-coded, structured, and interviewer-administered questionnaire based on reviewing the published literature was used to gather the required information.⁸ The interview questionnaire was composed of three sections. The first section comprised the participant's socio-economic characteristics (age, sex, family income expressed in Sudanese pounds (SDG), education, and marital status), and health insurance characteristics (period of enrollment in the NHIF plan, number of visits to NHIF clinics during the six months prior to the interview, number of dependents, and presence of additional health insurance).

The second section explored participants' utilization behaviors (whether they voluntarily utilized out-of-network physician visits during the six months prior to the interview or not) and perceived quality of care. Participants were asked to rate the quality of certain aspects of care at NHIF clinics (ie, overall quality rating, GP technical care, staff courtesy, and ease of referral from a GP to a specialist). The rating was done on a 3-point Likert scale (Good - Fair-Poor).⁸ Other data items in this section included perceived waiting time (long vs reasonable), self-reported health status, the number of chronic diseases, and whether the participant was seeking a second opinion. The last third section was only for participants who reported using out-of-network services in the six months prior to the interview. It was about details of the last out-of-network physician visit used (out-of-pocket expenses in Sudanese pounds, site, and the main reason for seeking out-of-network care). The internal consistency of the subscales used in the current study was examined using Cronbach's Alpha coefficient ($\alpha = 0.882$), which indicated the overall measurement was reliable. Data collection took place on Saturday, Monday, and Thursday, from September, 13th to October, 25th, 2021, using the kobo toolbox, a software developed by the Harvard Humanitarian Initiative for mobile data collection in challenging field settings.²⁴

Ethical Statement

The current study was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standard.²⁵ The Institutional Review Board (IRB) approval was obtained from the Ethics Committee of the High Institute of Public Health at Alexandria University, Egypt. This study was also approved by the Ethics, Research, and Technical Committees of the National Health Insurance Fund in Sudan. Written consent was taken from all study participants after an explanation of the purpose and benefits of the research. Anonymity

and confidentiality of the study participants were assured and the right to withdraw at any time was clearly stated at the beginning of the interview.

Statistical Analysis

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp).²⁶ The Kolmogorov–Smirnov test was used to verify the normality of the distribution of variables. Descriptive statistics were given using number (N) and percent (%). We carried out a series of cross-tabulations (bivariate analysis) to identify variables significantly associated with the pattern of physician visit utilization. Stepwise logistic regression analysis was carried out to detect the significant determinants of out-of-network users. The significance of the obtained results was judged at the 5% level of alpha error.

Results

Table 1 presents respondents' socio-economic characteristics, self-reported health status, and attitude toward medical care according to their pattern of care utilization (in-network or out-of-network). Of 768 interviewed NHIF clients (mean age 46 years, 55.1% females), 63.2% had reported using out-of-network physician visits in the six months prior to the interview. Most out-of-network users were males (51.8%), among the age group 40 to <50 years (30.9%), married (65.8%), with two chronic diseases (39%), and with a university or higher degree of education (39%). In addition, the higher percentage of out-of-network users were among clients in the higher income group (57.9%), with more than three family members dependent on their insurance (81.9%), and with a good self-perceived health status (45.6%). Participants who sometimes or usually sought a second opinion constituted 38.1% of the out-of-network users and 27.3% of the NHIF users only. There were statistically significant differences between the out-of-network users and NHIF users only for all the estimated variables for participants' socio-economic characteristics, health status, and attitude toward medical care.

Table 2 shows the participants' health insurance characteristics according to their pattern of care utilization. Most out-of-network users were enrolled in the NHIF plan for 5–9 years (52.6%), and with a smaller percentage of insured children compared to NHIF users only. The average number of visits to NHIF clinics during the six months prior to the interview was relatively higher among NHIF users only. Concerning dual insurance, the majority of both out-of-network users and NHIF users only had no additional insurance. There were statistically significant differences among the two groups concerning their period of enrollment, the number of visits to NHIF clinics during the six months prior to the interview, and the number of insured children ($p < 0.001$).

Respondents' perceived quality of different aspects of NHIF ambulatory services are listed in Table 3 according to their pattern of care utilization. The overall rating for the quality of care provided was perceived as good by 26.1% of the NHIF users as compared to only 17.5% of the out-of-network users. Regarding GP technical care, it was perceived as fair by more than half of the out-of-network users (62.5%). The ratings for staff courtesy were perceived as nearly the same by the two groups of NHIF clients under study. The waiting time at the NHIF clinics was perceived as long by a considerable proportion of out-of-network users (70.3%). More than two-thirds of out-of-network users perceived the referral to a specialist within the NHIF network as difficult (69.3%), in comparison to 34.3% of NHIF users only. A significant difference was detected between out-of-network users and NHIF users only in all measured aspects of the quality of NHIF ambulatory services except for staff courtesy.

Shown in Table 4 are the characteristics of the last out-of-network service utilized by NHIF clients who participated in the current study, the median out-of-pocket expenses on the last out-of-network physician visit was 5000 Sudanese pounds equals about 10\$ United States Dollars. The most common site for utilizing physician care services outside the NHIF network was private hospitals (65.8%). The main reason for seeking out-of-network care was the urgent and serious cases reported by 53.4% of out-of-network users.

The results of stepwise logistic regression analysis for the determinants of using out-of-network physician care among NHIF clients are shown in Table 5. Stepwise regression for 16 significant factors through univariate analysis between out-of-network users and NHIF users only resulted in a model that included six variables: namely, gender, marital status, self-reported health status, overall rating of the quality of care, rating of GP technical care, and ease of referral to a specialist [Model chi-squared = 67.069* ($p < 0.001$)]. Regarding gender, females were more than three times more likely to be out-of-network users

Table I Respondents' Socioeconomic Characteristics, Health Status, and Attitude Towards Medical Care

Variables	Pattern of Physician Visit Utilization				Total (n = 768)		P-value	OR (95%CI)
	Out-of-Network Users (n = 485)		NHIF Users Only (n = 283)		N	%		
	N	%	N	%				
Age								
<40 [®]	99	20.4	131	46.3	230	29.9	<0.001*	1.000
40–49	126	26.0	69	24.4	195	25.4		0.41 (0.28–0.61)
50–59	150	30.9	38	13.4	188	24.5		0.19 (0.12–0.29)
≥60+	110	22.7	45	15.9	155	20.2		0.30 (0.20–0.48)
Mean ± SD.	49.2 ± 11.9		41.7 ± 13.7		46.4 ± 13.1			
Median (IQR)	50 (40–57)		40 (30–50)		45 (35–55)			
Gender								
Male [®]	251	51.8	94	33.2	345	44.9	<0.001*	1.000
Female	234	48.2	189	66.8	423	55.1		2.2 (1.59–2.93)
Education								
Below secondary	97	20.0	44	15.5	141	18.4	<0.001*	0.73 (0.48–1.12)
Secondary	153	31.5	65	23.0	218	28.4		0.67 (0.47–0.99)
Technical diploma	46	9.5	57	20.1	103	13.4		2.00 (1.27–3.14)
University + [®]	189	39.0	117	41.3	306	39.8		1.000
Marital status								
Married [®]	319	65.8	132	46.6	451	58.7	<0.001*	1.000
Single	47	9.7	76	26.9	123	16.0		3.90 (2.58–5.92)
Divorced/widowed	119	24.5	75	26.5	194	25.3		1.52 (1.07–2.17)
Number of dependents								
Less than Three	88	18.1	93	32.9	181	23.6	<0.001*	1.000
Three or more	397	81.9	190	67.1	587	76.4		0.31 (0.22–0.44)
Monthly family income (SDG)								
<30,000 [®]	38	7.8	79	27.9	117	15.2	<0.001*	1.000
30,000 – <50,000	177	36.5	110	38.9	287	37.4		0.30 (0.19–0.47)
>50,000	270	55.7	94	33.2	364	47.4		0.17 (0.11–0.26)
Median (IQR)	50,000 (40,000–60,000)		40,000 (28,000–51,000)		45,000 (30,000–60,000)			
Chronic diseases								
None [®]	113	23.3	180	63.6	293	38.2	<0.001*	1.000
One	154	31.8	46	16.3	200	26.0		0.19 (0.13–0.28)
Two	189	39.0	43	15.2	232	30.2		0.14 (0.09–0.21)
Three or more	29	6.0	14	4.9	43	5.6		0.30 (0.15–0.59)

(Continued)

Table I (Continued).

Variables	Pattern of Physician Visit Utilization				Total (n = 768)		P-value	OR (95%CI)
	Out-of-Network Users (n = 485)		NHIF Users Only (n = 283)		N	%		
	N	%	N	%				
Self-reported health								
Excellent [®]	158	32.6	157	55.5	315	41.0	<0.001*	1.000
Good	221	45.6	92	32.5	313	40.8		0.42 (0.30–0.58)
Fair	76	15.7	27	9.5	103	13.4		0.36 (0.22–0.59)
Poor	30	6.2	7	2.5	37	4.8		0.23 (0.10–0.55)
Seeking a second opinion								
Rarely [®]	300	61.9	206	72.8	506	65.9	0.003*	1.000
Sometimes	161	33.2	61	21.6	222	28.9		0.55 (0.39–0.78)
Usually	24	4.9	16	5.7	40	5.2		0.97 (0.50–1.87)

Notes: *Statistically significant at p-value ≤ 0.05 ; [®]reference value.

Abbreviations: N, number; NHIF, National Health Insurance Fund; SDG, Sudanese pound; SD, standard deviation; C.I, confidence interval; IQR, interquartile range.

than males [OR = 3.5, (95% CI 2.19–5.61), $p < 0.001$]. In reference to married NHIF clients, single clients and divorced/widowed clients were more than two times likely to be out-of-network users [OR = 2.21, (95% CI 1.28–3.80), $p = 0.004$ and OR = 2.17, (95% CI 1.28–3.66), $p = 0.004$, respectively]. Clients who perceive their health as good, poor, or fair had two-times increased odds to be out-of-network users compared to clients with excellent self-reported health status. On the other hand, clients who perceived the overall quality of care at NHIF clinics or GP technical care as fair were less likely to be out-of-network users than clients with a good perceived overall quality of care or GP technical care [OR = 0.42 (95% CI 0.25–0.73), $p = 0.002$ and OR = 0.52 (95% CI 0.31–0.85), $p = 0.01$, respectively]. NHIF clients who perceived difficulty in the process of referral to a specialist were less likely to be out-of-network users than those who experienced easiness in the referral process [OR = 0.22 (95% CI 0.12–0.38), $p < 0.001$].

Discussion

This was the first study of insured clients' utilization behavior in Sudan that aimed to assess the prevalence and determinants of seeking out-of-network physician care among nationally insured clients. The current study showed a high magnitude of out-of-network physician visit utilization at 63.2%. It seems that out-of-network utilization of care is prevalent in developing as well as in developed countries; for instance, the magnitude of out-of-network services utilization among clients of the Health Insurance Organization (HIO) in Egypt was 70.7%, where clients utilized at least one out-of-network health service per year. The out-of-network physician visits were 66.6% with a mean out-of-pocket payment of 100 Egyptian pounds.⁸ In addition, a study among adolescent HMO enrollees in the United States showed 69% had utilized reproductive health services outside the HMO network.¹⁵ Additionally, a recent study among United States veterans with rheumatoid arthritis enrolled in the Veterans Affairs (VA) health care system indicated that among dual care users 65% reported having a non-VA primary care provider and 50% reported having a non-VA specialist. However, only 6% of the study population were reported to use a non-VA specialist consultation.¹² It is important to note that studies differed in the conceptualization and measurement of out-of-network utilization of care, which limits the comparison of the current study results to other studies around the globe.

Table 2 Participants' Health Insurance Characteristics According to Their Pattern of Utilization (n=768)

Health Insurance Characteristics	Pattern of Physician Visit Utilization				p-value	OR (95% C.I.)
	Out-of-Network Users (n = 485)		NHIF Users Only (n = 283)			
	N	%	N	%		
Period of enrollment in the NHIF plan						
1–4 years [®]	110	22.7	113	39.9	<0.001*	1.000
5–9 years	255	52.6	119	42.0		0.51 (0.32–0.64)
≥10 years	120	24.7	51	18.0		0.47 (0.34–0.69)
Visits to NHIF clinics during last six months						
One [®]	207	42.7	92	32.5	0.02*	1.000
Two	114	23.5	77	27.2		1.52 (1.04–2.22)
Three or more	164	33.8	114	40.3		1.56 (1.11–2.20)
The client has another health insurance						
Yes [®]	16	3.3	15	5.3	0.17	1.000
No	469	96.7	268	94.7		0.61 (0.30–1.25)
Insured children						
None [®]	56	11.5	21	7.4	<0.001*	1.000
Some	148	30.5	34	12.0		0.61 (0.33–1.14)
All	232	47.8	155	54.8		1.78 (1.04–3.06)
No children	49	10.1	73	25.8		3.97 (2.14–7.37)

Notes: *Statistically significant at p-value ≤ 0.05; [®]reference value.

Abbreviations: N, number; NHIF, National Health Insurance Fund; OR, odds ratio; C.I., confidence interval.

Characteristics of Out-of-Network Users

Regarding determinants for utilizing out-of-network physician care, the current study results showed that females are more than three times more likely to be out-of-network users compared to males. This could be due to several factors. Studies have shown that there are gender differences in the utilization of care and female adults have higher healthcare utilization than males, especially for GP visits.^{27–29} Women tend to use significantly more services and incur more out-of-pocket costs than men.^{30,31} Moreover, studies have also shown that women make more primary care visits and receive more diagnostic services, screening services, diet and nutrition counseling, and sexual health care than men, even though men generally have higher rates of obesity and cardiovascular problems.^{29,32} Another contributing factor may be the increased gender physician preference among females. The absence of a preferred gender physician in-network may have pushed respondents to receive care from the desired gender provider out-of-network. In previous research that assessed the Social Health Insurance (SHI) in Sudan, a significant number of respondents reported that the list of SHI providers lacks important specialties.³³ Studies have shown that female gender preference exists, especially among obstetrics and gynecology clinic attendees.³⁴ However, a study among an insured population in the United States concluded that patient-side demand or patients' preferences were relatively unimportant in explaining variations in health care expenditures.³⁵ Overall, these findings should draw the attention of health policymakers in Sudan to pay more attention to women's health needs and reduce access barriers to reproductive health services in Sudan, which were regarded as a pressing health challenge in the region.³⁶

Table 3 Respondents' Perceived Quality of Different Aspects of NHIF Ambulatory Services According to Their Pattern of Care Utilization (n=768)

Aspects of Quality of Care at NHIF Clinics	Pattern of Physician Visit Utilization				p-value	OR (95% C.I.)
	Out-of-Network Users (n = 485)		NHIF Users Only (n = 283)			
	N	%	N	%		
Overall quality rating						
Good®	85	17.5	74	26.1	0.01*	1.000
Fair	375	77.3	191	67.5		0.56 (0.41–0.84)
Poor	25	5.2	18	6.4		0.83 (0.42–1.64)
Rating of GP technical care						
Good®	85	17.5	76	26.9	<0.001*	1.000
Fair	303	62.5	109	38.5		0.40 (0.28–0.58)
Poor	16	3.3	10	3.5		0.7 (0.30–1.63)
Some are good others are bad	78	16.1	83	29.3		1.19 (0.77–1.84)
Do not Know	3	0.6	5	1.8		1.86 (0.43–8.06)
Rating of staff courtesy						
Good®	126	26.0	71	25.1	0.29	1.000
Fair	325	67.0	183	64.7		0.99 (0.71–1.40)
Poor	34	7.0	29	10.2		1.51 (0.85–2.69)
Waiting time						
Reasonable®	144	29.7	116	41.0	0.001*	1.000
Long	341	70.3	167	59.0		0.61 (0.45–0.83)
Referral to a specialist						
Easy®	46	9.5	90	31.8	<0.001*	1.000
Difficult	336	69.3	97	34.3		0.15 (0.09–0.23)
Do not Know	103	21.2	96	33.9		0.48 (0.30–0.75)

Notes: *Statistically significant at p-value ≤ 0.05 ; ®reference value.

Abbreviations: N, number; NHIF, National Health Insurance Fund; OR, odds ratio; GP, general practitioner.

The present study revealed that unmarried clients were more likely to be out-of-network users and thus incur more out-of-pocket expenses compared to the insured married clients. Marital status has been considered one of the major drivers for achieving better health outcomes at half the per-person cost of unmarried clients. Recent data from the Medicare Current Beneficiary Survey showed that married beneficiaries use in-network outpatient services at a higher rate than unmarried beneficiaries, lending support to our findings.³⁷ Pertaining to self-reported health, findings from the present study indicated that unwell self-perceived health status is a significant predictor for seeking out-of-network physician care. Indeed, health need factors play a significant role in the pattern and cost of care utilization.³⁸ As early as the 1990s, self-rated health was reported to be an important determinant of physician visit utilization.³⁹ This finding has been supported by previous literature that examined the relationship between self-reported health and healthcare utilization and spending. Fair or poor self-perceived health status was reported to be associated with seeking out-of-network care and it was a significant risk factor for high out-of-pocket expenses and financial burden.⁴⁰ In addition, a study among insured clients under the HIO in Egypt mentioned self-reported health status as a significant predictor for

Table 4 Characteristics of the Last Out-of-Network Service Utilized by NHIF Clients (n=485)

Variables	N	%
Out-of-pocket expenses on the last out-of-network physician visit (SDG)		
1000–5000	145	29.9
5000–10,000	336	69.3
10,000+	4	0.8
Median (IQR)	5000 (4000–5000)	
The site of the last out-of-network service		
Private clinic	147	30.3
Private hospital	319	65.8
Non-profit poly clinic	10	2.1
Others	9	1.9
The main reason for seeking out-of-network care		
Urgent and serious case	259	53.4
No confidence in the competence of physicians	16	3.3
Needed treatment at non-working hours of NHIF clinics	51	10.5
Prefer paying to get better care	122	25.2
Physician relative	9	1.9
Clinic far from residence	8	1.6
Bad treatment from nurses and employees	10	2.1
Cannot tell	10	2.1

Note: 10,000+: ten thousand Sudanese pounds or more.

Abbreviations: N, number; NHIF, National Health Insurance Fund; SDG, Sudanese pound; IQR, interquartile range.

seeking out-of-network physician visits.⁸ On the other hand, a study on variation in healthcare spending concluded that similar-price adjusted variations do not seem to be explained by illness or poverty.⁴¹

An intriguing result was that clients who perceived the overall quality of care or GP provided-care at NHIF clinics as fair were less likely to be out-of-network users than clients who perceived the overall quality of care or GP provided-care as good. This could be explained by the aspiration of out-of-network users for more quality care. In a study that assessed the quality of services of the SHI in Sudan, although 92% of participants perceived the services provided by the SHI as good, 55% of participants were looking for better services even when there were higher enrollment fees.³ However, a considerable proportion of respondents who perceived the quality of care as good were out-of-network users. In contradiction to this finding, a study showed that participants who rated the overall quality of care at the Egyptian HIO clinics as fair or poor had increased odds to be out-of-network users.⁸ Nonetheless, leaving the available in-network services by a considerable number of insured NHIF clients and seeking out-of-network care is a direct indicator of client dissatisfaction with the primary care provided at NHIF clinics. The inability of the NHIF to provide quality care that meets customer expectations was noted in a recent critical review of the pros and cons of the NHIF in Sudan.⁴² It seems that the poor quality of care provided through the NHIF is not only a problem in Sudan but in many other countries of sub-Saharan Africa.^{43–46}

Perception of the referral process from a GP to a specialist was an important factor that affected the use of out-of-network care. NHIF clients who perceived difficulty in obtaining a referral to a specialist were less likely to be out-of-network users than those who described the referral process as easy, likely resorting to in-network care to avoid the complicated process of

Table 5 Stepwise Logistic Regression Analysis for Determinants of Out-of-Network Physician Care Utilization Among NHIF Clients

Variables	Odds Ratio	p-value	95% C.I for Odds Ratio	
			Lower	Upper
Gender				
Male [®]	1.00			
Female	3.50	<0.001*	2.19	5.61
Marital status				
Married [®]	1.00			
Single	2.21	0.004*	1.28	3.80
Divorced/Widowed	2.17	0.004*	1.28	3.66
Self-reported health				
Excellent [®]	1.00			
Good	2.21	0.004*	1.28	3.80
Fair	2.17	0.004*	1.28	3.65
Poor	2.21	0.004*	1.28	3.80
Overall quality rating				
Good [®]	1.00			
Fair	0.42	0.002*	0.25	0.73
Poor	0.53	0.21	0.19	1.45
Rating of GP technical care				
Good [®]	1.00			
Fair	0.52	0.01*	0.31	0.85
Poor	1.90	0.27	0.56	6.04
Some are good others are bad	1.16	0.63	0.62	2.17
Do not Know				
Referral to a specialist				
Easy [®]	1.00			
Difficult	0.22	<0.001*	0.12	0.38
Constant	6.06	<0.001*		

Notes: [®]Reference value; *statistically significant at $p \leq 0.05$; model chi-square = 67.069*($p < 0.001$).

Abbreviations: C.I, confidence interval; GP, general practitioner.

the referral system. Previous research has shown that the referral system in the SHI in Sudan was perceived as inconvenient by beneficiaries residing in rural areas.³ The waiting time at NHIF clinics was perceived as long by a considerable proportion of out-of-network users. Despite not being a significant determinant for seeking out-of-network care, this finding should not be overlooked. Indeed, decreasing the waiting time will be an avenue for increasing client satisfaction with NHIF services.^{47,48} NHIF stakeholders should consider effective tools for decreasing the waiting time through the application of

“lean six sigma” and other quality improvement projects.⁴⁹ NHIF policy leaders in Sudan should adapt appropriate and effective strategies to enhance customer loyalty and reduce patients leakage to out-of-network services.⁵⁰

Implications for Policymakers

- The results from this study are presented for consideration as a policy document that suggests a need for assessment regarding out-of-network service utilization.
- The study shows a large portion of out-of-network users, and the results indicate the economic burden of this phenomenon.
- The study directs the attention of policy leaders toward seeking a means to update or formulate health laws and mandates to subsidize health services and medications, develop different co-payment policies, and expand the availability of medications for network members.

Implications for the Public

- The study assessed out-of-network utilization patterns with a focus on the magnitude of the problem. The study encourages policymakers to consider the participants’ views when developing reform initiatives to strengthen the national health insurance of Sudan. This could help decrease out-of-network use and consequently avoid catastrophic healthcare costs among the Sudanese population.

Limitation

This study used a cross-sectional design which has the fundamental limitation of temporal ambiguity. Additionally, the current study was based on investigating out-of-network use in the period prior to the interview. Hence, our findings may have been affected by recall bias. Due to a lack of sufficient resources, conflict, and COVID-19 restrictions; the present study was conducted in Al Jazirah state only, which limits the generalization of study results to all NHIF clients in Sudan. Nevertheless, the study provides essential information for policymakers in Sudan that could be used in reform activities of the NHIF in Sudan and other African countries.

Conclusions

A high magnitude of out-of-network physician visit utilization was found among the insured clients of the NHIF under study. The current study provides baseline information that could be useful for strengthening the NHIF in Sudan and other countries in the region. Policymakers and stakeholders in Sudan should work collaboratively to address issues identified in the current study to reduce patient leakage to out-of-network services and to increase the technical efficiency of the NHIF in Sudan.

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