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Healthcare access barriers and utilization among the Arab Bedouin population in Israel: a cross-sectional study

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Abstract

Background The Arab Bedouin Muslim minority in Israel, is one of the country's most vulnerable groups. They are residents of the Israeli geographical and social periphery. Bedouin's healthcare service utilization is shaped by its sociocultural and environmental characteristics. This study explores healthcare access barriers and utilization patterns among the Arab Bedouin population, focusing on two types of legal status locality: a legally recognized Bedouin town and the surrounding unrecognized villages.

Methods We conducted a cross-sectional study among Arab Bedouin adults ($N=246$) residing in a Bedouin recognized town and unrecognized villages. Using an anonymous, self-administered questionnaire in Arabic. We collected information about healthcare visits, types of services accessed, access barriers and the factors influencing healthcare-seeking behavior. Multivariate linear regression was conducted to examine the predictors of healthcare services utilization.

Results Of the 246 participants, 60% resided in a recognized Bedouin town and 40% resided in unrecognized villages. Most participants were female (61%) and the mean age was 37.8 ± 13.9 years. The findings showed that barriers to seeking care differed based on the residence town's legal status. While residents of unrecognized villages face significant physical access barriers, they also show a notable reliance on cross-border healthcare providers, particularly in the Palestinian Authority. Chronic medical conditions ($B = 1.147, p < 0.001$), gender ($B = -0.459, p < 0.01$), and parental status ($B = 0.667, p = 0.001$) have been identified as strong predictors of healthcare service utilization.

Conclusion This study offers new insights regarding the complexity of healthcare access and utilization in the Arab Bedouin population in Israel, emphasizing that barriers are not only structural but also deeply intertwined with cultural and linguistic factors. The study highlights the universal message of addressing both physical and systemic barriers to healthcare access, ensuring that healthcare services are culturally and linguistically tailored to the specific needs of marginalized populations locally and globally. These findings provide actionable insights for policymakers emphasizing the need to improve health equity by addressing the access barriers faced by the Arab Bedouin population, including structural, cultural, and linguistic challenges, and ensuring targeted interventions for marginalized communities both locally and globally.

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Keywords Access barriers, Arab bedouin population, Healthcare disparities, Healthcare utilization, Minority

Introduction

Ensuring equitable access to healthcare services (HCS) remains a critical concern worldwide, as significant disparities are evident among socio-economic, racial, and ethnic groups. In the 1990s, access was redefined to reflect the degree of alignment between the characteristics of healthcare resources and the needs of the population seeking care [1]. As the complexities of healthcare access became more apparent, this definition broadened to include not only the availability of services but also their actual utilization [2]. Global research has widely examined access barriers, showing that access to healthcare varies by country according to each nation's healthcare system [3–5]. Main barriers include financial barriers, such as the cost of medications and health insurance coverage [6], geographic and gender-specific barriers [7]. Arab minority populations in the United States (US), for example, face significant barriers to healthcare access, including language difficulties, low health literacy, and socioeconomic challenges [8]. In Germany, communication challenges and unfamiliarity with the healthcare system are significant barriers for pregnant Arabic-speaking refugee women [9]. Similarly, Muslim women face barriers such as limited access to culturally sensitive care, language barriers, and experiences of discrimination [10]. Research has also suggested that geographic isolation, inadequate infrastructure, and economic barriers significantly impact healthcare access for rural and marginalized communities, such as the Bedouin population in remote areas of Jordan, where travel distances, costs, and a lack of culturally competent providers further complicate access to acceptable care [11]. Moreover, research within marginalized communities, such as women and minority populations, are at heightened risk of effects due to lack of access to HCSs [4, 7].

An example is the selected study population, which is the Arab Bedouin community in Israel (hereafter *Bedouins*), a Muslim Arab minority who lives throughout the Negev (also known as Al-Naqab in Arabic). The Bedouins constitute approximately 3% of the Israeli population (around 314,000 individuals) [12]. The Bedouins live in traditional and tribal social structures and are considered one of the most economically disadvantaged population groups in Israel, partly due to historical discrimination in various aspects of life [13]. They face low socioeconomic status [14], low educational levels [15], and high unemployment rates [16].

The systemic barriers facing the Arab Bedouin population in Israel are influenced by historical and structural factors. Since the establishment of the State of Israel in 1948, conflicts between Israeli government and the

community on land ownership, living in unrecognized villages and rapid urbanization contributed to disparities in infrastructure, and quality of life for many Bedouins, particularly those residing in unrecognized villages.

As of today, the Bedouins are residents of the Israeli geographical and social periphery, most of them living in three types of residence types: (a) seven planned towns constructed by the Israeli government between 1968 and 1989, called recognized towns, where most of the Bedouins reside (65%). These Bedouin towns are classified in socioeconomic cluster number 1 of 10, the lowest ranking in the country's socioeconomic index [14]; (b) eleven “newly recognized” but not planned villages; and (c) thirty-five unrecognized villages where almost 30% of the Bedouin community live. These unrecognized villages are traditional tribal lands that have not received formal recognition or legal status by the Israeli government [17]. This has resulted in a lack of basic services and resources for the residents of these villages. The residents lack access to basic infrastructures such as paved roads, public transportation, fresh water supply, connection to the national electric grid, sewage systems, and garbage disposal services [4, 18–20]. The poor housing conditions they live in impact their health and lives [4, 7]. Although all Israeli citizens, including the Bedouins, have entitled right to public healthcare, studies have shown that Bedouin women experience multiple access barriers, leading to delayed or forgone needed healthcare [4, 7].

Healthcare services in Israel rest on the National Health Insurance Law (1994), which mandates medical insurance coverage for all Israeli residents provided with a basic basket of services by one of four health maintenance organizations (HMOs) [21]. Although the introduction of the law reduced the affordability barrier, debate remains regarding the role of other barriers that might hinder access and availability of HCS, ultimately affecting utilization. Several factors are involved in accessing health care. Previous studies have demonstrated that minority women in Israel face gender and cultural barriers while accessing HCS [4, 22, 23]. The language barrier also seems to be affecting access to HCS among minorities in Israel [4, 24]. A situation reflective of the experiences of minority populations globally [25, 26].

Additionally, despite the legal obligation to provide medical services at a reasonable quality level, within a reasonable period of time, and at a reasonable distance from the individual's home [21], physical barriers, including poor living conditions and geographical remoteness from HCS in Israel, remain largely unaddressed. This is particularly significant given the increasing recognition

of an individual's place of residence in shaping the individual's health and access to health [27–29]. Research has pointed out that geographical distance from the major cities, where high-quality family physicians, medical care, and specialist services are located, negatively correlates with the number of visits to specialist clinics in Israel [30]. Furthermore, the lack of public transportation further exacerbates the difficulties and widens the gaps between the Bedouin minority population using HCS in Israel [4, 31]. Moreover, access to HCS in Israel is not uniformly undertaken within the community in all geographical areas or among different Israeli population groups.

While previous research has documented barriers such as gender, cultural, and physical access issues among the Bedouins [4, 32] and the Arab minority in Israel [33], our study expands on these findings by examining differences in access barriers and utilization patterns based on the legal status of localities. Furthermore, research on other minority groups in Israel, such as the Ultra-Orthodox Jewish (UOJ) community, has highlighted similar challenges, including financial challenges, lack of awareness, and cultural norms, which limit health-seeking behavior [34]. However, unique barriers specific to each minority, such as modesty and religious restrictions in the UOJ community or geographic isolation and unrecognized legal status in Bedouin villages, highlights the diversity of challenges faced by different minority populations in Israel. By focusing on the Bedouin community, this study not only contributes to understanding healthcare access disparities among a particularly underserved group but also complements existing research on other minority populations, providing a broader perspective on the intersection of cultural, structural, and systemic barriers to healthcare access.

Given this background, we set out to assess and compare HCSs utilization patterns and access barriers among the Arab Bedouin population in Southern Israel, focusing on the healthcare visits, types of services accessed, and the factors influencing healthcare-seeking behavior. We hypothesized that: [1] The legal status of the locality (recognized vs. unrecognized) would be associated with differences in reported healthcare access barriers among the Bedouin residents; [2] Patterns of HCS utilization differ between residents of recognized town and unrecognized villages.

Methods

Study population and data collection

Data were collected between March and November 2019 in Bedouin communities in Israel's southern region, including one legally recognized Bedouin town with approximately 23,200 residents and six surrounding unrecognized villages. To protect participants' privacy,

village names have been omitted from the manuscript. Instead, generalized region names or coded identifiers (e.g., Village A, Village B) are used to reference geographical locations. The map of the study region is shown in Fig. 1 in Supplementary Material A.

Inclusion Criteria:

- Age 18 years or above.
- Residing in one of the selected recognized towns or unrecognized villages.
- Self-identification as Bedouin.

Exclusion Criteria:

- Age under 18 years.
- Residing outside the selected recognized towns or unrecognized villages.
- Does not self-identify as Bedouin.

The study included a convenience sample of 246 participants recruited by trained native Arab speakers as study surveyors. Convenience sampling has been used when researchers face limitations related to access to certain groups or locations [35, 36]. In this study, convenience sampling was chosen due to the limited accessibility of the Bedouin population, particularly those in unrecognized villages. Data were collected using a self-completion anonymous questionnaire in Arabic in hard copy format. The questionnaire was initially developed in Hebrew and then translated into Arabic, followed by a back-translation into Hebrew to ensure translation accuracy and clarity in both languages. This back-translation step helped maintain the quality and precision of the translated items [37]. Additionally, the questions were developed based on insights from qualitative research conducted by the research team, focusing specifically on the experiences and perspectives of the Bedouin population [4]. To validate the survey further, it was piloted among recognized and unrecognized Bedouin community members. The questionnaire aimed to assess patterns of HCS utilization causes for referral to the HCS, self-reported barriers in accessing HCS, and gathered other socio-demographic data. The study protocol served to address the challenge of reaching out to underrepresented population groups, such as older people and people living in unrecognized villages. The surveyors approached potential participants from the recognized town and its surrounding unrecognized villages in public places and houses, introduced themselves, explained the study's objectives, stated the voluntary nature of the participation and offered assistance to individuals who had difficulty filling out the questionnaires.

Measures

The primary dependent variable was the number of services visited. The utilization of various types of HCSs was assessed, including specialist physicians, private physicians, after-hours medical centers, and lastly, HCSs in the Palestinian Authority. Participants were asked: "How many different types of HCSs did you use?"

Independent variables included:

- Year of birth (used to calculate age).
- Gender was categorized as male or female.
- The name of the village was then grouped by the legal status into two categories: recognized town and unrecognized village.
- Marital status was assessed in detail but dichotomized into two categories: married/cohabiting and not in a relationship.
- Parental Status is a binary variable indicating whether or not a participant has children.
- Relative income was assessed by asking participants about their income relative to the country's average income. This included three categories: below average, same as average, and above average.
- Education level included five categories (no formal education, elementary school, partial high school, full high school, and academic degree) that were categorized into three categories: no formal education, up to 12 years of education, and academic degree.
- Employment status was categorized into three categories: unemployed, part-time job, and working full-time.
- The chronic medical condition was grouped into two categories (yes/no).
- Self-reported proficiency in Hebrew (the dominant official language in the country) was grouped into two categories: proficient and not proficient.
- The mode of arrival to HCS was assessed by asking the participants how they got to the HCS. Responses were categorized into three categories: private vehicle, public transportation, or by foot.

Statistical analysis

Data analysis was performed using IBM's Statistical Package for Social Sciences (version 25.0; IBM Corp, Armonk, NY). Descriptive statistics for each variable were computed as follows: counts and percentages for categorical variables (gender, legal status of local authority of residence, marital status, parental status, relative income, education level, employment status, chronic medical condition, self-reported proficiency in Hebrew, and mode of arrival to HCS, means and standard deviations for continuous variables. For the non-normally distributed age variable, the Mann-Whitney U non-parametric

test was used to compare the legal status of localities. This was chosen due to the non-normal distribution of the age data. Two-sided Chi-Square test was used for all other categorical independent variables to assess any significant differences between the recognized town and unrecognized village groups. We conducted a series of chi-square tests to compare HCSs utilization between recognized local authorities and unrecognized villages. Chi-square tests were particularly suitable as they allow the comparison of proportions across groups without assuming a continuous distribution or normality [38], which aligns with our categorical data structure. We analyzed five types of HCSs: family physicians, specialist physicians, private physicians, after-hours medical centers, and physicians outside of Israel (in the Palestinian Authority). For each service, we calculated the percentage of individuals who used the service within each locality type and determined the contribution of each group to the total visits.

A multivariate linear regression analysis was conducted to examine the predictors of HCSs utilization. The dependent variable in this analysis was the number of different HCSs utilized by the Bedouin participants. Independent variables included age, gender, township type, education, parental status, relative income, employment status, presence of a chronic medical condition, and mode of transportation to HCSs. Prior to running the regression, preliminary analyses were conducted to ensure that the assumptions of linear regression were met. First, ANOVA, independent t-test and Spearman tests were used to explore the relationships between each independent and dependent variable, identifying which variables were most strongly associated with HCSs utilization. Multicollinearity was assessed using Variance Inflation Factor (VIF) and tolerance values. No significant multicollinearity was detected ($VIF < 5$). The analysis provided unstandardized coefficients (B), standardized coefficients (Beta), and 95% confidence intervals for each predictor. The adjusted R-squared value assessed the model's overall explanatory power. Statistical significance was set at $p < 0.05$ for all tests.

Ethics

Participants received information about the study before completing the questionnaire and were given the option to opt-out at any time. The participants indicated their understanding of the explanation and willingness to participate by ticking a box to confirm their acceptance. Confidentiality was ensured by using an anonymous, self-administered questionnaire. The study was conducted according to the guidelines of the Declaration of Helsinki. The study protocol was reviewed and approved by The Human Subjects Research Committee of the Ben-Gurion University of the Negev.

Results

Demographic characteristics

A total of 246 participated in the study. The characteristics of the participants with stratifications for the legal status of the locality are provided in Table 1. Of the 246

Table 1 Characteristics of study participants, stratified by the township type ($n = 246$)

Characteristic	Total $n = 246$ (100%)	Recognized town $n = 147$ (60%)	Unrecognized villages $n = 99$ (40%)	p - val- ue
Age, yr, mean \pm SD ^a	37.8 \pm 13.9	36.8 \pm 12.5	39.24 \pm 15.6	0.475
Gender				
Female	150 (61%)	95 (64.6%)	55 (55.6%)	0.153
Male	96 (39%)	52 (35.4%)	44 (44.4%)	
Marital status				0.015
Married	141 (57%)	75 (51%)	66 (66.7%)	
Not in a relationship	105 (43%)	72 (49%)	33 (33.3%)	
Parental Status				0.001
Has Children	146 (61.6%)	76 (52.1%)	69 (75.8%)	
No Children	91 (38.3%)	70 (47.9%)	22 (24.2%)	
Relative income				0.822
Below average	100 (41%)	80 (54.4%)	46 (46.5%)	
Same as average	129 (52%)	8 (5.4%)	14 (14.1%)	
Above average	17 (7%)	59 (40.1%)	39 (39.4%)	
Education				0.946
No formal education	56 (22.8%)	33 (22.4%)	23 (23.2%)	
Up to 12 years of education	80 (32.5%)	49 (33.3%)	31 (31.3%)	
Academic degree	110 (44.7%)	65 (44.2%)	45 (45.5%)	
Employment status				0.057
Unemployed	98 (40%)	59 (40.1%)	39 (39.4%)	
Part-time job	22 (9%)	8 (5.4%)	14 (14.1%)	
Working full time	126 (51%)	80 (54.4%)	46 (46.5%)	
Chronic medical condition				0.120
Yes	64 (26%)	33 (22.4%)	31 (31.3%)	
No	182 (74%)	114 (77.6%)	68 (68.7%)	
Hebrew language proficiency				0.977
Proficient	199 (81%)	119 (81%)	80 (80.8%)	
Not proficient	47 (19%)	28 (19%)	19 (19.2%)	
Mode of arrival to healthcare services				0.001
Private vehicle	163 (66.3%)	83 (56.5%)	80 (80.8%)	
Public transportation	54 (22%)	37 (25.2%)	17 (17.2%)	
By foot	29 (11.8%)	27 (18.4%)	2 (2%)	

Note: n =number of respondents; ^aSD=Standard Deviation; Percentages, excluding missing values, are presented

participants, about 60% resided in a recognized Bedouin town. Most participants were female (61%), and the majority were married (57%), between 18 and 89 years old, and the mean age was 37.8 ± 13.9 years.

Self-reported barriers to seeking healthcare services

A significant association ($\chi^2 = 28.43$, $p < 0.001$) was found between reported access barriers and the legal status of the locality. For participants residing in a recognized town, the most frequently reported barrier was low health literacy (27.9%), followed by the lack of physical access (27.2%). Conversely, the primary barrier among participants living in unrecognized villages was a lack of physical access (57.6%), followed by a low health literacy barrier (12.1%). The results are shown in Fig. 1.

Utilization of healthcare services

Table 2 presents a comparison of HCSs utilization between residents of a recognized town and unrecognized villages. The analysis shows both the percentage of people who used each HCS and the contribution of each service to the overall visits within each locality type. The analysis reveals that healthcare utilization patterns differ between recognized towns and unrecognized villages. While differences in the use of most services are not statistically significant, the significant difference in the use of Palestinian Authority physicians ($p < 0.05$) indicates that locality type does impact access and service-seeking behavior for this particular HCS. Specifically, a greater reliance on Palestinian Authority physicians is observed among residents of unrecognized villages (51.8%) compared to the recognized town (48.2%). The equal contribution of total visits from both locality types (around 11%) suggests that while the overall demand is similar, a larger proportion of participants in unrecognized villages seek healthcare outside Israel (Key healthcare access metrics are also summarized in Table 4, Supplementary Material A).

A multivariate regression model was fitted to identify statistically significant associations between study variables and the number of different HCSs utilized. The results showed three significant statistically explanatory variables. Gender was a significant factor, with males significantly less likely to use multiple services compared to females ($B = -0.459$, $p < 0.01$). Parental status was also a significant factor, as having children was associated with a significant increase in HCSs utilization ($B = 0.667$, $p = 0.001$). The presence of a chronic medical condition emerged as the strongest predictor, with individuals having chronic conditions utilizing more than one additional service on average compared to those without a chronic condition ($B = 1.147$, $p < 0.001$). Variables such as age, township type, education, relative income, and

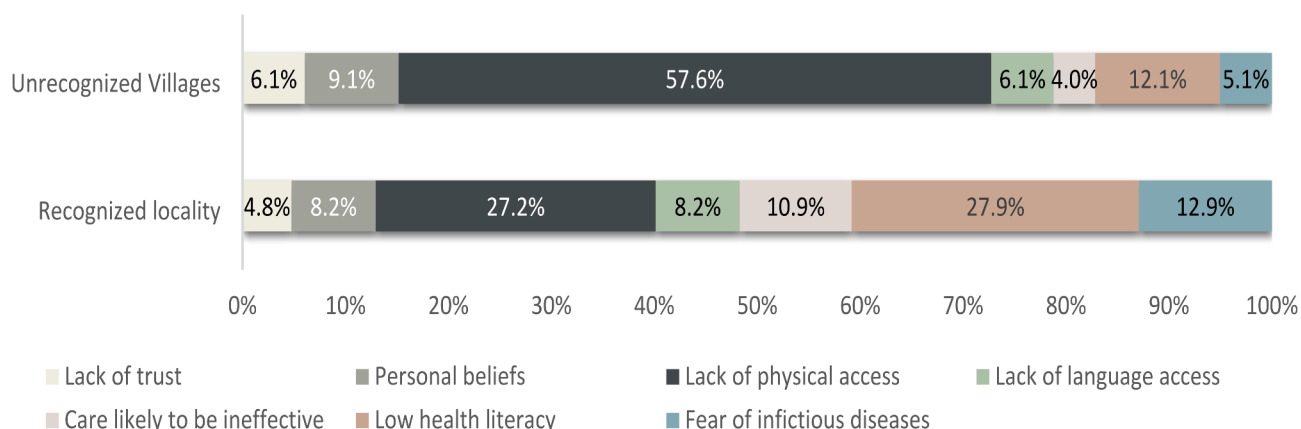


Fig. 1 Self-reported barriers for the delay in seeking healthcare among Bedouin residents in a recognized town ($n=147$) and unrecognized villages ($n=99$). ($\chi^2=28.43$, $p<0.001$)

Table 2 Healthcare utilization differences: recognized and unrecognized villages

Service Type	Recognized Town (% Using Service)	Unrecognized Villages (% Using Service)	p-value	% of Total Visits in Recognized Town	% of Total Visits in Unrecognized Villages
Family Physician	56.3%	43.7%	0.058	41.9%	32.5%
Specialist Physician	60.7%	39.3%	0.779	27.6%	17.9%
Private Physician	57.1%	42.9%	0.677	11.4%	8.5%
After- hours medical center	63.2%	36.8%	0.492	17.5%	10.2%
Palestinian Authority Physician	48.2%	51.8%	0.045	11.0%	11.8%

Table 3 Multivariate linear regression of predictors of healthcare service utilization (with the number of different healthcare services utilized as a dependent variable)

Model	B	Std. Error	Beta	t	Sig.	95% CI for B	
						Lower Bound	Upper Bound
(Constant)	0.278	0.522		0.531	0.596	-0.752	1.307
Age	-0.006	0.009	-0.058	-0.691	0.490	-0.023	0.011
Gender (Ref: Female)	-0.459	0.173	-0.159	-2.663	0.008	-0.799	-0.119
Township type (Ref: Unrecognized villages)	-0.113	0.170	-0.039	-0.665	0.507	-0.449	0.222
Parental Status (Ref: No)	0.667	0.195	0.233	3.417	<0.001	0.283	1.052
Relative income (Ref: Above average)							
Less than average	-0.346	0.348	-0.120	-0.995	0.321	-1.032	0.339
Same as average	0.150	0.326	0.053	0.460	0.646	-0.492	0.791
Education (Ref: Academic degree)							
No formal education	0.025	0.252	0.008	0.101	0.920	-0.471	0.522
Up to 12 years of education	-0.337	0.212	-0.112	-1.586	0.114	-0.755	0.082
Employment status (Ref: Not working)							
Full-time employment	-0.233	0.191	-0.082	-1.219	0.224	-0.609	0.143
Part-time employment	0.150	0.326	0.053	0.460	0.646	-0.492	0.791
Chronic medical condition (Ref: No)	1.147	0.239	0.356	4.806	<0.001	0.677	1.617
Mode of arrival to healthcare services (Ref: By foot)							
By Private Vehicle	0.526	0.278	0.176	1.891	0.060	-0.022	1.075
By Public transportation	0.227	0.302	0.066	0.751	0.453	-0.369	0.823

Notes: $n=246$, Adjusted R Square = 25.1%, $F=7,308$, $p<0.001$. Reference groups are indicated in parentheses

employment status did not have a significant impact on service utilization (Data is provided in Table 3).

Discussion

To ensure equitable accessibility and utilization of HCS, addressing the potential barriers for vulnerable populations to access HCS is essential. Though public health

systems seek to achieve equal health services utilization for equal needs, vulnerable populations still face a lack of healthcare access [4, 39]. The present study aimed to examine access barriers to HCS and healthcare utilization patterns among the Arab Bedouin population of Southern Israel, focusing on the impact of the legal status of the locality on healthcare access and utilization patterns.

Access barriers differed between recognized and unrecognized localities, with low health literacy being the primary barrier among residents of the recognized town and lack of physical access being the main obstacle among unrecognized village residents. Our results indicate that low health literacy is a significant barrier for residents in recognized towns despite the availability of HCSs. Low health literacy refers to the inability to obtain processes and understand health information needed to make informed decisions [40]. As a result, individuals may struggle to fully understand or navigate the healthcare system. This barrier can manifest in various ways, such as difficulty understanding medical instructions, limited awareness of available services, or challenges in effectively communicating with healthcare providers [41]. Previous research supports that low health literacy is associated with reduced access to healthcare, even when physical infrastructure is adequate [40]. In contrast, residents in unrecognized villages face more fundamental physical access barriers due to the absence of basic infrastructure like paved roads and public transportation. Similarly, the physical barriers faced by residents of unrecognized villages echo challenges observed in remote rural populations globally. For example, in remote Indigenous communities in Australia, where lack of infrastructure and transportation limit access to essential healthcare services [42]. The findings also align with a previous study conducted in Israel examining HCSs accessibility among the Bedouin community, highlighting that physical accessibility barriers in unrecognized villages contribute significantly to delays in seeking necessary care. These barriers, such as lack of paved roads and limited access to public transportation make it difficult for residents to reach HCSs [4].

However, the healthcare utilization patterns observed reveal a more complex situation. Our results showed that while the overall utilization of most services did not differ significantly between locality types, what differs is the pathways to care and how and where these services are accessed. Our results showed a significant utilization of Palestinian Authority physicians among residents of unrecognized villages compared to recognized towns (51.8% vs. 48.2%, $p < 0.05$). This significant finding about the use of non-local providers may be explained by the inadequacies in local service provision, where even geographically closer HCSs remain inaccessible. This

preference for Palestinian Authority healthcare providers among residents of unrecognized villages may indicate that the decision-making process for seeking care involves overcoming geographical and physical access barriers as well as cultural ones.

A previous international study conducted in northern Tajikistan showed that the decision to seek maternal care for labor migrants' wives was primarily influenced by traditional gender roles, cultural beliefs, and family dynamics rather than geographical barriers [43]. Similarly, healthcare services in the Palestinian authority may allow male family members such as husband/father/ brother to discuss a woman's health issues on her behalf. In contrast, Israel's physician-patient privilege emphasizes individual privacy and confidentiality in healthcare, making such practices less common [44].

The multivariate linear regression analysis provided further insights into the factors influencing HCSs utilization among Bedouin residents in recognized and unrecognized villages. The results highlighted three significant predictors: the presence of a chronic medical condition, gender, and parental status. While other factors like township type, age, education, relative income, and employment status did not significantly impact HCS utilization.

The presence of a chronic medical condition was found to be the strongest predictor of healthcare utilization. Individuals with chronic conditions universally require ongoing management, which naturally results in more frequent use of HCSs. This finding accords with a study in the Netherlands suggesting that patients with multimorbidity (i.e., having two or more chronic conditions) have higher healthcare utilization rates, particularly in general practice settings [45]. This can be interpreted through the lens of the nature of chronic illnesses, which requires regular monitoring, follow-ups, and management of chronic conditions by family physicians. Thus, individuals with chronic conditions find themselves more frequently in contact with HCSs, contributing to higher utilization rates [45].

Gender differences were evident, with men less likely to utilize multiple HCSs compared to women, also mirror findings from international studies, indicating that women tend to engage more with healthcare systems [44]. While some of this higher healthcare utilization by women is partly attributed to reproductive health needs, research shows that even after adjusting for this factor, women still show higher utilization rates [46]. Additionally, women play a significant role in healthcare decision-making for themselves and their families. In the US, for example, women make approximately 80% of healthcare decisions for their families [47]. In the Bedouin community, characterized by tribal traditions and gender norms, women may be more involved in both their healthcare

and the healthcare needs of their families, which likely contributes to the observed higher HCS utilization among women.

Parental status also emerged as a significant factor, as having children was associated with a significant increase in HCSs utilization. Parents may interact more frequently with healthcare providers to meet their children's needs, such as routine checkups and vaccinations. In the Bedouin community, which has the highest fertility rate in the country (4.99) and a 69.9% rate of families with children aged up to 17 [48], the responsibility of managing the health of multiple dependents is shared within the family, likely contributes to higher engagement with HCSs.

Interestingly, given the well-documented disparities in infrastructure between recognized and unrecognized villages, locality type did not significantly influence the number of HCSs used. This finding suggests that while physical barriers are certainly an issue, other factors might play a more important role in determining where and how residents seek care.

Although this study does not directly measure cultural and linguistic factors, a study showed that Bedouin patients prefer healthcare providers who better align with their cultural and linguistic needs, sometimes opting for providers in the Palestinian Authority even if it requires traveling longer distances [49]. These utilization patterns highlight the complexity of access barriers in the Bedouin community. While physical access remains a significant challenge, the decision to seek care from non-local providers suggests that cultural and linguistic compatibility are critical considerations in healthcare-seeking behavior. This preference for culturally aligned providers emphasizes the importance of designing HCSs that are not only geographically accessible but also culturally and linguistically appropriate.

To address the barriers highlighted in our study, several targeted interventions could improve healthcare access for the Bedouin community. First, building partnerships with community leaders, including religious leaders (e.g., Imams, Sheikhs), heads of local councils, influential women, and social activists, can improve trust and awareness of healthcare services. Establishing continuous communication channels with these leaders, alongside regular meetings, can provide opportunities to update, discuss, and address community needs and challenges. Additionally, providing healthcare teams with relevant culturally sensitive training can meet Bedouin cultural and linguistic needs. Furthermore, implementing a community health worker program tailored to the Bedouin population is another potential solution. Trained community health workers, drawn from the community, could bridge the gap by assisting patients with healthcare navigation, providing translation when

needed, and offering health education in culturally relevant ways [50]. Moreover, planning patient flow within healthcare facilities so patients meet a social worker, cultural mediator, or clinic reception staff before and after their physician visit can contribute to the system's navigation. These non-medical staff can play an important role in improving health literacy and guiding patients through their healthcare journey. Finally, introducing telemedicine options can make healthcare services more accessible, particularly for residents of unrecognized villages who face geographic barriers to HCSs. This remote option can reduce travel burdens and improve access to HCSs. This study provides valuable insights into the public health field regarding the accessibility and utilization of HCSs among the Arab Bedouin minority. However, it is important to acknowledge the limitations that must be considered when interpreting the results. Firstly, the study relied on self-reported data, which may be subject to social desirability bias [51], with responses reflecting participants' beliefs about socially acceptable norms rather than their actual beliefs or behaviors [51]. Social desirability bias may be particularly relevant in our study since it involves healthcare utilization patterns, as participants may feel pressure to report perceived positive behaviors related to their health. Despite our efforts to minimize this bias, such as using anonymous surveys and emphasizing the importance of honest responses, it is unclear to what extent social desirability bias has affected the findings. Secondly, data collection employed convenience sampling, a method prone to self-selection bias, where participants who are readily available or motivated to participate may differ from those who are not [52]. Consequently, our study sample may be over-representative of more educated individuals and, accordingly, an above-average relative income, which may not accurately reflect the typical education or socioeconomic status of the Arab Bedouin population in Southern Israel. Therefore, caution should be exercised when generalizing the study findings to the entire Arab Bedouin population of Southern Israel.

Conclusion and implications for practice and policy

This study offers new insights regarding the complexity of healthcare access and utilization in the Arab Bedouin population in Israel, emphasizing that barriers are not only structural but also deeply intertwined with cultural and linguistic factors. The findings demonstrate that while recognized and unrecognized localities face distinct barriers, the challenges in unrecognized villages are particularly rooted in physical access issues due to inadequate infrastructure. However, the reliance on healthcare providers in the Palestinian Authority raises important questions regarding the availability and accessibility of local services. Seeking care outside the formal Israeli

health system introduces concerns about continuity of care and the potential risks and inconsistencies in care. These issues suggest that improving healthcare delivery in these communities is not just a matter of infrastructure but also involves ensuring that local services are fully accessible. Our findings highlight the universal message of addressing physical and systemic barriers to healthcare access, ensuring that healthcare services are culturally and linguistically tailored to the specific needs of marginalized populations, locally and globally.

Based on these findings, several actionable steps can be implemented to address healthcare access barriers and improve utilization in marginalized populations. Improving infrastructure in unrecognized villages is critical, with a focus on developing public transportation to mitigate physical access barriers. Enhancing cultural and linguistic accessibility through healthcare practitioner training and interpretation services is essential to ensure care is tailored to the Arab Bedouin minority. This also needs to be communicated effectively to patients and the community to ensure they are aware of the availability of culturally and linguistically accessible services. Furthermore, collaborating with community leaders and members to co-develop healthcare interventions can improve trust and awareness, while integrating community-based approaches, such as outreach programs can prioritize accessibility for vulnerable subgroups, including women and individuals with chronic diseases.

Future research should also investigate the long-term impact of cross-border healthcare utilization on patient outcomes and identify targeted strategies to mitigate associated risks and ensure care continuity. Additionally, these findings can inform policy reforms aimed at strengthening local healthcare infrastructure and integrating community-based approaches to improve trust and accessibility.

Abbreviations

HCS Healthcare service
US United states

Supplementary Information

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Supplementary Material 1

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Author contributions

HS: Conceptualization, Methodology, Data curation, Formal analysis, Software, Validation, Visualization, Investigation, Writing– Original Draft, Writing–review and editing. PFB: Conceptualization, Methodology, Interpretation, Supervision, Funding acquisition, Resources, Writing - review and editing. ND: Conceptualization, Methodology, Interpretation, Resources, Funding acquisition, Writing - Review & Editing. LAD: Conceptualization, Methodology,

Interpretation, Supervision, Funding acquisition, Resources. Writing - Review & Editing.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

The study was conducted according to the guidelines of the Declaration of Helsinki, and it was reviewed and approved by The Human Subjects Research Committee of the Ben-Gurion University of the Negev. Participants received information about the study before completing the questionnaire and were given the option to opt-out at any time. The participants indicated their understanding of the explanation and willingness to participate by ticking a box to confirm their acceptance. Confidentiality was ensured by using an anonymous, self-administered questionnaire.

Competing interests

The authors declare no competing interests.

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