

Exploring health-seeking behaviour and healthcare utilization among the Temiar Orang Asli (indigenous people) in Kuala Kangsar, Malaysia

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Key words: health-seeking behavior, healthcare utilization, indigenous health, health literacy.

Contributions: AZ contributed to the study design, literature review, and statistical analysis. FM led the manuscript drafting and editing, as well as the data review and interpretation. SS and KI provided comprehensive comments on the manuscript and assisted in the interpretation of the data. All the authors have read and approved the final version of the manuscript and agreed to be held accountable for all aspects of the work.

Conflict of interest: the authors declare no potential conflict of interest.

Availability of data: the data presented in this study are available upon request from the corresponding author.

Ethics approval: ethical clearance and permission for this study were obtained from the Malaysia National Medical Research and Ethics Committee (MREC) (NMRR ID-23-01634-U35 (IIR)), the Universiti Teknologi MARA (UiTM) Research and Ethics Committee (REC/02/2024 (PG/FB/4)), and the Department of Orang Asli Development (JAKOA).

Informed consent: all participants in this study were informed of the study's purpose and provided written informed consent before participation. The confidentiality of the data was strictly maintained.

Acknowledgments: we express our deepest gratitude to the Orang Asli community in Kuala Kangsar, Perak, for their participation and cooperation. Special thanks to the District Health Office (Pejabat Kesihatan Daerah) Kuala Kangsar and Orang Asli Mobile Healthcare Team (Pasukan Bergerak Orang Asli) for their essential support in participant recruitment and field assistance, which made this research possible.

Received: 10 January 2025.

Accepted: 23 May 2025.

Early access: 4 July 2025.

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Licensee PAGEPress, Italy
Healthcare in Low-resource Settings 2025; 13:13609
doi:10.4081/hls.2025.13609

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Abstract

This study examines health-seeking behaviour and healthcare utilization among the Temiar sub-tribe of the Orang Asli in Kuala Kangsar, Malaysia, with a focus on health literacy and sociodemographic factors. A cross-sectional survey was conducted among 404 Temiar adults using a structured questionnaire. Of the participants, 50.7% preferred modern healthcare, while 42.3% reported using both modern and traditional treatments. Multivariable logistic regression identified significant predictors of modern treatment preference, including chronic health conditions (aOR=3.51; 95% CI: 2.02–6.10; $p<0.001$), suburban residence (aOR=2.15; 95% CI: 1.27–3.65; $p=0.005$), and male gender (aOR=0.37; 95% CI: 0.19–0.74; $p=0.005$). In the linear regression model, older age (≥ 40 years) was associated with higher healthcare utilization ($\beta=1.21$; 95% CI: 0.84–1.58; $p<0.001$), while good health literacy was associated with fewer visits ($\beta=-0.59$; 95% CI: -1.01 to -0.16 ; $p=0.01$). Despite ongoing government outreach, barriers such as low health literacy and geographic isolation persist. These findings highlight the need for culturally tailored health education and improved healthcare accessibility.

Introduction

The Orang Asli, Indigenous peoples of Peninsular Malaysia, are a marginalized minority with distinct cultural, social, and economic attributes. Representing approximately 0.64% of Malaysia's population, they are divided into 18 sub-tribes within three main groups: Negrito, Senoi, and Proto-Malay.^{1,2} Among them, the Temiar sub-tribe of the Senoi group, primarily residing in rural areas of Perak, faces significant barriers to accessing healthcare due to geographic isolation and cultural differences.³ The Temiar, like many Indigenous groups, have a rich tradition of holistic health practices that are deeply intertwined with their cultural beliefs and social structures.

The Temiar's health practices include traditional medicine and spiritual rituals, which play a crucial role in their understanding of health and illness. These practices often involve natural remedies and spiritual healing, leading to a preference for traditional methods over modern medical interventions.^{4,5} Language barriers further complicate access to healthcare, as many Temiar speak their native dialect, which is often not understood by healthcare providers.⁶ Additionally, the community's social structure, where health decisions are often made collectively, can delay the seeking of healthcare.^{6,7} Low health literacy further compounds these challenges, restricting the Temiar's ability to navigate healthcare sys-

tems effectively and leading to delayed health-seeking behaviour.^{7,8} These barriers exacerbate the existing health disparities by limiting access to essential healthcare services and preventive measures.⁹ This creates a cycle of unmet healthcare needs and poor health outcomes among the Temiar.

Health-seeking behaviour among the Orang Asli is influenced by cultural beliefs, geographic isolation, and perceptions of healthcare services. For instance, Ithnin *et al.* highlighted a reliance on both modern healthcare and traditional medicine among the Temuan sub-tribe in Negeri Sembilan, reflecting broader cultural and accessibility challenges.⁷ However, such insights are limited in their applicability to sub-tribes like the Temiar, whose distinct sociocultural context remains understudied.

Much of the available research on Orang Asli health-seeking behaviour is based on findings from sub-tribes such as the Temuan and Semai, while offering limited exploration of other sub-tribes like the Temiar.^{7,17} Although these studies provide important insights into tradition, accessibility, and healthcare perceptions, they do not adequately capture intra-group differences. The Temiar, Malaysia's second-largest Orang Asli sub-tribe, remain underrepresented in health research despite their distinct linguistic, geographic, and cultural characteristics.^{4,16,17}

Despite the Malaysian Ministry of Health's initiatives, including specialized facilities, Orang Asli mobile healthcare team (Pasukan Bergerak Orang Asli, PBOA), and the Flying Doctor Service, the Orang Asli continue to face challenges such as poor healthcare access, low health literacy, and higher prevalence of Non-Communicable Diseases (NCDs), child malnutrition, and stunting compared to the national population.^{8,10–12} Given these challenges, this study aims to examine the health-seeking behaviour and healthcare service utilization of the Temiar sub-tribe of the Orang Asli in Kuala Kangsar, Perak, using a survey-based cross-sectional design, focusing on the influence of health literacy and sociodemographic factors.

Materials and Methods

Study design and setting

The research was designed as a cross-sectional study aimed at assessing health-seeking behaviour and healthcare utilization among the Orang Asli communities, specifically focusing on the Temiar sub-tribe in Kuala Kangsar, Perak. The Kuala Kangsar district was chosen due to its significant Temiar population, one of the largest Orang Asli sub-tribes in the region. It is home to 58 Orang Asli villages, many of which are located in rural, forested areas with challenging geographic access.¹

The study population comprised adult Orang Asli individuals aged 18 years and older, belonging to the Temiar sub-tribe, and residing in Kuala Kangsar, Perak.

Sample size and sampling method

The required sample size for this study was calculated using the formula $n = Z^2 \cdot p \cdot (1-p) / e^2$, where Z represents the z-value for a 95% confidence level (1.96), p is the estimated proportion of Orang Asli prefer modern treatment (59.3%), and e is the margin of error (5%). Based on a population of 6,232 adult Orang Asli in Kuala Kangsar,¹ the required sample size was determined to be 371 participants.

Due to the geographic dispersion and logistical constraints in accessing remote communities, a combination of convenience and snowball sampling was employed. While this approach enabled

broader coverage across settlements, it may have introduced selection bias, particularly the overrepresentation of more accessible or socially connected individuals. To mitigate this, recruitment efforts were diversified across multiple locations such as Kuala Mu, Bawong, Yum, Lasah, and Perwor, spanning both deep rural and suburban areas, and local informants were engaged to ensure inclusion of harder-to-reach groups. Snowball sampling expanded the participant pool through referrals, ensuring broader representation of the Temiar sub-tribe across the district.

Questionnaire instruments

Data were collected using a structured, self-administered questionnaire in Malay, consisting of three main components. The first component captured sociodemographic characteristics (e.g., age, gender, education, income) and healthcare accessibility factors (e.g., transportation issues, distance to healthcare facilities). Sociodemographic characteristics were analyzed for their influence on both health-seeking behaviour and healthcare utilization outcomes, while healthcare accessibility factors were specifically evaluated for their impact on healthcare utilization outcomes only and were not used in the analysis of health-seeking behaviour.^{7,13}

The second component assessed health literacy using the validated Health Literacy Short-Form 12 (HL-SF12). This instrument evaluates general health literacy across three domains: healthcare, disease prevention, and health promotion. Responses were rated on a 4-point Likert scale ranging from «very difficult» to «very easy.» Total scores were converted into a General Health Literacy Index (GEN-HL), which provides a unified score ranging from 0 to 50, with higher scores indicating better health literacy. Scores were categorized into two levels: Poor (≤ 33) and good (> 34), based on the index score proposed by Van Duong *et al.* (2019). The HL-SF12 is derived from the European Health Literacy Questionnaire (HLS-EU-Q47) and has been validated for use in Malaysia and other Asian populations, demonstrating good reliability and validity.¹⁴ Prior to the main study, a pilot test was conducted with 30 Temiar adults to assess the clarity and comprehensibility of the instrument. The results of the pilot indicated that no wording modifications were necessary. As part of the full study, the HLS-SF12 underwent psychometric validation within the Temiar population. Confirmatory factor analysis (CFA) demonstrated acceptable model fit (RMSEA=0.08, GFI=0.94, CFI=0.94), and the tool showed good internal consistency for the General Health Literacy Index (GEN-HL), with a Cronbach's alpha of 0.87.

The third component explored health-seeking behaviour and utilization. Participants were asked about their treatment preferences and their choices of healthcare providers.⁷ Additionally, healthcare utilization was assessed using participants self-reported the number of healthcare facility visits in the past year.¹⁵ The questions on health-seeking behaviour were adapted from a validated questionnaire, which demonstrated a Cronbach's α coefficient of 0.83.⁷

Data collection procedure

Data collection was conducted from May 2024 to August 2024. Trained health staff distributed self-administered paper questionnaires to participants and provided guidance to ensure independent completion.

Statistical analysis

Data were analysed using IBM SPSS (version 28). Descriptive statistics were used to summarize participants' sociodemographic characteristics, health literacy levels, treatment preferences, and healthcare utilization patterns. Categorical variables were present-

ed as frequencies and percentages, while continuous variables were reported as means with standard deviations. To examine factors associated with treatment preferences (modern versus traditional or both treatments), logistic regression analyses were conducted. Simple logistic regression was used to estimate crude Odds Ratios (cOR) and 95% Confidence Intervals (CI) for each independent variable. All independent variables were then entered simultaneously into a multiple logistic regression model to calculate adjusted Odds Ratios (aOR), accounting for potential confounding. Model fit was assessed using the Hosmer–Lemeshow goodness-of-fit test, and multicollinearity was evaluated using Variance Inflation Factor (VIF) values. Healthcare utilization, defined as the number of healthcare facility visits in the past year, was treated as a continuous outcome variable and analyzed using linear regression. This method was selected to estimate the direction and strength of association between multiple predictors and the frequency of healthcare visits. Simple linear regression was first conducted to examine unadjusted associations. All independent variables were subsequently included in the multiple linear regression model to determine adjusted beta coefficients (β) and 95% confidence intervals. Assumptions of linearity, normality, homoscedasticity, and multicollinearity were checked and met. Model fit was reported using R^2 and adjusted R^2 . A p -value < 0.05 was considered statistically significant.

Results

Socio-demographic characteristics and health literacy

A total of 404 Temiar Orang Asli adults participated in this study, with a mean age of 38.3 years (SD=13.0). The majority of participants were female (66.6%) and resided in rural areas (75.7%). Most participants were married (84.1%), while 9.9% were single, and 6.0% were either widowed or divorced. Regarding education, 41.3% of participants had completed primary school, 31.2% had secondary education, 26.5% had no formal education, and only 0.1% had attended university or college.

Participants reported a mean monthly income of RM 617.95 (SD=RM 630.59; Malaysian Ringgit). Nearly half (44.8%) earned less than RM 500 per month, while 12.1% earned more than RM 1,000. Regarding employment, 27.9% were self-employed, 46.5% were housewives, and 10.6% were unemployed. Employees in government and private sector made up 2.2% and 12.6%, respectively. Additionally, 29.9% of participants reported having at least one chronic health condition.

In term of healthcare accessibility, only 41.8% of participants reported living near a healthcare facility and 31.4% of participants reported transportation issues.

Health literacy was notably poor, with 84.4% of participants demonstrating inadequate levels. This suggests substantial difficulty in accessing, understanding, appraising, and applying health information, which may hinder effective communication with healthcare providers, reduce informed decision-making, and contribute to delays in seeking appropriate care. Only 15.6% demonstrated good health literacy. This high prevalence of inadequate health literacy may hinder effective communication with healthcare providers, reduce the likelihood of informed decision-making, and contribute to delays in seeking appropriate care.

Health-seeking behaviour and healthcare utilization

The health-seeking behaviour and healthcare utilization characteristics are summarised in Table 1. Among the 404 participants, just over half (50.7%) preferred modern treatment, while 42.3% reported using both modern and traditional modalities, and only 6.9% relied solely on traditional medicine. Government clinics were the most preferred modern healthcare facility (53.2%), followed by the Orang Asli Mobile Healthcare Team (Pasukan Bergerak Orang Asli; PBOA) at 30.6%. The most commonly cited reasons for seeking modern treatment included Communicable Diseases (CDs) (31.4%) and Non-Communicable Diseases (NCDs) (29.3%), which together accounted for over half of the treatment motivations. This reflects the burden of both infectious and chronic illnesses in the population. Among traditional users, the majority consulted traditional healers or shamans (59.3%) and commonly used herbal remedies (40.7%) and blessed water (40.2%). In term of healthcare utilization, the average number of healthcare visits in the past year was 3.29 (SD=1.67), with most participants (53.2%) reporting 0 to 3 visits (Table 1).

Factors influencing health-seeking behaviour (treatment choices)

Logistic regression was conducted to identify factors associated with participants' preference for modern healthcare, with modern treatment set as the reference outcome. The results of the bivariate and multivariable analyses are presented in Table 2.

In the bivariate analysis, several factors were significantly associated with preference for modern healthcare. Participants aged ≥ 40 years had higher odds of preferring modern treatment compared to those aged ≤ 39 years (cOR=1.91; 95% CI: 1.28–2.85; $p=0.002$). Male participants had significantly lower odds of choosing modern healthcare compared to females (cOR=0.52; 95% CI: 0.34–0.79; $p=0.002$). Participants with high education (Secondary School/University/College) had lower odds of preferring modern care than participants with low education (cOR=0.55; 95% CI: 0.36–0.84; $p=0.006$). Participants with at least one chronic condition were significantly more likely to prefer modern care than those without chronic illness (cOR=3.39; 95% CI: 2.14–5.36; $p<0.001$). Although not significant, suburban residents had marginally higher odds of preferring modern care than rural residents (cOR=1.57; 95% CI: 0.99–2.49; $p=0.06$). Other variables, including marital status, income, employment status, and health literacy, were not significantly associated with treatment preference in the bivariate model.

In the multivariable analysis, three factors remained independently associated with preference for modern treatment after adjusting for all covariates. Male participants had significantly lower odds of preferring modern healthcare compared to females (aOR=0.37; 95% CI: 0.19–0.74; $p=0.005$). Suburban residents were more than twice as likely to choose modern treatment compared to those in rural areas (aOR=2.15; 95% CI: 1.27–3.65; $p=0.005$). Participants with at least one chronic condition had more than three times the odds of preferring modern care compared to those without (aOR=3.51; 95% CI: 2.02–6.10; $p<0.001$). The association between age and treatment preference was no longer statistically significant after adjustment (aOR=1.54; 95% CI: 0.89–2.64; $p=0.12$).

Factors influencing healthcare utilization

Simple and multiple linear regression analyses were conducted to examine factors associated with healthcare utilization, measured as the number of visits to healthcare facilities over the past year, as

shown in Table 3. In the bivariate analysis, several variables showed significant associations. Participants aged ≥ 40 years had a higher frequency of healthcare visits compared to those aged ≤ 39 years ($\beta=1.21$; 95% CI: 0.84 to 1.58; $p<0.001$). Participants with good health literacy made fewer visits than those with poor health literacy ($\beta=-0.59$; 95% CI: -1.01 to -0.16 ; $p=0.01$). Transportation difficulties were also associated with reduced healthcare utilization ($\beta=-0.37$; 95% CI: -0.72 to -0.02 ; $p=0.04$). Other variables, including gender, marital status, education level, and income, were not significantly associated with healthcare utilization in the bivariate model. In the multivariable analysis, two factors remained significant after adjusting for all covariates. Older adults (≥ 40 years) continued to report more frequent healthcare visits ($\beta=1.21$; 95% CI: 0.84 to 1.58; $p<0.001$), and participants with good health literacy continued to report fewer visits ($\beta=-0.59$; 95% CI: -1.01 to -0.16 ; $p=0.01$). The association between transportation issues and visit frequency was attenuated and no longer statistically significant in the adjusted model. No other variables were independently associated with healthcare utilization.

Discussion

This study highlights key factors influencing health-seeking behaviour and healthcare utilization among the Temiar Orang Asli in Kuala Kangsar, Perak. Despite proximity to modern infrastructure, most participants had low educational attainment, poor household income, and alarmingly poor health literacy, consistent with findings from other sub-tribes Orang Asli in Perak, such as the Semai Orang Asli in Kampar and the Lanoh Orang Asli in Lenggong.^{17,18} These disparities remain stark when compared to other ethnic groups in Malaysia, such as Malays and Chinese, who generally report higher education levels, better access to healthcare, and stronger engagement with preventive health services.¹⁰

While the majority of participants (50.7%) preferred modern healthcare, 42.3% continued to use both modern and traditional treatments. This dual preference reflects longstanding cultural beliefs in traditional healing, including the use of herbal remedies and consultations with traditional healers or shamans.^{4,5} This dual usage is consistent with patterns observed among the Temuan sub-tribe in Negeri Sembilan, where traditional and modern healthcare

Table 1. Health-seeking behaviour and healthcare utilization of adult Orang Asli (Temiar) in Kuala Kangsar, Perak (n=404).

Variable	Frequency	Percentage
Choice of treatment		
Modern treatment	119	50.7
Both	171	42.3
Alternative/Traditional	28	6.9
Prefer place for modern treatment (n=376)		
Government Clinic	200	53.2
Orang Asli Mobile Healthcare Team (PBOA)	115	30.6
Government Hospital	44	11.7
Private Clinic	14	3.7
Pharmacy	3	0.8
Reason to go for modern treatment (n=376)		
Communicable Diseases (CDCs)	118	31.4
Non-Communicable Diseases (NCDs)	110	29.3
Pregnant	85	22.6
Others	38	10.1
Trauma	12	3.2
Gastrointestinal Problem	11	2.9
Respiratory Problem	2	0.5
Prefer place for traditional treatment (n=199)		
Traditional healer/Shaman	118	59.3
Traditional massage	20	10.1
Islamic Medicine	18	9.0
Others	43	21.6
Prefer Traditional Medicine (n=199)		
Herbal remedies (<i>Akar kayu & Herba</i>)	81	40.7
Blessed water (<i>Air Penawar</i>)	80	40.2
Others	38	19.1
Past year frequency of attendance to health facilities Mean=3.29 (1.67)		
0 to 3 times	215	53.2
4 to 6 times	185	45.8

Income is reported in Malaysian Ringgit (RM). Health comorbid refer to participants reporting at least one chronic health condition.

are often used concurrently.⁷ Similarly, Indigenous communities across Southeast Asia display comparable patterns. For example, studies on the Aeta communities in the Philippines highlight a dual reliance on traditional and modern medicine shaped by cultural norms and access barriers.¹⁹ In Indonesia, Dayak Indigenous communities in Kalimantan continue to use traditional healing systems such as traditional healers and herbs, while also accessing modern health services when available.²⁰ These parallels suggest that cultural and structural factors may play a more decisive role in shaping health-seeking behaviours among Indigenous populations in the region than socioeconomic variables alone. While socioeconomic factors such as education and healthcare access contribute to improved health outcomes in Malaysia's general population,^{10,21} our findings suggest that these factors may be insufficient on their own in the indigenous Orang Asli context, where cultural beliefs and structural barriers remain dominant influences on healthcare decisions.

Chronic health conditions and suburban residence were positively associated with modern treatment preference, likely reflecting healthcare needs and improved physical access, consistent with findings from similar studies among Orang Asli.^{7,13,18} Interestingly, males were significantly less likely to prefer modern care than females, possibly reflecting traditional gender roles, where women, often as caregivers, may have greater engagement with health-related decisions and exposure to health information.²² This

suggests women in this community may be more proactive in health decision-making, particularly around family care.^{23,24}

The non-significant associations between education, income, and employment status with treatment preference may reflect a relative socioeconomic homogeneity within the study population, as most participants had low-income levels and limited formal education. This lack of variability may have reduced the statistical power to detect meaningful associations. More importantly, these findings align with prior research suggesting that, in marginalized or rural communities, cultural health beliefs, perceived healthcare accessibility, and geographic barriers can outweigh traditional socioeconomic predictors in shaping health-seeking behaviour. As shown in studies among rural Appalachian residents and women of Mexican descent, healthcare decisions were more strongly influenced by cultural norms and spatial constraints than by income or education levels.^{25,26}

In terms of healthcare utilization, older adults reported more frequent visits, which aligns with age-related health needs. Those with good health literacy, however, visited healthcare facilities less often, possibly due to improved self-care and decision-making. This suggests that improving health literacy among the Orang Asli could empower individuals to make more appropriate healthcare decisions, potentially reducing unnecessary visits while ensuring timely care for serious conditions. This aligns with global studies showing that individuals with low health literacy tend to use

Table 2. Logistic regression analysis of factors influencing health-seeking behaviour (treatment choice).

Socio-demographic Characteristics	Choice of treatment		cOR (95% CI)	p	aOR (95% CI)	p
	Traditional/ Both N (%)	Modern N (%)				
Age						
≤39 years	131 (56.0)	103 (44.0)	Ref.		Ref.	
≥40 years	68 (40.0)	102 (60.0)	1.91 (1.28, 2.85)	0.002*	1.54 (0.89, 2.64)	0.12
Gender						
Female	118 (43.9)	151 (56.1)	Ref.		Ref.	
Male	81 (60.0)	54 (40.0)	0.52 (0.34, 0.79)	0.002*	0.37 (0.19, 0.74)	0.005*
Residence type						
Rural	159 (52.0)	147 (48.0)	Ref.		Ref.	
Suburban	40 (40.8)	58 (59.2)	1.57 (0.99, 2.49)	0.06	2.15 (1.27, 3.65)	0.005*
Marital status						
Not married	37 (57.8)	27 (42.2)	Ref.		Ref.	
Married	162 (47.6)	178 (52.4)	1.51 (0.88, 2.58)	0.14	1.30 (0.72, 2.36)	0.39
Educational level						
Low Education (No Education/Primary School)	122 (44.5)	152 (55.5)	Ref.		Ref.	
High Education (Secondary School/University/College)	77 (59.2)	53 (40.8)	0.55 (0.36, 0.84)	0.006*	0.61 (0.36, 1.03)	0.07
Income						
Below RM 500	87 (48.1)	94 (51.9)	Ref.		Ref.	
RM 500 - RM 1000	80 (46.0)	94 (54.0)	1.09 (0.72, 1.65)	0.69	1.12 (0.69, 1.79)	0.64
Above RM 1000	32 (65.3)	17 (34.7)	0.49 (0.26, 0.95)	0.03*	0.93 (0.43, 1.99)	0.84
Work status						
Employed	97 (56.1)	76 (43.9)	Ref.		Ref.	
Not employed	102 (44.2)	129 (55.8)	1.61 (1.09, 2.40)	0.02*	1.04 (0.55, 1.97)	0.91
Health comorbid						
No	164 (58.0)	119 (42.0)	Ref.		Ref.	
Yes	35 (28.9)	86 (71.1)	3.39 (2.14, 5.36)	<0.001*	3.51 (2.02, 6.10)	<0.001*
Health Literacy						
Poor	169 (49.6)	172 (50.4)	Ref.		Ref.	
Good	30 (47.6)	33 (52.4)	1.08 (0.63, 1.85)	0.78	1.52 (0.82, 2.82)	0.18

Note: Odds ratios represent likelihood of choosing modern treatment compared to traditional/both. cOR, Crude Odds Ratio, aOR, Adjusted Odds Ratio. P-values indicate statistical significance, with $p < 0.05$ marked by an asterisk (*). Income is reported in Malaysian Ringgit (RM). Health comorbid refer to participants reporting at least one chronic health condition.

healthcare services more frequently, including emergency and unplanned visits, whereas those with higher health literacy demonstrate better self-management and more judicious use of healthcare resources.^{27,28} These findings highlight the need for culturally tailored health literacy interventions that not only increase understanding of health information but also build decision-making confidence and self-care capacity. Specifically, community-based health education programs that are culturally sensitive, linguistically appropriate, and delivered by trained healthcare professionals or outreach teams could be particularly effective in improving the Orang Asli's ability to navigate the healthcare system and empowering them to make informed health decisions.

Transportation issues, while significantly associated with healthcare utilization in the bivariate analysis, were not retained as a predictor in the multivariable model. This may indicate that other factors may have a more direct influence on healthcare utilization. Regardless, addressing transportation issues, particularly in rural

areas, remains crucial to improving access to healthcare for Indigenous populations.²⁵ This study also has limitations. The use of convenience and snowball sampling may limit generalizability. Additionally, reliance on self-reported data may be subject to recall and social desirability bias. Cultural factors may have influenced participants' responses, especially around traditional healing practices, which could be underreported due to stigma or researcher presence. Future studies should consider longitudinal designs to capture temporal changes in health-seeking behaviour and healthcare utilization among the Orang Asli.

Conclusions

This study demonstrates that health literacy, cultural beliefs, and geographic factors significantly influence health-seeking behaviour and healthcare utilization among the Temiar Orang Asli.

Table 3. Linear regression analysis of factors influencing healthcare utilization (number of healthcare visits over the past year).

Socio-demographic characteristics	Bivariate model		Multivariable model	
	β (95% CI)	p	β (95% CI)	p
Age				
≤39 years	Ref.		Ref.	
≥40 years	1.36 (1.06, 1.67)	<0.001*	1.21 (0.84, 1.58)	<0.001*
Gender				
Female	Ref.		Ref.	
Male	0.12 (-0.23, 0.46)	0.51	0.06 (-0.39, 0.52)	0.79
Residence type				
Rural	Ref.		Ref.	
Suburban	-0.15 (-0.53, 0.23)	0.43	0.23 (-0.13, 0.59)	0.22
Marital status				
Not married	Ref.		Ref.	
Married	0.54 (0.09, 0.99)	0.02*	0.36 (-0.05, 0.77)	0.09
Educational level				
Low Education (No Education/Primary School)	Ref.		Ref.	
High Education (Secondary School/University/College)	-0.87 (-1.21, -0.53)	<0.001*	-0.16 (-0.52, 0.21)	0.39
Income				
Below RM 500	Ref.		Ref.	
RM 500 - RM 1000	-0.31 (-0.66, 0.04)	0.08	-0.12 (-0.44, 0.21)	0.48
Above RM 1000	-0.54 (-1.06, -0.01)	0.04*	-0.31 (-0.83, 0.21)	0.24
Work status				
Employed	Ref.		Ref.	
Not employed	0.14 (-0.19, 0.47)	0.41	0.34 (-0.11, 0.78)	0.14
Health comorbid				
No	Ref.		Ref.	
Yes	0.93 (0.58, 1.27)	<0.001*	0.21 (-0.18, 0.56)	0.26
Health Literacy				
Poor	Ref.		Ref.	
Good	-0.96 (-1.40, -0.52)	<0.001*	-0.59 (-1.01, -0.16)	0.01*
Near to healthcare facility				
Yes	Ref.		Ref.	
No	-0.09 (-0.42, 0.25)	0.61	0.02 (-0.29, 0.34)	0.88
No transportation issues to healthcare facility				
Yes	Ref.		Ref.	
No	-0.37 (-0.72, -0.02)	0.04*	-0.20 (-0.52, 0.12)	0.27

Note: P-values indicate statistical significance, with $p < 0.05$ marked by an asterisk (*). β , Unstandardized regression coefficient; CI, Confidence Interval. The model explained 22% of the variance in healthcare utilization ($R^2 = 0.22$, Adjusted $R^2 = 0.20$). The analysis met assumptions for linearity, normality of residuals, and homoscedasticity. Variance Inflation Factor (VIF) values ranged from 1.05 to 2.28 indicating no significant multicollinearity concerns. F-Change: 9.200, $p < 0.001$.

Despite the growing use of modern healthcare, traditional practices persist, and poor health literacy remains a barrier to access. To reduce these disparities, policymakers should implement culturally tailored health education, expand mobile outreach services like the PBOA, and engage trained community health workers from within Orang Asli communities. Improving transportation and digital access in remote areas is also essential. A coordinated, culturally sensitive approach is key to advancing healthcare equity for Indigenous populations in Malaysia.

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