

Self-Medication and Antibiotic Use Among the Deaf in Ghana's Ashanti Region: A Cross-Sectional Study of Knowledge, Practices, Perceptions, and Predictors

Bright Owusu-Afriyie

brettbryte@gmail.com

Kwame Nkrumah University of Science and Technology

Mustapha Bin Usman

Kwame Nkrumah University of Science and Technology

Nana Bugyei Buabeng

Kwame Nkrumah University of Science and Technology

Cynthia Amaning Danquah

Kwame Nkrumah University of Science and Technology

Research Article

Keywords: Self-medication, Antibiotic use, Deaf community, Antimicrobial resistance, Ghana, Health equity

Posted Date: June 19th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-9947678/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.
[Read Full License](#)

Additional Declarations: No competing interests reported.

Version of Record: A version of this preprint was published at BMC Public Health on September 26th, 2026. See the published version at <https://doi.org/10.1186/s12889-026-29624-y>.

Abstract

Background

Self-medication and antibiotic misuse are major drivers of antimicrobial resistance (AMR), yet evidence is scarce for people with disabilities, especially the Deaf community. Communication barrier and restricted access to health information may heighten vulnerability to inappropriate medication practices among the Deaf population.

Methods

A quantitative descriptive cross-sectional study was conducted among 327 Deaf adults aged ≥ 18 years in the Ashanti Region, Ghana. Participants were recruited using multistage purposive and snowball sampling from Deaf institutions and community networks. Data was collected via structured questionnaires administered through Ghanaian Sign Language (GSL)-assisted interviews. Descriptive statistics, chi-square tests, and binary logistic regression were conducted using IBM SPSS v25.

Results

Self-medication prevalence was 57.5% ($n = 188/327$); antibiotic self-medication was reported by 49.8% ($n = 163$) of respondents. Amoxicillin was the dominant antibiotic (96.3% of cases; 55.1% of total responses), followed by metronidazole (36.2%) and co-amoxiclav (28.8%). Only 59.9% of participants demonstrated basic antibiotic awareness, and widespread misconceptions persisted. Attitude toward antibiotics (OR = 5.68, 95% CI: 2.07–15.60, $p = 0.001$) and higher education level (OR = 1.59, 95% CI: 1.19–2.13, $p = 0.002$) were independent predictors of self-medication. Gender, age, and health insurance were non-significant in multivariate analysis.

Conclusions

Self-medication and antibiotic misuse are highly prevalent among Deaf adults in the Ashanti Region and are driven primarily by attitudes and systemic communication barriers rather than demographic characteristics. Inclusive antibiotic stewardship interventions in GSL, regulatory enforcement, and healthcare system reform are urgently needed.

Background

Self-medication, which is the use of medicines to treat self-recognised illness without professional guidance, is widespread globally and a major driver of antimicrobial resistance (AMR) [1], [2]. The World Health Organisation (WHO) acknowledges that responsible self-medication can reduce the burden on healthcare systems, however, inappropriate use, particularly of prescription-only antibiotics, poses a

serious public health risk through misdiagnosis, adverse drug reactions, and the acceleration of resistance [3].

In sub-Saharan Africa, self-medication prevalence is disproportionately high. A systematic review and meta-analysis across Ghana estimated a pooled self-medication prevalence of 53.7% [4], with antibiotic self-medication ranging from 36% in rural communities [5] to 76% during the COVID-19 pandemic [6]. The ease of obtaining antibiotics without a prescription from licensed chemical sellers and pharmacies remains a structural facilitator [3].

The Deaf community constitutes a distinct linguistic minority facing compounded barriers in healthcare access. Communication difficulties with providers, scarcity of sign language interpreters, low health literacy, and inadequate accessible health information collectively increase the risk of poor medication practices [7], [8]. Studies in Brazil and the United States have demonstrated limited medication literacy [9], high reliance on potentially unreliable online sources [10], and poor pharmacist communication experiences [11] among Deaf individuals. In Ghana, where Ghanaian Sign Language (GSL) is the primary language of the Deaf community, healthcare infrastructure for this population remains markedly inadequate [12].

Ghana's Ashanti Region hosts the country's largest Deaf adult population, estimated at approximately 3,157 adults [13]. Despite this, no published research has examined self-medication or antibiotic use practices in this group, representing a critical evidence gap at the intersection of disability, pharmacology, and AMR stewardship. This study addresses that gap by assessing the knowledge, practices, and perceptions of self-medication and antibiotic use among Deaf adults in the Ashanti Region and by identifying the predictors of self-medication behaviour to inform inclusive policy and stewardship interventions.

Methods

Study design and setting

A quantitative descriptive cross-sectional study was conducted in the Ashanti Region of Ghana from 30th June to 3rd August 2025. The Ashanti Region was selected for its demographic diversity, its position as the region with the highest estimated Deaf population in Ghana [13], and the presence of active Deaf community organisations, including branches of the Ghana National Association of the Deaf (GNAD), schools for the Deaf, Deaf churches, and Social clubs. The region's blend of urban and rural settings enabled the capture of variation in medication behaviour across healthcare access levels.

Study population and eligibility

The target population comprised Deaf adults aged 18 years and above residing in the Ashanti Region for a minimum of six months. Inclusion required the capacity to provide informed consent via sign language

or written communication. Individuals with temporary or non-permanent hearing loss, severe cognitive impairments, or who withdrew consent were excluded.

Sample size and sampling

Sample size was calculated using Yamane's (1967) simplified formula for finite populations, applying a 5% margin of error to an estimated Deaf adult population of 2,405 [13], yielding a minimum of 343 participants. A total of 347 questionnaires were administered, of which 327 were valid (response rate: 94.2%). A multistage strategy was employed: districts with known Deaf communities were purposively selected following regional stratification; participants were recruited from institutional settings (schools for the Deaf, Deaf associations, churches); and snowball sampling extended coverage to non-institutionalised community members.

Data collection instrument

A structured questionnaire comprising five domains was developed and adapted from validated instruments (see supplementary file 1): (1) sociodemographic characteristics; (2) self-medication practices and patterns; (3) antibiotic knowledge; (4) perceptions and attitudes toward antibiotic use; and (5) information sources and medication acquisition. The instrument was pilot-tested with 30 Deaf adults not included in the main sample. Content validity was established through expert review by pharmacologists, public health specialists, and Deaf community representatives. Internal consistency was adequate (Cronbach's $\alpha = 0.76$ for the knowledge subscale; $\alpha = 0.81$ for the attitude subscale).

Data collection procedure

Data was collected through structured interviews administered with the assistance of trained Deaf GSL interpreters. Research assistants received training in culturally appropriate communication with Deaf participants. Written information sheets and sign language explanations were provided before consent. All interviews were conducted in a private, confidential setting.

Statistical analysis

Data were analysed using IBM SPSS Statistics version 25. Descriptive statistics (frequencies, means, standard deviations) characterised the sample and medication patterns. Chi-square tests with Cramer's V as effect size explored categorical associations. Binary logistic regression identified independent predictors of self-medication, with the model including gender, education level, age, health insurance status, antibiotic knowledge score, and attitude score. Statistical significance was set at $p < 0.05$.

Ethical considerations

Ethical approval

was obtained from the Committee on Human Research, Publications and Ethics (CHRPE), KNUST (Approval No. CHRPE AP/514/25). Informed consent was obtained from all participants in Ghanaian Sign Language or written format. Participation was voluntary, anonymous, and without incentive.

Results

Sociodemographic characteristics

Table 1 presents the sociodemographic profile of the 327 participants. The majority were male (57.8%), aged 18–22 years (39.8%), single (75.5%), and held a junior high school education (38.2%). Most identified as Christian (74.0%), nearly half were students (49.2%), and the majority were enrolled in the National Health Insurance Scheme (NHIS) (90.2%).

Table 1
Sociodemographic characteristics of participants (N = 327)

Variable	Category	n	%
Sex	Male	189	57.8
	Female	138	42.2
Age (years)	18–22	130	39.8
	23–27	68	20.8
	28–32	69	21.1
	33–37	11	3.4
	38–42	11	3.4
	43 + years	38	11.5
Marital status	Single	247	75.5
	Married	61	18.7
	Divorced	5	1.5
	Widowed	14	4.3
Education level	No formal education	20	6.1
	Primary	35	10.7
	Junior High School (JHS)	125	38.2
	Senior High School (SHS)	70	21.4
	Tertiary	77	23.5
Employment status	Student	161	49.2
	Gainfully employed	60	18.3
	Self-employed	69	21.1
	Unemployed	37	11.3
Religion	Christian	242	74.0
	Muslim	80	24.5
	Traditionalist	3	0.9
	No Religion	2	0.6
Health insurance	Insured (NHIS)	295	90.2
NHIS = National Health Insurance Scheme			

Variable	Category	n	%
	Uninsured	32	9.8
NHIS = National Health Insurance Scheme			

Prevalence and patterns of self-medication

Overall, 57.5% (n = 188) of participants reported engaging in self-medication, with 42.0% doing so "sometimes," 24.5% "most of the time," and 13.8% "always." Self-medication was predominantly reported for common and familiar conditions like stomach disorders, headaches, allergies, and respiratory symptoms attracted the highest agreement. In contrast, conditions perceived as more serious, including malaria, insomnia, and menstrual problems, attracted lower agreement, indicating condition-specific patterns driven by perceived severity and familiarity.

The most cited reasons for self-medication were convenience (mean score = 2.71 on a 3-point Likert scale), prior experience with the same illness (mean = 2.68), and cost savings (mean = 2.54). Communication barriers with healthcare providers (mean = 2.42) and perceived inadequate explanations by doctors (mean = 2.38) were also prominent drivers. Pharmacies and licensed chemical sellers were the primary medicine sources (87.1%), followed by leftover prescriptions (31.4%) and medicines from family or friend prescriptions (18.9%). Family and friends (40.4%) and personal knowledge (37.6%) were the dominant information sources guiding self-medication decisions.

Prevalence and patterns of antibiotic self-medication

Antibiotic self-medication was reported by 49.8% (n = 163) of all participants. Multiple antibiotic use was common, yielding 285 total antibiotic responses (cumulative case percentage: 174.8%), confirming polypharmacy within this subgroup. Amoxicillin was the dominant antibiotic of choice - used by 96.3% of antibiotic self-medicators - accounting for 55.1% of all antibiotic responses. Metronidazole (36.2% of cases) and co-amoxiclav (28.8% of cases) followed (Table 2).

Table 2
Types and frequency of antibiotics self-medicated among participants (n = 163
antibiotic self-medicators, 285 responses)

Antibiotic	Cases (n)	Cases (%)	Responses (%)
Amoxicillin	157	96.3	55.1
Metronidazole	59	36.2	20.7
Co-amoxiclav (amoxicillin/clavulanate)	47	28.8	16.5
Penicillin	14	8.6	4.9
Ciprofloxacin	8	4.9	2.8
Total responses	285	174.8	100

☒ Percentages based on total responses (not participants) and sum to 100%. Case percentages exceed 100% due to multiple antibiotic use per respondent.

Antibiotic knowledge, perceptions, and attitudes

Basic awareness of antibiotics was reported by 59.9% ($n = 196$) of participants; the remaining 40.1% lacked fundamental antibiotic knowledge - a far lower proportion than reported in studies of Ghanaian health students (94.1%) [14] or Nigerian pharmacy consumers (95.9%) [15]. Among those with awareness, health professionals were the primary information source (55.6%), followed by family and friends (31.1%) and media (11.9%).

Widespread misconceptions were identified. Many participants incorrectly believed antibiotics speed recovery from colds and flu, and that they are effective for any infection. A significant proportion endorsed stopping antibiotic courses upon feeling better and stockpiling antibiotics at home - practices that directly contribute to treatment failure and AMR. Awareness of antimicrobial resistance existed among a minority but did not consistently translate into safe behaviour.

An independent samples t-test revealed that those with antibiotic knowledge used a significantly broader antibiotic repertoire: metronidazole use was 39.5% versus 4.1% ($p < 0.001$), co-amoxiclav 33.7% versus 5.5% ($p < 0.001$), and ciprofloxacin 8.9% versus 1.4% ($p = 0.003$) in the knowledge-positive versus knowledge-negative groups, respectively, with large effect sizes for metronidazole (Cohen's $d = 0.92$) and co-amoxiclav ($d = 0.74$). Amoxicillin use was near-universal regardless of knowledge status ($p = 0.534$). No statistically significant gender differences were found across antibiotic attitude domains (Mann-Whitney U tests; all $p > 0.05$).

Predictors of self-medication

Chi-square analysis identified a significant association between education level and self-medication prevalence ($\chi^2(4) = 14.26$, $p = 0.007$; Cramer's $V = 0.21$): tertiary-educated participants had the highest self-medication prevalence (74.0%) compared to junior high school graduates (47.2%) and those with no formal education (60.0%). A significant association was also found between uninsured status and higher frequency of self-medication ($\chi^2(3) = 42.90$, $p < 0.001$; Cramer's $V = 0.48$), with 59.4% of uninsured participants reporting frequent self-medication versus 26.9% of insured participants. Gender and marital status were not significantly associated with self-medication prevalence.

Binary logistic regression ($N = 196$) confirmed two independent predictors of self-medication (Table 3). The full model was statistically significant ($\chi^2(6) = 22.58$, $p = 0.001$; Nagelkerke $R^2 = 0.147$), correctly classifying 66.3% of cases. Attitude toward antibiotics was the strongest predictor (OR = 5.68, 95% CI: 2.07–15.60, $p = 0.001$), followed by education level (OR = 1.59, 95% CI: 1.19–2.13, $p = 0.002$). Antibiotic knowledge showed a marginally significant protective association (OR = 0.86, $p = 0.083$). Gender, age, and health insurance status were non-significant in the multivariate model.

Table 3
Binary logistic regression predicting likelihood of self-medication (N = 196)

Predictor	B	SE	Wald χ^2	p-value	OR (95% CI)
Gender	-0.069	0.316	0.048	0.827	0.93 (0.50–1.73)
Education level	0.466	0.148	9.910	0.002*	1.59 (1.19–2.13)
Age	-0.003	0.021	0.017	0.896	1.00 (0.96–1.04)
Health insurance	-0.526	0.542	0.942	0.332	0.59 (0.20–1.72)
Antibiotic knowledge score	-0.150	0.087	3.003	0.083	0.86 (0.73–1.02)
Attitude score	1.738	0.516	11.324	0.001*	5.68 (2.07–15.60)
Constant	-3.442	1.452	5.622	0.018	-

Note: Model $\chi^2(6) = 22.58$, $p = 0.001$; Nagelkerke $R^2 = 0.147$; 66.3% of cases correctly classified. * $p < 0.01$. OR = odds ratio; CI = confidence interval; SE = standard error.

Sociodemographic dynamics of medication use

Employment status was significantly associated with orthodox (conventional) medicine use ($\chi^2(6) = 18.24$, $p = 0.006$; Cramer's $V = 0.22$), with employed (78.4%) and unemployed (84.2%) participants showing higher use than students (52.2%), consistent with economic access barriers for student populations. No significant association was found between employment status and herbal medicine use ($p = 0.545$), suggesting that herbal medicine functions as a culturally embedded behaviour regardless of socioeconomic position.

A significant gender difference was identified for herbal medicine use ($\chi^2(2) = 9.70$, $p = 0.008$; Cramer's $V = 0.23$): female participants showed substantially higher endorsement of herbal medicine use (81.8%) compared to males (61.3%). No gender difference was found for orthodox medicine use ($p = 0.887$). Religious affiliation and marital status were not significantly associated with either medicine type.

Discussion

This study provides the first systematic evidence on self-medication and antibiotic use among Deaf adults in Ghana. The findings reveal a population facing a dual burden - high rates of inappropriate medication use and deep systemic exclusion from accessible healthcare - with serious implications for AMR and health equity.

Prevalence and condition-specific patterns

A self-medication prevalence of 57.5% exceeds the Ghanaian national pooled estimate of 53.7% [4] and closely mirrors rates documented in the most underserved subgroups nationally - rural communities

(61.2%) and the middle belt region (62.1%) [4]. This convergence is conceptually coherent: Andersen's Behavioural Model of Health Services Use [16] explains self-medication as a rational adaptive response when enabling resources are absent. For Deaf individuals, the structural absence of sign language interpreters, Deaf-competent providers, and accessible health information creates a push toward self-care that operates beyond financial considerations - evidenced directly by the non-significance of health insurance in the multivariate model.

The condition-specific pattern - higher for perceived minor and familiar ailments, lower for conditions seen as serious - aligns with the Health Belief Model (HBM) [17]: when perceived severity is low and prior experience has reinforced success, self-medication becomes the default. The major motivators of convenience, cost, and prior experience mirror findings across the Ghanaian literature [4], [5], [18] but are compounded in the Deaf context by communication barriers in formal healthcare settings - a driver confirmed by significant agreement with "poor explanations from doctors" as a self-medication motive.

Antibiotic knowledge and the knowledge-practice gap

The finding that 40.1% of Deaf participants lacked basic antibiotic awareness stands in stark contrast to knowledge rates among Ghanaian health students (94.1%) [14] and Nigerian pharmacy consumers (95.9%) [15], reflecting the consequences of a healthcare communication environment that has systematically excluded this linguistic minority. The near-universal concentration of antibiotic self-medication around amoxicillin (96.3% of cases) - likely reflecting perceived safety, over-the-counter availability, and cultural familiarity - mirrors patterns from rural Accra [5] but represents a uniquely restricted formulary that in itself signals poor awareness of appropriate indications.

A critical and counterintuitive finding is that antibiotic knowledge expanded the repertoire of antibiotics used rather than reducing self-medication, consistent with evidence from Uganda [19] and Nigeria [15]. This challenges purely information-based stewardship approaches and underscores that knowledge provision, absent attitudinal and structural change, may intensify rather than reduce antibiotic misuse.

Attitudes as the dominant driver

Attitude toward antibiotics emerged as by far the strongest independent predictor of self-medication (OR = 5.68, $p = 0.001$), validating the HBM's emphasis on perceived benefits and barriers as primary behavioural determinants. This finding parallels the 75% satisfaction rate with antibiotic self-medication reported among Ghanaian students [20], where positive reinforcement of prior self-treatment entrains the behaviour. For the Deaf community, communication barriers further limit exposure to counterbalancing professional advice, creating a self-reinforcing cycle of positive attitudinal feedback.

The pervasiveness of misconceptions - antibiotics effective for viral infections, stopping treatment when symptoms improve, home stockpiling - is consistent with evidence from Ghana [3], [14] and Sub-Saharan Africa broadly [19]. Their particular hazard in this population lies in the reinforcement provided by informal information networks (31.1% of antibiotic knowledge from family/friends) in the absence of accessible professional guidance.

The paradox of education and the communicative access failure

The positive association between education and self-medication ($OR = 1.59$, $p = 0.002$) runs counter to assumptions of health literacy as a protective factor [21], and has two plausible explanations in the Deaf context. First, an overconfidence effect: educated individuals may develop sufficient self-diagnostic confidence to self-treat without recognising the limits of lay knowledge - observed even among health students in Ghana [14] and Ethiopia [22], [23]. Second, and more specific to this population, a frustration-access dynamic: educated Deaf individuals hold higher expectations for care quality, but encounter greater dissonance when communication barriers prevent those expectations being met [12], driving increased self-reliance. The non-significance of health insurance - a canonical enabling factor in Andersen's model - directly supports this interpretation: financial access cannot substitute for communicative access in a healthcare system not designed for linguistic minorities [24].

The non-significance of gender, marital status, and age across the multivariate model points to Deafness as a shared vulnerability transcending conventional socio-demographic divisions, and cautions against direct extrapolation from hearing population models to Deaf communities. The significant gender difference in herbal medicine use - with women more likely to use traditional remedies (81.8% vs. 61.3%) - likely reflects cultural gender roles in family health decision-making rather than differential structural access, and aligns with broader gendered self-medication patterns in the literature [25].

AMR implications and the health equity imperative

Amoxicillin self-medication at near-universal rates in a population with low awareness of AMR creates localised conditions for resistance emergence with population-level consequences [1]. This demands that antibiotic stewardship be understood as a health equity imperative, not solely a clinical or informational challenge. A healthcare system that is communicatively inaccessible to the Deaf - as evidenced by significant agreement with communication barriers as a self-medication driver - does not merely fail to protect individual patients; it actively drives unsafe antibiotic use, and thus contributes to AMR generation in the community.

Limitations

The cross-sectional design precludes causal inference. Self-reported medication behaviour is susceptible to recall and social desirability bias. The snowball sampling component may limit representativeness. The study was conducted in a single region, and findings may not be fully generalisable to Deaf populations in other Ghanaian regions or other low- and middle-income country settings. Future research should employ mixed methods and longitudinal designs, and should work to develop and validate health literacy measurement tools for GSL users.

Recommendations

A multi-level response is required. The Ghana Ministry of Health should mandate sign language interpretation services in all public healthcare facilities and treat communication access as a core component of quality care. The Food and Drug Authority should enforce prescription-only regulations for antibiotics, with particular attention to outlets serving Deaf communities. Antibiotic stewardship programmes must be redesigned for accessibility in Ghanaian Sign Language, incorporating visual aids, community peer education, and adapted media campaigns. At the healthcare provider level, mandatory cultural competency training and basic GSL proficiency would directly address the access barrier identified in this study as the root driver of self-medication. Future research should co-design and evaluate sign language-based medication counselling interventions, conduct qualitative investigations of the lived healthcare experiences of Deaf patients, and assess AMR emergence in communities with high concentrations of Deaf populations.

Conclusions

Self-medication and antibiotic misuse are highly prevalent among Deaf adults in Ghana's Ashanti Region, driven primarily by deeply held attitudes - shaped by systemic communication barriers and healthcare inaccessibility - rather than by individual sociodemographic characteristics. Attitude toward antibiotics and education level are the strongest independent predictors of self-medication. The near-universal self-medication with amoxicillin among antibiotic self-medicators represents a direct contribution to AMR risk in a population already marginalised by the healthcare system.

Declarations

Ethics approval and consent to participate:

Ethical approval was granted by the Committee on Human Research, Publications and Ethics (CHRPE), KNUST, Ghana (Reference: CHRPE AP/514/25). Written and sign language informed consent was obtained from all participants.

Competing interests

The authors declare no competing interests.

Funding

This study received no external funding.

Author Contribution

BOA: conceptualisation, data collection, analysis, and manuscript preparation. CAD: supervision, critical revision. MBU: supported data analysis, NBB: contributed to methodological rigour and supervision

Acknowledgement

The authors express sincere gratitude to all Deaf participants who generously gave their time and trusted this research. We thank the trained Ghanaian Sign Language interpreters whose work was essential to data collection, and the Ghana National Association of the Deaf (GNAD) and its Ashanti Regional branches for facilitating community access. We are grateful to the Ghana Statistical Service for population data, and to all health professionals and institutional collaborators who supported the study. The authors also acknowledge the encouragement and support of family, colleagues, and friends throughout this work.

Data Availability

The datasets used during the current study are available from the corresponding author on reasonable request. Clinical trial number: not applicable.

References

1. Murray CJ et al. Feb., 'Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis', *The Lancet*, vol. 399, no. 10325, pp. 629–655, 2022, 10.1016/S0140-6736(21)02724-0
2. World Health Organisation. 'Guidelines for the regulatory assessment of medicinal products for use in self-medication', 2000, *World Health Organisation*.
3. Auta A, et al. Global access to antibiotics without prescription in community pharmacies: A systematic review and meta-analysis. *J Infect*. Jan. 2019;78(1):8–18. 10.1016/j.jinf.2018.07.001.
4. Opoku R, et al. Prevalence of self-medication in Ghana: a systematic review and meta-analysis. *BMJ Open*. Mar. 2023;13(3):e064627. 10.1136/bmjopen-2022-064627.
5. Kretchy JP, Adase SK, Gyansa-Lutterodt M. The prevalence and risks of antibiotic self-medication in residents of a rural community in Accra, Ghana. *Sci Afr*. Nov. 2021;14. 10.1016/J.SCIAF.2021.E01006.
6. Hackman HK, et al. Self-medication with antibiotics during the COVID-19 pandemic: A cross-sectional study among adults in Tema, Ghana. *PLoS ONE*. Jun. 2024;19(6):e0305602. 10.1371/journal.pone.0305602.
7. Kuenburg A, Fellingner P, Fellingner J, 'Health Care Access Among Deaf People. Table 1'. *J Deaf Stud Deaf Educ*. Jan. 2016;21(1):1–10. 10.1093/deafed/env042.
8. Naseribooriabadi T, Sadoughi F, Sheikhtaheri A. 'Barriers and Facilitators of Health Literacy among D/deaf Individuals: A Review Article.', *Iran. J. Public Health*, vol. 46, no. 11, pp. 1465–1474, Nov.

2017.

9. Takara LEM, Pereira PCA, Aguiar PM. 'Use of medications by patients who are Deaf or Hard of Hearing: Reflections for the promotion of rational use', *Journal of the American Pharmacists Association*, vol. 61, no. 6, pp. e20–e24, Nov. 2021, 10.1016/j.japh.2021.07.001
10. Paracha M et al. Oct., 'Medication-Related Experience of Deaf American Sign Language Users', *HLRP: Health Literacy Research and Practice*, vol. 7, no. 4, 2023, 10.3928/24748307-20231116-01
11. Al Aloola N, Alanazi M, Alotaibi N, Alwhaibi M. Pharmacists' communication skills with deaf and hard of hearing patients: A needs assessment. *PLoS ONE*. Jun. 2023;18(6):e0286537. 10.1371/journal.pone.0286537.
12. Mprah WK, Duorinaah J, Adwan-Kamara L, Tawiah R. 'Assessing Barriers to Mental Healthcare Interventions for Deaf People in Ghana', *J. Biosci. Med. (Irvine)*., vol. 12, no. 01, pp. 29–51, 2024, 10.4236/jbm.2024.121004
13. Ghana Statistical Service. 'Ghana 2021 Population and Housing Census General Report Volume 3F', 2021.
14. Owusu-Ofori AK, Darko E, Danquah CA, Agyarko-Poku T, Buabeng KO. 'Self-Medication and Antimicrobial Resistance: A Survey of Students Studying Healthcare Programmes at a Tertiary Institution in Ghana', *Front. Public Health*, vol. 9, p. 706290, Oct. 2021, 10.3389/FPUBH.2021.706290/BIBTEX
15. Akande-Sholabi W, Ajamu AT, Adisa R. Prevalence, knowledge and perception of self-medication practice among undergraduate healthcare students. *J Pharm Policy Pract.* Dec. 2021;14(1):49. 10.1186/s40545-021-00331-w.
16. Andersen RM. Revisiting the behavioral model and access to medical care: does it matter? *J Health Soc Behav.* 1995;36(1):1–10. 10.2307/2137284.
17. Rosenstock IM. 'Historical Origins of the Health Belief Model', *Health Educ. Monogr.*, vol. 2, no. 4, pp. 328–335, Dec. 1974, 10.1177/109019817400200403
18. Mensah B, Agyemang I, Afriyie D, Amponsah S. Self-medication practice in Akuse, a rural setting in Ghana. *Nigerian Postgrad Med J.* 2019;26(3):189. 10.4103/npmj.npmj_87_19.
19. Ocan M, et al. Household antimicrobial self-medication: a systematic review and meta-analysis of the burden, risk factors and outcomes in developing countries. *BMC Public Health.* Dec. 2015;15(1):742. 10.1186/s12889-015-2109-3.
20. Darko E, Owusu-Ofori A. Antimicrobial resistance and self-medication: A survey among first-year health students at a tertiary institution in Ghana. *Int J Infect Dis.* Dec. 2020;101:43. 10.1016/j.ijid.2020.09.145.
21. Alkhatatbeh MJ, Alefan Q, Alqudah MAY. High prevalence of self-medication practices among medical and pharmacy students: A study from Jordan. *Int J Clin Pharmacol Ther.* May 2016;54(5):390–8. 10.5414/CP202451.
22. Siraj EA et al. Dec., 'Self-Medication Prevalence and Factors Associated with Knowledge and Attitude Towards Self-Medication Among Undergraduate Health Science Students at GAMBY

- Medical and Business College, Bahir Dar, Ethiopia', *Patient Prefer. Adherence*, vol. Volume 16, pp. 3157–3172, 2022, 10.2147/PPA.S390058
23. Tesfaye ZT, Ergena AE, Yimer BT. 'Self-Medication among Medical and Nonmedical Students at the University of Gondar, Northwest Ethiopia: A Cross-Sectional Study', *Scientifica (Cairo)*., vol. 2020, pp. 1–5, Jun. 2020. 10.1155/2020/4021586
24. Torres NF, Chibi B, Middleton LE, Solomon VP, Mashamba-Thompson TP. 'Evidence of factors influencing self-medication with antibiotics in low and middle-income countries: a systematic scoping review', *Public Health*, vol. 168, pp. 92–101, Mar. 2019, 10.1016/j.puhe.2018.11.018
25. Yeamans S, Gil-de-Miguel Á, Hernández-Barrera V, Carrasco-Garrido P. 'Self-medication among general population in the European Union: prevalence and associated factors', *Eur. J. Epidemiol.*, vol. 39, no. 9, pp. 977–990, Sep. 2024, 10.1007/s10654-024-01153-1

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [SupplementaryFile1.pdf](#)