

Non-prescription use of Antibiotics and its Associated Factors in Drug Retail Outlet in Ambo Town, Oromiya, Ethiopia: a cross-sectional study

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Research

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Abstract

Background

The non-prescription use of antibiotics is a major challenge faced by all nations. The practice is pronounced in developing and low-income countries where legislation and regulations are weak. The present study assessed the non-prescription use of antibiotics and associated factors in Ambo town, West Shoa, Oromiya, Ethiopia.

Methods

Institutional based cross-sectional study design supported with the qualitative study was conducted in Ambo town from February 1 to March 1, 2020. Data were collected using a pre-tested semi-structured questionnaire and in-depth interview guide questions. Simple random sampling was used to select retail outlets and systematic random sampling to select study participants. The data analysis was done using SPSS and univariate and multivariate binary logistic regression analysis were performed to identify factors associated with non-prescription use of antibiotics. Thematic framework analysis was applied for the qualitative data.

Results

From a 421 study sample, a total of 399 participants were interviewed with a 94.8% response rate. Among the study participants 214 (53.6) were males, 228 (57.1%) were married, 191 (47.9%) were orthodox by religion and, 343 (86%) were Oromo by ethnicity. One hundred seventy two (43.1%) 95% CI= (38.6, 48.1) of the participants had used non prescribed Antibiotics. Being male [AOR = 2.21 95%CI 1.276,3.835], residing in rural area [AOR = 3.659, 95%CI 1.479, 9.054], holding Diploma [AOR = 0.120, 95% CI 0.025, 0.591], and hold BSC Degree [AOR = 0.050, 95% CI 0.007, 0.378], and being farmer [AOR = 0.034, 95% CI 0.004, 0.285] showed significant association with the non prescription use of Antibiotics.

Conclusion

This study concluded that the non-prescription use of antibiotics 172 (43.1%) was relatively high. Being male, residing in a rural area, holding a diploma, BSc Degree, and being a farmer were significantly associated with non-prescription use of antibiotics. So West Shoa Zone regulatory body should actively focus on the prevention of non-prescription use of Antibiotics through health communication and public awareness on the demerits of non-prescription use of Antibiotics

Background

Antibiotics are widely used drugs to treat bacterial infections and they are the most frequently prescribed medicines worldwide. Between 2000 and 2010, the consumption of antibiotics increased from approximately 50 billion to 70 billion standard units [1]. Their use is also associated with more harm than good when not used properly. Non-prescription sale and use of antibiotics are prevalent in all communities of the world [2]. Non-prescribed use of antibiotics increases irrational use, especially with most infections in the community such as respiratory tract infections viral in origin [3]. Irrational use of antibiotics is a key driver in the emergence and spread of antimicrobial resistance (AMR), which is now seen as a major threat to global public health [4].

The impact of antibacterial resistance has negative consequences on health and the economy. Drug-resistant infections cause approximately 700,000 deaths per year globally. If no intervention the number increase to 10 million by 2050, with associated costs as high as USD 100 trillion worldwide [5]. Many factors have been related to the emergence of AMR. People hold the view that medicine should be used in the event of any sickness or discomfort [6]. Socio-demographic characteristics including; sex, age, marital status, occupation, income, religion, residence, and educational status, chronic diseases [7], the severity of illness [8], and repeated exposure to disease [9] have been documented as determinants of non-prescribed anti-microbial drugs use [10]. Other variables such as previous experience with antibiotics, waiting time in health facilities and distance of health care facility, knowledge-related factors (drug awareness, adverse effect, previous exposure, and past successful anti-microbial drug use) [8, 11] have also been enlisted. The consequences of non-prescribed antimicrobial drug use include; adverse drug reactions and masking of underlying infectious processes [12]. On the other hand, irrational use of antibiotics can be short term treatment, inadequate dose, sharing of medicines, or stopping treatment upon the improvement of disease symptoms [13]. Antimicrobial-resistance is a major emerging global public health problem in communities with frequent non-prescribed antibiotic use [14].

Although globally antimicrobial resistance is an emerging threat to public health, the problem is more severe in developing countries like Ethiopia where the burden of infectious diseases is relatively greater and healthcare spending is low. In Ethiopia, over the counter (OTC) use of antibiotics in partial doses and without prescription are common practices, although the practice is not legal [15]. According to the study conducted in Ethiopia's Tigray region, the magnitude of non-prescribed antimicrobial use was 47.1% [16]. The misuse and overuse of antibiotics in Ethiopia coupled with weak regulatory mechanisms contributed to increasing antimicrobial resistance ranging from 0-100 % [17].

In countries, like Ethiopia antibiotics are illegally purchased without medical prescriptions and very little effort has been made to tackle the situation. The role of pharmacists in contributing to healthcare remains debatable. Community pharmacists and drug stores are now seen as businessmen and retailers rather than health care providers. Self-medication with antibiotics is a universal problem and variations regarding such practices are obvious around the globe [18]. The practice cuts across culture, gender, age, health status, social status, race, and occupation [19]. Therefore, this study aims to assess the magnitude of non-prescription sale of antibiotics and associated factors in Ambo Town, West Shoa Zone, Oromiya, Ethiopia 2020.

Methods And Materials

Study area

The study was conducted in Ambo town, West Shoa Zone, Oromiya Regional State, Ethiopia. The town is located 114 km from the capital Addis Ababa. Based on the 2007 Ethiopian national population and housing census, the population of the town is projected to be about 86,405. The town has both private and governmental pharmacies and drug stores where the prescription-only drugs and over the counter drugs are dispensed to the customers.

Study Design and period

A drug retail outlet based cross-sectional study was conducted from February 1 to March 1, 2020.

Study population

All the people who bought antibiotics, from randomly selected pharmacies and drug stores (drug retail outlet) in Ambo Town during the study period.

Sample size determination

The sample size was calculated using a single population proportion formula; considering a 5% margin of error, the proportion of non-prescription use of antibiotics was 47.1% obtained from a previous study done in Tigray [16], Ethiopia, 95% confidence interval, and 10% possible non-response rate.

$$n = Z^2 \alpha_{/2} \times p(1-p) / w^2$$

Where: n= Sample size.

p = proportion of irrational use and non-prescription sale of antibiotics

W = maximum allowable error (margin of error) = 0.05

Z = value of the standard normal distribution (Z-statistic) at a 95% confidence level which was 1.96. $1.96^2 \times 0.471 \times 0.529 / 0.05^2 = 383$

The sample size for the qualitative study was based on the saturation of ideas.

Sampling technique and procedures

A simple random sampling technique was used to select 10 out of 32 pharmacies and drug stores in the town. Then the history of the number of antibiotics purchasers in January 2020 was assessed for each

selected pharmacy and drug store. Based on the history data systematic random sampling methods were used to select study participants from each selected pharmacy or drug store for every 3rd purchaser at the exit. The first study subject was determined randomly by the lottery method. The sample size was allocated proportionally to each pharmacy or drug store.

Operational Definition

Non-prescription antibiotic use-non-prescription-based inappropriate antimicrobial use for the treatment of common infections without consulting a medical practitioner and any medical supervision

Drug retail outlet -A place used for the conduct of the drug sale, administering or dispensing, and licensed by the responsible body as a place wherein the practice of pharmacy may lawfully occur.

Data collection tool and techniques

Data were collected using a pre-tested and semi-structured questionnaire and in-depth interviews. The questionnaire was prepared in English and translated to Afaan Oromo and Amharic then back to English to check for consistency and completeness.

The exit interview was conducted at the pharmacies or drug stores immediately after a person purchased antibiotics after getting consent. The interview was conducted by trained nurses who could speak Afaan Oromo and Amharic.

In-depth interviews of sellers were conducted using open-ended interview guide questions to explore factors related to non-prescription use of antibiotics. The in-depth interview was supported by tape-recording which took 25–30 min on average. All the interviews were taken at locations that were chosen by the respondents.

Data quality control and management

To ensure data quality, training on the topic, and purpose of the research, on how to approach study subjects and how to use the questionnaire was given for one day for the data collectors. A pre-test was conducted at pharmacy retail outlets found outside the study area to modify the questionnaire. The collected data were checked for completeness, accuracy, and clarity on a daily basis after data collection and correction measure was made before the next data collection.

Data processing and analysis

Coding and cleaning of data were performed for completeness and consistency. Data were entered into Epi-Info version 7.1 and exported to SPSS version 24 software package for analysis. Descriptive statistics are presented as frequencies and percentages. The bi-variate analysis was performed for each variable

and those variables with a p-value less than 0.25 was a candidate for multiple binary logistic regression. The binary logistic regression model was used to check the association between outcome and independent variables. Crude Odds Ratio (OR) and Adjusted Odds ratio (AOR) with their 95% confidence interval (CI) was reported. All statistical significance was determined at a p-value less than 0.05.

Qualitative data were analyzed using thematic framework analysis [20]. The following six steps were conducted:

1. Transcriptions were carried out from the audio-taped interviews;
2. All transcripts were repeatedly read to familiarize with the data;
3. After careful reading, codes were developed so that similar codes were grouped into categories.
4. A working analytical framework was developed while grouping similar codes into categories;
5. Data were summarized by category from each transcript using a matrix spreadsheet, a process called charting;
6. Interpreting the data was the last step. Findings from patients and health professionals were triangulated. This helps to the validity of the data and show conflicting views.

Results

Socio-demographic characteristics of study participants

Out of the 421 study sample, a total of 399 participants were interviewed with a 94.8% response rate. The mean age of study participants was 36.32 (SD \pm 16.32) years. Among the study participants, 214 (53.6) were males, 228 (57.1%) were married, 191(47.9%) were orthodox by religion and, urban residents 291(72.9). One-fourth of the participants were unable to read and write while the remaining completed at least primary school. Occupationally the majority of the respondents were merchants (22.8) followed by government (20.3) (Table 1).

Table 1: Socio-demographic characteristics of the study participants (n=399).

Variables	Category	Frequency	Percentage
Sex	Male	214	53.6
	Female	185	46.4
Age Group in year	18-27	143	35.8
	28-37	85	21.3
	38-47	79	19.8
	48-57	39	9.8
	>57	53	13.3
Marital Status	Single	159	39.8
	Married	228	57.1
	Others	12	3
Religion afflation	Orthodox	191	47.9
	Protestant	175	43.9
	Muslim	33	8.3
Residence	Urban	291	72.9
	Rural	108	27.1
Educational Status	Unable to read and write	85	21.3
	Primary school	99	24.8
	Secondary school	86	21.6
	Diploma	62	15.5
	Degree and above	67	16.8
Occupational status	Government	81	20.3
	Merchant	91	22.8
	Farmer	74	18.5
	Housewife	42	10.5
	Student	13	5.7
	Non employed	21	5.3
	Day laborer	63	15.8

Others; Divorced and Widowed

Non-prescription antibiotic use

The magnitude of non-prescription use antibiotic in the study area is 43.2% (95%CI: 38.2, 48.1). Amoxicillin is the top drug purchased (43.6%) without prescription and followed by its congeners Ampicillin (11.63). Surprisingly, Azithromycin, which is a new drug, is one of the top four antibiotics purchased without a prescription. Moreover, metronidazole also purchased without a prescription (Table-2).

Table 2: Antibiotics purchase without prescription the Antibiotic use Ambo town, Oromiya, Ethiopia, 2020

Non prescription purchased Antibiotics	Frequency	Percent
Amoxicillin	75	43.6
Ampicillin	20	11.63
Cotrimoxazole	15	8.72
Azitromycin	13	7.56
Metrinidazole	10	5.81
Tinidazole	7	4.07
Cloxacillin	7	4.07
Augumentin	6	3.48
Cephalexin	5	2.9
Tetracycline	4	2.32
Ciprofloxacin	3	1.74
Erythromycin	2	1.16
Chloraniphenicol	2	1.16
Gyntamicin	1	0.59
Cefixin	1	0.59
Penicillin	1	0.59
Total	172	100

Reasons for non-prescription use of antibiotics

In this study, one hundred seventy-two study participants were reported using antibiotics without prescription. The study participants were asked the reason for taking antibiotics without prescription while they were expected to use only prescribed ones. One hundred seven (62.2%) of the participants use

the non-prescribed antibiotics to save time, 111 (64.5%) to save money, 111 (64.5%) to get well soon, 64% because of previous experience with the same disease which was successful, 110 (64%) because they assume antibiotics can be purchased without a prescription in pharmacy or drug stores, and 93 (54.1%) doctors are likely to prescribe the same type of antibiotics (**Figure 1**).

The key informants were asked for their opinion on the main reasons that drive for nonprescription use of Antibiotics and the majority of them mentioned the lack of health information and previous experience with the same disease.

“One of the main problems is long waiting time, so to save their time as well their money the majority of our customers asked for antibiotics without prescription” (36-year-old female, Key informant who is working in one drug store).

A 25-year-old male, who was working in one private pharmacy in-depth interview said: “I worked in this pharmacy which is located in Ambo as a pharmacist. Even if the majority of our customers are using the prescribed antibiotics there are also a large number of customers who requested for antibiotics without prescription and the probable reasons for the non-prescription use of antibiotics may be long waiting time at the clinic”

Another 37-year-old male during an in-depth interview stated: “I am working in the drug store as a druggist and also the owner of the drug store, almost 45 to 50% of our customers ask us to provide them antibiotics without prescription and the majority of them use that due to lack of awareness or lack of health information”

Bivariate and multivariate analysis of factors associated with non-prescription use of antibiotics

According to the results from bivariate binary logistic regression, factors that were associated with non-prescription use of antibiotics are sex, age, marital status, residence, educational status, occupational status, traveling time, type of transportation, and cost of transportation (Table-3).

Table 3: Bivariate Binary Logistic Regression analysis of factors associated with non-prescription use of Antibiotics in Ambo town, Oromiya, Ethiopia, 2020 (n=399).

Variables	Category	Non-prescribed Antibiotic Use		COR (95%CI)	P-value
		Yes (%)	No (%)		
Sex	Male	99(57.6)	115(50.7)	1.32(0.89, 1.97)	0.172*
	Female	73(42.4)	112(49.3)	1	
Age in year	18-27	74(43)	69(30.4)	1	
	28-37	40(23.3)	45(19.8)	3.30(1.63, 6.69)	0.001*
	38-47	30(17.4)	49(21.6)	2.74(1.28, 5.83)	0.009*
	48-57	15(8.7)	24(10.6)	1.88(0.87, 4.08)	0.108*
	>57	13(7.6)	40(17.6)	1.92(0.78, 4.72)	0.154*
Marital Status	Single	80(46.5)	79(34.8)	1	
	Married	84(48.8)	144(63.4)	0.58(0.38, 0.87)	0.009*
	Others	8(4.7)	4(1.8)	1.98(0.57, 6.82)	0.282
Residence	Urban	114(66.3)	177(78)	1	
	Rural	58(33.7)	50(22)	1.80(1.15, 2.81)	0.010*
Educational Status	Unable to read and write	40(23.3)	45(19.8)	1	
	Elementary school	45(26.2)	54(23.8)	0.94(0.52,1.68)	0.828
	Secondary school	46(26.7)	40(17.6)	1.29(0.71,2.36)	0.401
	Diploma	25(14.5)	37(16.3)	0.76(0.39, 1.47)	0.417
	Degree and above	16(9.3)	51(22.5)	0.35(0.17, 0.71)	0.004*
Occupational status	Government	23(13.4)	58(25.6)	1	
	Merchant	34(19.8)	57(25.1)	1.50(0.79, 2.86)	0.213
	Farmer	19(11)	55(24.2)	0.87(0.43, 1.77)	0.704
	Housewife	23(13.4)	19(8.4)	3.05(1.40, 6.63)	0.005*
	Student	14(8.1)	13(5.7)	2.72(1.11,6.65).	0.029*
	Non employed	14(8.1)	7(3.1)	5.04(1.80, 4.10)	0.002*
	Daily laborer	45(26.2)	18(7.9)	6.30(3.04, 3.07)	0.000*

Traveling time in Min	<15min	189(83.6)	117(68)	0.52(0.30, 0.88)	0.016*
	15-30min	24(10.6)	43(25)	0.35(0.21, 0.59)	0.000*
	>30min	13(5.8)	12(7)		
Type of transportation	On foot	101(58.7)	74(32.6)	2.93(1.94, 4.43)	0.000*
	Use own transport	2(1.2)	5(2.2)	0.86(0.16, 4.53)	0.857
	Public transport	69(40.1)	65.2(148)	1	
Cost of travel for a single trip in ETB	<6Birr	70(30.8)	33(19.2)	1	
	>6Birr	157(69.2)	139(80.8)	1.34(0.90, 1.99)	0.154*

*=P-value ≤ 0.25 COR= crude odds ratio, CI= confidence interval

In the multivariate binary logistic regression marital status, residence (rural), sex (male), educational status (diploma and degree holder), and occupation (farmer) were found to be statistically significant (Table-4).

Table 4: Multivariable logistic regression analysis and associated factors for non-prescription use of Antibiotics in Ambo town, Oromiya, Ethiopia, 2020 (n=399).

Variables	Category	Non-prescribed Antibiotic use		AOR(95%CI)	P-Value
		Yes (%)	No (%)		
Marital status	Single	80(46.5)	79(34.8)	1	
	Married	84(48.8)	144(63.4)	1.21(0.53, 2.79)	0.653
	Others	8(4.7)	4(1.8)	8.73(1.61, 7.29)	0.012**
Residence	Urban	114(66.3)	177(78)	1	
	Rural	58(33.7)	50(22)	3.66(1.48, 9.05)	0.005**
Sex	Male	99(57.6)	115(50.7)	2.21(1.28, 3.84)	0.005**
	Female	8(4.7)	4(1.8)	1	
Educational Status	uneducated	40(23.3)	45(19.8)	1	
	Primary school	45(26.2)	54(23.8)	0.47(0.21, 1.08)	0.075
	Secondary school	46(26.7)	40(17.6)	0.89(0.39, 2.03)	0.783
	Diploma	25(14.5)	37(16.3)	0.12(0.03, 0.59)	0.009**
	Degree	16(9.3)	51(22.5)	0.05(0.01, 0.38)	0.004**
Occupation	Government	23(13.4)	58(25.6)	1	
	Merchant	34(19.8)	57(25.1)	0.19(0.03, 1.23)	0.082
	Farmer	19(11)	55(24.2)	0.03(0.00, 0.29)	0.002**
	Housewife	23(13.4)	19(8.4)	0.36(0.05, 2.88)	0.337
	Student	14(8.1)	13(5.7)	0.18(0.02, 1.37)	0.097
	Non employed	14(8.1)	7(3.1)	2.64(0.63, 1.09)	0.187
	Day laborer	45(26.2)	18(7.9)	0.34(0.05, 2.23)	0.260

**=P-value <0.05 AOR adjusted odds ratio, CI confidence interval. Others=divorced and widowed

Discussion

The current study has assessed the non-prescription use of antibiotics and associated factors in Ambo Town. The study findings revealed that 172(43.1%) with (95%CI: 38.3, 47.9) had used non-prescribed antibiotics in the study period. This study finding is consistent with previous studies conducted in Asmara Eretria (45.1%) [21] and Saudi Arabia (48.5%) [22]. But the finding of this study is higher than the

findings reported from South Ethiopia (14.5%) [23], Northwest Ethiopia 23.3% [24], United Arab Emirate (31.7%) [25], and Southwestern Ethiopia (39%) [26]. The difference in the prevalence of non-prescription use of antibiotics might be due to the differences in awareness of the communities, and definitions used in the studies. However, the results on non-prescription use of antibiotics in the current study are lower than the findings of researches conducted in Zambia (97%) [27], India (66.7%) [28], and Riyadh (77.6%) [29]. The prevalent trend of non-prescription use of antibiotics in the developing world has been associated with a lack of access to health care, availability of antibiotics as Over-the-Counter (OTC) drugs, poor regulatory practice, and the relatively higher prevalence of the infectious disease. The differences could also be because of the country's laws on drug procurement or the law enforcement policies of the drug regulatory agencies of the countries where the studies were conducted.

The independently associated factors with non-prescribed antibiotics use were being male, residing in a rural area, divorced and widowed, and hold a diploma and BSc degree. The odds of non-prescription use of antibiotics among male respondents were 2.213 times higher than female respondents. Similar findings have been evidenced in Indonesia [30], Asmara Eritria [21], Central Zone of Tigray, Ethiopia [31], Saud Arabia [32]. This finding was contrary to other studies done in Nigeria [33], and the United Arab Emirates [34]. This difference may be due to the current study context, males have better health-seeking behavior compared to their counterparts.

The odds of non-prescription use of antibiotics among rural dweller respondents were three times more likely as compared to urban residing respondents. This study was similar to the study conducted in Nigeria [35]. Furthermore, the divorced and widowed were nine times more likely to use non-prescribed antibiotics than those who are single.

The finding of this study also showed that level education has significant association with non-prescription use of antibiotics. Holding Diploma and BSc degree decreases the odds of non-prescribed antibiotics use by 88%, and 95 % respectively as compared to those uneducated. This finding was similar to the studies conducted in Saud Arabia [32]. However, this finding was not in line with the study finding in Rwanda [36].

Regarding the occupational status, farmers were 96.6 % less likely to use the non-prescribed antibiotics as compared to those who are government employees. This study finding is similar to studies conducted in the United Arab Emirates[34]. However, the current study was contrary to the studies conducted in Sudan which showed professionals have better incomes and thus can afford to pay for health expenses [37].

Limitation Of The Study

Triangulation of data collection methods (both quantitative and qualitative) is the strength of this study while most previous studies were used only quantitative or qualitative study design alone. Lack of temporally relationship and limitation related to self-report are the two common limitations of the study.

Conclusions

This study revealed that the majority of the respondents practiced the non-prescription use of antibiotics. These groups associated with the non-prescription use of antibiotics were mainly male, residing in rural areas, others (divorced and widowed), diploma and degree holders as well as farmers. The findings emphasize the need to form and deliver comprehensive and multifaceted interventions such as providing tailored education to the public to improve their knowledge about the demerits of using antibiotics without the prescription. Moreover, to improve their attitude towards utilizing a non-prescription antibiotic, it is very important to adopt a strong and explicit line of action on the accessibility of antibiotics without a prescription from any drug retail outlets.

Abbreviations

AMR: Antimicrobial resistance; OTC: Over the counter; COR: Crude odds ratio; AOR: Adjusted odds ratio; CI: Confidence interval; SD: Standard deviation; SPSS: Statistical Package for Social Science; USD: United States Dollar

Declarations

Ethics Approval and consent to practice

This study was approved by the ethical committee of Rift Valley University with approval number RVU-Sop217/2020. A written informed consent was also obtained from the study participants before commencing the study. Participant's information was kept confidential.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interest

The authors declare that they have no competing interests

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Authors' contribution

All authors have directly participated in the planning, data collection supervision as well as writing and drafting of the manuscript and read and approved the final version.

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Figures

Reasons reported by key informants for non-prescription use of antibiotics

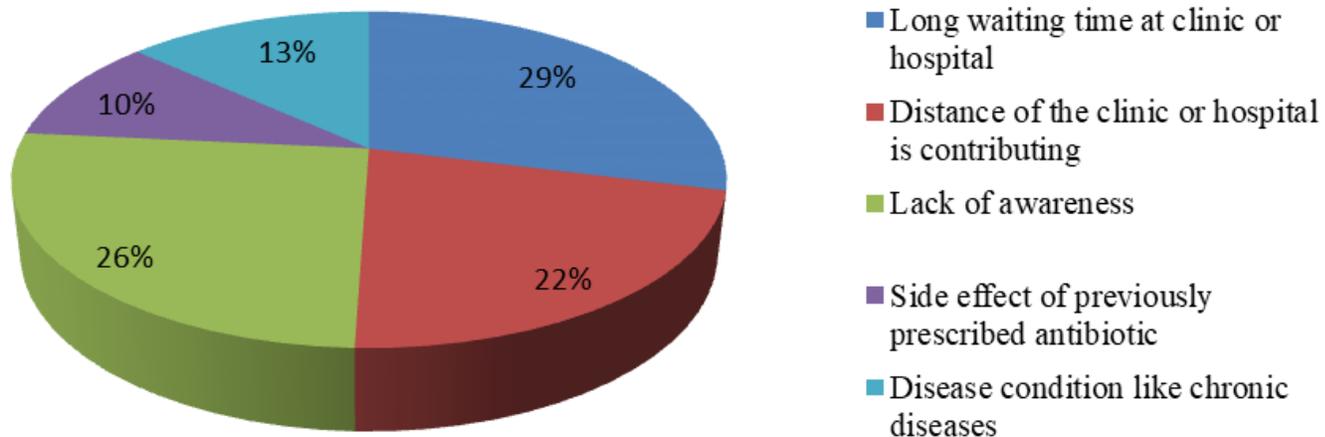


Figure 1

Reasons reported by key informants for nonprescription use of antibiotics in Ambo town, West Shoa, Oromiya, Ethiopia 2020.