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Knowledge, Attitude and Practices towards the Use and Resistance of Antimicrobials among Mbeya Urban Community-Tanzania, 2021

Clarence Sumbizi[1]*, Emmanuel Balandya[2], Muhsin Aboud[1]

[1]Department of Surgery, School of Medicine, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania
[2]Department of Physiology, School of Medicine, Muhimbili University of Health and Allied Sciences, Dar es Salaam, Tanzania

***Corresponding author:**

Clarence Sumbizi

Muhimbili University of Health and Allied Sciences

P. O. Box 65001

Dar es salaam, Tanzania

Email: sumbiziclarence@yahoo.com

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Abstract

Background
Antimicrobials are readily available, accessible, and affordable medications making them among the commonly misused and mishandled class of drugs rendering the emergency of their resistance, which is a growing public health emergence. The burden of antimicrobial use (AMU) and antimicrobial resistance (AMR) is not known in many parts of our country; this study serves to add information on the burden of antimicrobial usage and resistance with underlying causes based on the knowledge attitude, and practices of the Mbeya urban community on antimicrobials.

Aim
This study aimed to assess the knowledge, attitude, and practices towards the use and resistance of antimicrobials among Mbeya urban community members.

Methodology
A descriptive cross-sectional study in Mbeya city council. Participants were aged at least 18 years; enrolment was through a random sampling technique. Data collection was done through pre-tested structured, closed-ended questionnaire. The responses for knowledge, attitude, and practice were scored and analysed using Statistical Package for Social Sciences version 20, by chi-square with p-value of 0.05 for the statistical significance of dependent variables.

Results
Participants enrolled in the study were 154, and their main source of information about antimicrobials was health facilities (65.6%). About 79% of participants had poor knowledge of the uses and resistance of antimicrobials. Out of 154, only 10 participants had never used antimicrobials, and among those who have ever used antimicrobials, 68.05% had poor practices. The majority of participants, 84%, had a positive attitude toward the use and resistance of antimicrobials. Self-prescription practices were found among 70% of participants, knowledge about the illness, and the high cost of medical services at hospitals were among the leading factors for self-prescription. Pharmacies were the leading sources of drugs, followed by health facilities.

Conclusion
There is a high proportion of poor knowledge, good attitude, and poor practices in the Mbeya urban community towards the use and resistance of antimicrobials. Knowledge correlated with education level and information exposure to antimicrobials, unlike practices, which correlated with neither demographic feature of the participants. In addition, self-prescription practices and the incompletion of prescribed doses were very significant and alarming.

Keywords: *Antimicrobials, Antimicrobial use, Antimicrobial resistance, Self-Prescription, Mbeya.*

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Introduction

The discovery of penicillin in the mid-20th century marked a remarkable transformation in managing communicable diseases. Despite, the massive technological and scientific innovations and improvements in the health sector since then, the burden of infectious diseases because of pathogenic microbes is piling up mainly due to the development of resistance of the available and previously effective antimicrobials.

There is a growing resistance to antimicrobials globally but compared to the developed countries, the developing countries experience the worst impacts of resistance to antimicrobials due to the high incidence, prevalence, and thus mortality of infectious diseases such as Malaria, HIV/AIDs, TB, lower respiratory tract infections and diarrheal diseases (WHO)(1). “Worldwide, an estimated 56.2 million people died from all causes in 2001. Almost one-third of these deaths (26.1%) were due to infectious causes, and virtually all were in developing regions (14.2 million out of 14.7 million)(2).

The irrational use of antimicrobials, among many factors, is a leading cause of emergence of resistance to antimicrobials. A study done in London in 2016 on the assessment of public perspective on factors driving antimicrobial resistance revealed that overuse/misuse of antibiotics in humans, followed by animal health were the leading determinants (3). A study conducted in Kinondoni and Ilala municipalities in Dar es salaam, Tanzania revealed that 100% of all liver residues of broilers in the market contained the antibiotic, commonly Tetracycline, and a 100% proportion of all farmers reported using antibiotics in poultry(4). It also described as the overall increase overuse of antimicrobials in farming and poultry countrywide as described by Kimera et al. (5). Underlying the irrational use of antimicrobials and the emergence of their resistance is the community's knowledge, attitude and practices (KAP) towards antimicrobials.

The burden of infectious diseases and the relative emergence of antimicrobial resistance necessitate more research studies in the region, but that is not the case, and as a result, there is an enormous knowledge gap. Few studies already exist but do not give the exact picture of most countries' situation. The latest study conducted in four regions of Tanzania, including the Mbeya region, revealed that the communities had a low level of knowledge on the use and resistance of antimicrobials (6), but the study did not reveal the practices and attitude of the community towards the use of the antimicrobials and their resistance.

This study aimed to establish the level of knowledge, attitudes, and practices on the use and resistance of antimicrobials.

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Materials and methods

Study design and setting

A descriptive cross-sectional community-based study was conducted between October and November 2021 in the Mbeya urban council of Mbeya region, Tanzania. Mbeya urban district is among seven districts of the Mbeya region. The district has 36 administrative wards, and according to the national bureau of statistics census of 2012, the Mbeya urban district had 385,479 residents.

Study population

The study involved selected community members aged 18 years old and above in Mbeya urban district who willingly consented to participate excluding those who were physically and/or mentally sick.

Sampling technique

The study utilized a multistage random sampling technique in enrolling study participants and selecting study areas in terms of wards, streets, and households. In the first stage, five wards were randomly selected in a lottery among 36 wards of the town council, second stage, one street from the selected wards was sampled randomly in a lottery, and lastly, a minimum of 15 households was ascertained randomly in the streets of selected wards.

Sample size

The sample size was calculated using the formula for cross-sectional study (z2p (1-p)/d2). Using a proportion (p) of 90% of the participants with adequate knowledge about antibiotic uses obtained from a study by Sindato et al., (2020), the minimum sample size was 138. Considering 10% non-response, the final sample size was 152 respondents.

Data collection tool

Data was quantitatively collected using provider administered pre-tested structured close-ended questionnaires, divided into four parts: demographic characteristics of respondents, assessment of the knowledge, assessment of attitude, and lastly, assessment of practices, respectively, for assessment of antimicrobials use and resistance.

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Data analysis

Data obtained from the study were analysed using a statistical package for social sciences (SPSS) version 20 software. The results are presented in tables, bar charts and pie charts. Frequencies and percentages are used to present descriptive statistics on participants' demographic characteristics and determine the level of knowledge, attitude, and practices. For the case of inferential statistics, Chi-square with a P-value of 5% is used to determine the association of dependent and independent variables of the study.

Operational terms

Antimicrobials refer to the class of medications with activity against disease-causing microorganisms like viruses, bacteria, parasites, worms, and fungi. This class of medications includes the likes of antibiotics, antivirals, antifungals, anthelminthic, and antiparasitics, and for the particular interest of this study, much will be discussed on antibiotics. In the study, attitude of the participants is a term that is used to describe thoughts, beliefs, and behaviours that are socially oriented and underlying inclinations in their respective ways of responding to something or someone. Thus, a positive attitude is favourable to proper responses and a negative attitude is to unfavourable responses. Practices is another term in the study that describes the daily methods of operating by the participants, for this study will include things like when, how, and why using antimicrobials, storage, and sources.

Results

Demographic characteristics

The study had a total of 154 participants, females dominated by 66 (57.1%) of the study population, the predominant age group was those aged 18-30, 99(64.3%) of participants, the highest level of education achieved by most participants was secondary education, 67(43.5%) of the study population and the leading source of information about antimicrobials was health facilities (65.6%) followed by radio (31.8%) as described in Table 1.

Awareness of antibiotics use and resistance

In our study, the commonly known medications as antibiotics were Amoxicillin (31.2%), followed by metronidazole (25.3%) and ciprofloxacin (21.4%). Others mentioned other type of medications like analgesics and antifungal as antibiotics while majority, 73(47.4%) could not mention any drug, as elaborated in Table 2.

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Table 1: Demographic characteristics of participants

Characteristic	Number of participants (N)	Percentage (%) of the study population
Sex		
Male	66	42.9
Female	88	57.1
Age (years)		
18-30	99	64.3
31-40	24	15.6
Above 40	31	20.1
Marital status		
Not married	75	48.7
Married/cohabited	69	44.8
Separated/widowed/divorced	10	6.5
Education level		
No formal education	4	2.6
Primary	45	29.2
Secondary	67	43.5
College/university	38	24.7
Main source of income		
Unemployed	50	32.5
Employed	10	6.5
Business	77	50
Agriculture	17	11
Fishing	0	0
Source of information		
Radio	49	31.8
Television	31	20.1
Health facilities	101	65.6
Neighbours/friends/family	18	11.7
Local government meetings	5	3.2
School	12	7.8

Table 2: Awareness of drugs that are antibiotics among commonly used drugs in the study population

Medication	Frequency (N)	Percentage (%) of the total study population
Metronidazole	39	25.3
Amoxicillin/amoxiclav	48	31.2
Ciprofloxacin	33	21.4
Paracetamol/Panadol	27	17.5
Diclofenac	24	15.6
Artemether Lumefantrine/Alu	19	12.3
Albendazole/mebendazole	17	11
Fluconazole/ ketoconazole	8	5.2
ART	20	13
Never heard	73	47.4

In the study, 67(43.5%) of participants did not know when to or not to use antibiotics, but UTI was the common illness to necessitate the use of antibiotics by the participants, followed by malaria (23.4%), fever (22.7%) and headache (18.8%). Others reported pneumonia 25(16.2%), TB and HIV/AIDs (20.8% and 11% respectively).

Majority of study participants responded that antimicrobial resistance is when antimicrobials are no longer effective against microbes, 56(36.4%) but others responded as a hypersensitivity reaction following the use of antimicrobials or adverse reactions, 19(12.3%) and 35 of them did not know it at all. A total of 144 participants (94%) reported having used antimicrobials at least once. Most of them, 74(48.1%) reported using antimicrobials when they just felt sick followed by 66(42.9%) who reported to only use antimicrobials when prescribed by medical personnel. Others reported to use them as advised by neighbours/friends/family and some for prevention of illness (3.2% and 5.8% respectively).

Again, among those who have ever used antimicrobials only in the study only 57 of them (54%) reported finishing their doses, while 45% reported stopping taking them as soon as they felt better, and one person reported stopping once he/she had forgotten to take them. About 57(40%) of the study population reported storing them as advised by medical personnel and same number of participants reported storing them in the sleeping room, followed by 26(19%) of participants who stored them in sitting rooms while only one participant reported to store them in the kitchen.

The level of information exposure on antimicrobials

Regarding the sources of information described in table 1 of demographic characteristics of study participants, the results were analysed based on individual exposure to the selected sources of information regarding the use and resistance of antimicrobials. The results were, 147 reported being exposed to at least one of the selected sources of information. Between them, 141(95.9%) had a below-mean level of information exposure, and only six (4.1%) had a good level of information exposure.

Level of knowledge towards antimicrobials

The study shows the level of knowledge on antimicrobials among participants; where by 79% had poor knowledge and only 21% had good knowledge.

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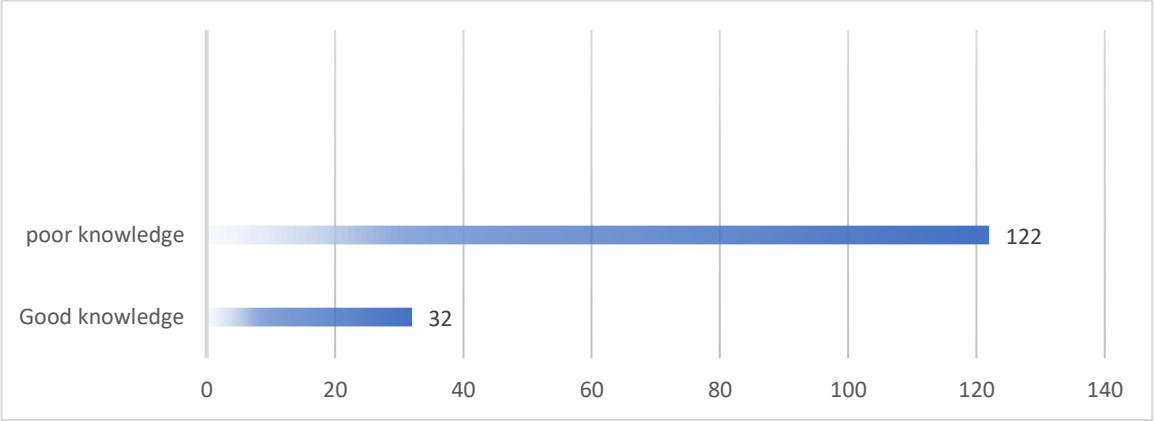

Figure 1. Level of knowledge about antimicrobials

Factors associated with the knowledge level

Table 3 illustrates the association between participants' knowledge level on AMU and AMR and their demographic characteristics. Only the education level of the participant and their level of information exposure regarding antimicrobials was statistically significant p-value = 0.012 and p-value = 0.000, respectively (P-value <0.05).

Table 3: Association between the demographic features of participants and their level of knowledge on antimicrobial uses and resistance

Demographic feature	Level of knowledge		Total (N) among the study population	P-value
	Poor knowledge	Good knowledge		
Sex				
Male	49 (31.9)	17 (11)	66 (42.8)	0.187
Female	73 (47.4)	15 (9.7)	88 (57.2)	
Total	122 (79.2)	32 (20.8)	154 (100)	
Age				
18-30	78 (50.6)	21 (13.6)	99 (64.3)	0.891
31-40	20 (13)	4 (2.6)	24 (15.6)	
Above 40	24 (15.6)	7 (4.6)	31 (20.1)	
Total	122 (79.2)	32 (20.8)	154 (100)	
Marital status				
Not married	58 (37.7)	17 (11.1)	75 (48.8)	0.542
Married/cohabited	55 (35.7)	14 (9.1)	69 (44.8)	
Separated/widowed	9 (5.8)	1 (0.6)	10 (6.4)	
Total	122 (79.2)	32 (20.8)	154 (100)	

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Formal education level				
No formal education	3 (2)	1 (0.6)	4 (2.6)	0.012
Primary	39 (25.3)	6 (3.9)	45 (29.2)	
Secondary	57 (37)	10 (6.5)	67 (43.5)	
College/university	23 (14.9)	15 (9.8)	38 (24.7)	
Total	122 (79.2)	32 (20.8)	154 (100)	
Main economic activity				
Not employed	37 (24)	13 (8.4)	50 (32.4)	0.541
Employed	7 (4.5)	3 (2)	10 (6.5)	
Business	64 (41.6)	13 (8.4)	77 (50)	
Agriculture	14 (9.1)	3 (2)	17 (11.1)	
Fishing	0	0	0	
Total	122 (79.2)	32 (20.8)	154 (100)	
Level of information exposure per selected sources				
Poor	114 (77.5)	27 (18.4)	141 (95.9)	0.000
Good	1 (0.7)	5 (3.4)	6 (4.1)	
Total	115 (78.2)	32 (21.8)	147 (100)	

Participant's attitude and their association with demographic characteristics

Majority of participants, 129 out of 154 (84%) had good attitude towards the use and resistance of antimicrobials. Among studied demographic characteristics of participants, only education level with a P-value of 0.002 was statistically significant in correlating the attitude of participants (Table 4).

Participant's practices and their association with demographic characteristics

Among 154 participants, 10 reported having never used antimicrobials. The remaining 144, who reported having used antimicrobials, were then assessed on the level of practices towards the use of antimicrobials as either good or poor practices, and among them 98 (68.05%) had poor practices and 46 (31.95%) had poor practices. Table 5 illustrates the relationship between participants' demographic features with their level of information regarding the study inclusively and their level of practices, which revealed no statistical significance between the variables (Table 5).

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Table 4: Association between the demographic characteristics of participants and their attitude towards the use and resistance of antimicrobials

Demographic characteristics	Attitude		Total (N) of the study population	P-value
	Negative	Positive		
Sex				
Male	8 (5.2)	58 (37.6)	66 (42.8)	0.305
Female	16 (10.4)	72 (46.8)	88 (57.2)	
Total	24 (15.6)	130 (84.4)	154 (100)	
Age				
18-30	16 (10.4)	83 (53.9)	99 (64.3)	0.974
31-40	4 (2.6)	20 (13)	24 (15.6)	
Above 40	4 (2.6)	27 (17.5)	31 (20.1)	
Total	24 (15.6)	130 (84.4)	154 (100)	
Marital Status				
Not married	11 (7.1)	64 (41.5)	75 (48.6)	0.483
Married/cohabited	13 (8.5)	56 (36.4)	69 (44.9)	
Separated/widowed	0	10 (6.5)	10 (6.5)	
Total	24 (15.6)	130 (84.4)	154 (100)	
Formal education level				
No formal education	3 (2)	1 (0.6)	4 (2.6)	0.002
Primary	4 (2.5)	41 (26.6)	45 (29.1)	
Secondary	14 (9.1)	53 (34.4)	67 (43.5)	
College/university	3 (2)	35 (22.8)	38 (24.8)	
Total	24 (15.6)	130 (84.4)	154 (100)	
Main economic activity				
Not employed	6 (3.9)	44 (28.6)	50 (32.5)	0.748
Employed	2 (1.3)	8 (5.2)	10 (6.5)	
Business	14 (9.1)	63 (40.9)	77 (50)	
Agriculture	2 (1.3)	15 (9.7)	17 (11)	
Fishing	0	0	0	
Total	24 (15.6)	130 (84.4)	154 (100)	
Level of information exposure per selected sources				
Poor	20 (13.6)	121 (82.3)	141 (95.9)	0.124
Good	1 (0.7)	5 (3.4)	6 (4.1)	
Total	21 (14.3)	126 (85.7)	147 (100)	

Table 5: Association between the demographic features of participants and their practices

Demographic features	Level of practices		Total (N) of the study population	P-value
	Poor practices	Good practices		
Sex				
Male	46 (31.9)	14 (9.7)	60 (41.6)	0.061
Female	52 (36.1)	32 (22.3)	84 (58.4)	
Total	98 (68)	46 (32)	144 (100)	
Age				
18-30	64 (44.4)	30 (20.8)	94 (65.2)	0.992

31-40	16 (11.1)	7 (4.9)	23 (16)	
Above 40	18 (12.5)	9 (6.3)	27 (18.8)	
Total	98 (68)	46 (32)	144 (100)	
Marital status				
Not married	50 (34.7)	21 (14.6)	71 (49.3)	0.808
Married/cohabited	43 (29.9)	21 (14.6)	64 (44.5)	
Separated/widowed	5 (3.4)	4 (2.8)	9 (6.2)	
Total	98 (68)	46 (32)	144 (100)	
Formal education level				
No formal education	2 (1.4)	1 (0.7)	3 (2.1)	0.922
Primary	28 (19.4)	12 (8.3)	40 (27.7)	
Secondary	41 (28.5)	22 (15.3)	63 (43.8)	
College/university	27 (18.7)	11 (7.7)	38 (26.4)	
Total	98 (68)	46 (32)	144 (100)	
Main economic activity				
Not employed	36 (25)	11 (7.7)	47 (32.7)	0.412
Employed	6 (4.1)	2 (1.4)	8 (5.5)	
Business	47 (32.6)	28 (19.4)	75 (52)	
Agriculture	9 (6.3)	5 (3.5)	14 (9.8)	
Fishing	0	0	0	
Total	98 (68)	46 (32)	144 (100)	
Level of information exposure per selected sources				
Poor	93 (67)	40 (28.7)	133 (95.7)	0.232
Good	3 (2.15)	3 (2.15)	6 (4.3)	
Total	96 (69.15)	43 (30.85)	139 (100)	

Participants' self-prescription practices

About 102(70%) of participants reported having practiced self-prescription at least once. In addition, knowledge about illness 75 (73.5%) was the leading factor for self-prescription, followed by the high cost of medical services at health facilities 19 (18.6%). Others reported that long distance from health facilities, advice from friends/family as well as low cost and easy availability and accessibility of antimicrobials as the driving reasons (6.9%, 12.7% and 4% respectively). To add on that, pharmacies were mentioned as the leading source of the drugs followed by health facilities 79(77.4%) and 15(14.6%) among those who practiced self-prescription.

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Association of demographic characteristics with Self-prescription practices

The Association between the demographic pattern of participants and self-prescription practices is illustrated in the table below, which shows that only the economic activity of the participants was statistically significant (p-value = 0.018) in predicting the practice.

Table 6: Association between the demographic features of participants and self-prescription practices

Demographic characteristics	Self-prescription practices		Total (N) of the study population	P-value
	Yes	No		
Sex				
Male	37 (25.7)	23 (16)	60 (41.7)	0.092
Female	64 (44.4)	20 (13.9)	84 (58.3)	
Total	101 (70.1)	43 (29.9)	144 (100)	
Age				
18-30	66 (45.8)	28 (19.4)	94 (65.2)	0.799
31-40	17 (11.8)	6 (4.2)	23 (16)	
Above 40	18 (12.5)	9 (6.3)	27 (18.8)	
Total	101 (70.1)	43 (29.9)	144 (100)	
Marital status				
Not married	46 (31.9)	25 (17.4)	71 (49.3)	0.442
Married/cohabited	47 (32.6)	17 (11.8)	64 (44.4)	
Separated/widowed	8 (5.6)	1 (0.7)	9 (6.3)	
Total	101 (70.1)	43 (29.9)	144 (100)	
Formal education level				
No formal education	3 (2.1)	0	3 (2.1)	0.058
Primary	32 (22.2)	8 (5.6)	40 (27.8)	
Secondary	44 (30.5)	19 (13.2)	63 (43.7)	
College/university	22 (15.3)	16 (11.1)	38 (26.4)	
Total	101 (70.1)	43 (29.9)	144 (100)	
Main economic activity				
Not employed	31 (21.5)	16 (11.1)	47 (32.6)	**0.018**
Employed	4 (2.8)	4 (2.8)	8 (5.6)	
Business	59 (41)	16 (11.1)	75 (52.1)	
Agriculture	7 (4.8)	7 (4.8)	14 (9.6)	
Fishing	0	0	0	
Total	101 (70.1)	43 (29.9)	144 (100)	
Level of information exposure per selected sources				
Poor	95 (68.3)	38 (27.3)	133 (95.6)	0.124
Good	3 (2.2)	3 (2.2)	6 (4.5)	
Total	98 (70.5)	41 (29.5)	139 (100)	

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Discussion

Knowledge on antimicrobials use and resistance

The terms antimicrobial and antimicrobial resistance were familiar to many participants. Among 154 total participants, 146 (95%) and 109 (71%) of the participants reported having heard of the terms, “antimicrobial” and “antimicrobial resistance,” respectively. But only 56 (36%) participants knew correctly that antibiotics kill bacteria, 86 (56%) did not know what antibiotics do, and about 9 (6%) reported that antibiotics kill viruses. The findings are dainty lower than those in a study done by Mbwambo *et al*. (7).

We found that the most recognized antibiotic was Amoxicillin (31.2%), metronidazole, and ciprofloxacin (25.3% and 21.4%, respectively). Similarly, about 17.5% and 15.6% of participants mentioned paracetamol and diclofenac as an antibiotic respectively. The results are similar to a study conducted in Kibaha, Kilosa, and Ilala on antibiotic preference (8) also, in a study done in Moshi(9). These findings suggest that study participants were more likely to use Amoxicillin, Ciprofloxacin, Paracetamol, and Alu (antimalarial) as antimicrobials when they thought dealing with infection. In that sense, those drugs are the highest risk of developing resistance as described in a study at Muhimbili National Hospital(10).

Antibiotics were most likely to be used in treating UTI (28.6%) and TB (20.8 %), which were correct but also others were likely to incorrectly used in any fever, diagnosed malaria, headache and viral flu (22.7%, 23.4%, 18.8%, 16.9% respectively) unlike findings of Sindato *et al*. Likely in a study by Francesco Politano in Italy, there was a high proportion of misuse of antimicrobials as in fever, sore throat, and flu (11) and in the WHO report on Southeast Asia on self-medication with Antibiotics(12). Conclusively UTI, malaria, fever, and headache were the leading indications for using antimicrobials in the study.

In our study, fifty-six (36.4%) of study participants were knowledgeable about “antimicrobial resistance”, and 41(26.6%) were unaware of antimicrobial resistance at all. This was slightly lower than the findings in a study done by Sindato *et al.*(8). In a nutshell, the majority of the study participants have heard of AMR, but only a few of them (36.4%) knew what it means, almost similar to the results found by Sindato *et al.*

The overall level of knowledge in the study about antimicrobial use and resistance was deficient in 79.2% of participants. However, the knowledge level was statistically significant for education level and level of exposure to sources of information, whereby it was highest among those with college/university education compared to other education levels *(p-value 0.012)* as

well to those with good information exposure *(p-value 0.0000)*. This was higher than findings from the study done by Mbwambo *et al.* (9). In a nutshell, there is a high proportion of community members with common knowledge, as in the study done by Sindato *et al.* but unlike in Mbwambo *et al.* In general, region wise, there is insufficient knowledge, and similarly, in all studies, this is significantly influenced by the level of education.

Attitude towards the use and resistance of antimicrobials

Attitude is among many factors that influence the use and general practices towards antimicrobials. In the study we found that many participants had an overall positive attitude (84%, n=129) towards the use, storage, responsibility, burden, and other perspectives of antimicrobials. However, attitude was only statistically significant for the education level of the participants, whereby it was highest among those with a secondary education level, 34.3%, and lowest among those who had no formal education, 0.6% *(p-value=0.002)*. The findings were similar to those found in Moshi by Mbwambo *et al.*(9) and Sindato *et al.,* in their study in Ilala, Kinondoni and Kilosa. Across different demographic patterns, it was significant for education level only.

Practices towards antimicrobials use and resistance

In our study, only 10 participants (6%) reported having never used antimicrobials. Different reasons for the use were studied among the remaining 94% of the study population; 48.1% of them reported using whenever they felt sick, 42.9% when prescribed, and 5.8% prophylactically. Additionally, among those who reported having used antimicrobials, only 54% reported completing their doses, and 45% were more likely to stop using their medications as soon as they felt better. Moreover, 40% stored their medications as advised by medical personnel, and others just stored them in their sleeping rooms or sitting room, 40% and 19% respectively. In a similar study done by Sindato *et al.*, an overall of >99% of participants who were aware of antimicrobials reported having ever used antimicrobials. Sindato *et al.* found that females were more likely to use antimicrobials than females *(p-value<0.05),* and the distribution was homogenous across age groups and education levels *(p-value>0.05)*(8). There was a very high proportion of community members who did not complete their doses and had poor storage of medications.

It was found that 102(70.8% n=144) participants reported having practiced self-prescription; this high was compared to the results of a study conducted by Marwa *et al.* to establish the prevalence of self-medication among pregnant women attending antenatal clinic (13). The

findings tally with the WHO reports on Southeast Asia on self-prescription of antibiotics,; the proportion was between 7.3% and 85.6%(12). Knowledge about their illnesses was the leading indication (73.5%), similar to results in Sindato *et al*. Pharmacies were reported as the leading sources of medicines among those who practiced self-prescription (77.4%), followed by health facilities (14.6%). In contrast, findings from Sindato *et al*., health facilities were the leading sources (65%). Self-prescription was not statistically correlating with any demographic characteristic described in the study.

Only 32% (n=46) of the study participants had good practices towards antimicrobials, and this differed among participants according to their demographic characteristics but statistically correlating with none of the addressed demographic features. In a study done by Sindato *et al.*, 97.1% of participants had poor practices, and only 2.9% had moderate to good practices, which is by far low compared to the findings of this study. The level of practice was statistically influenced by education level and occupation *(p-value<0.05)*. The findings of the study are in many ways similar to the study conducted in Saudi Arabia, in which 51% of participants had practiced self-prescription, and almost 42% halted using medications upon the alleviation of symptoms(14). Conclusively, there is a relatively high prevalence of poor practices towards antimicrobials, primarily seen in self-medication practices, dose completion, and storage of medications; results are deficient from ours study as compared to those of Marwa *et al.* and Sindato *et al*.

Conclusion and recommendations

Antimicrobial resistance is a natural phenomenon as microbes evolve to develop new means for their survival and existence. Humans through different ways stipulated in many studies and this, play part in the fast development of antimicrobial resistance. Our study explored essential attributes regarding antimicrobial resistance, knowledge, attitude, and practices and revealed a considerable knowledge gap and malpractices burden in the community towards antimicrobials use. The knowledge level correlates with education level and information exposure of the participant, attitude correlates with education level and practices, and neither the demographic characteristics of the participant addressed.

Improving community awareness through information accessibility should be one of the targets to fight against antimicrobial resistance through revising of existing campaigns and innovation of new more accessible methods, for instance, in our study, health facilities were the leading source of information on AMU. Thus, a large percent of the community can be

accessed with adequate and correct information about antimicrobials via posters, audio, videos or by selected trained personnel can provide the education while they're attending other services at the facilities. Improving the level of knowledge of the community will improve the way antimicrobials are handled in the community as it has been highlighted in the study that self-prescription practices of antimicrobials go in hand with low level of knowledge which in turns accounts to the development of resistance. We would also like to recommend further studies on this topic, AMU, and AMR, across all areas of the country to have a national wise scale of the problem and establish national programs for intervention(s).

Declarations

Ethical considerations

Ethical clearance to conduct the study was obtained from the MUHAS university Research and Ethics committee and importantly from local government authorities. We affirm that ethical considerations were given due importance throughout the planning, implementation, and reporting stages of the study. The research was conducted with integrity, transparency, and with the utmost respect for the rights, welfare, and dignity of all individuals involved.

Competing interests

The authors declare there is no actual or potential conflict of interest with any part, including but not limited to any financial, personal or other relationship with people or organization**.**

Authors' contributions

CS, MA conceptualized the study. CS, EB, AM designed the study and conducted data analysis. EB, AM conducted a review, editing and visualization of data AM supervised the conduct of the study. All authors approved the submission and publication of this manuscript.

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Abbreviations

AMU	Antimicrobial Use
AMR	Antimicrobial Resistance
TB	Tuberculosis
WHO	World Health Organization
HESLB	High Education Students Loan Board
HIV	Human Immunodeficiency Virus
MRTB	Multi-Drug Resistant
MUHAS	Muhimbili University of Health and Allied Sciences
SARS	Severe Acute Respiratory Syndrome
UTI	Urinary Tract Infection

References

1. WHO, WIPO, WTO. Antimicrobial resistance a global epidemic. 2014;1–4. Available from: https://www.wto.org/english/news_e/news16_e/heal_29aug16_e.pdf
2. Maldonado V, Loza-mejía MA, Chávez-alderete J. Global burden of infectious diseases, C M Michard, Havard initiative for Global Health, Cambridge MA, USA. 2020;(January). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7150259/pdf/main.pdf
3. Castro-Sánchez E, Moore LSP, Husson F, Holmes AH. What are the factors driving antimicrobial resistance? Perspectives from a public event in London, England. BMC Infect Dis. 2016;16(1).
4. Ulomi WJ, Mgaya FX, Kimera Z, Matee MI. Determination of Sulphonamides and Tetracycline Residues in Liver Tissues of Broiler Chicken Sold in Kinondoni and Ilala Municipalities, Dar es Salaam, Tanzania. Antibiotics. 2022;11(9):1–11.
5. Kimera ZI, Mshana SE, Rweyemamu MM, Mboera LEG, Matee MIN. Antimicrobial use and resistance in food- producing animals and the environment: an African perspective. 2020;1–12.
6. Simba D, Kakoko D, Semali I, Kessy A, Embrey M. Household knowledge of antimicrobials and antimicrobial resistance in the wake of an Accredited Drug Dispensing Outlet (ADDO) program rollout in Tanzania. PLoS One. 2016;11(9):1–13.
7. Agarwal S, Yewale VN, Dharmapalan D. Antibiotics use and misuse in children: A knowledge, attitude and practice survey of parents in India. J Clin Diagnostic Res. 2015;9(11):SC21–4.
8. Sindato C, Mboera LEG, Katale BZ, Frumence G, Kimera S, Clark TG, et al. Knowledge, attitudes and practices regarding antimicrobial use and resistance among communities of Ilala, Kilosa and Kibaha districts of Tanzania. Antimicrob Resist Infect Control [Internet]. 2020;9(1):1–17. Available from: https://doi.org/10.1186/s13756-020-00862-y
9. Goodluck M, Basiliana E, Maseke RM, Geofrey NS, Debora CK. Community knowledge and attitudes on antibiotic use in Moshi Urban, Northern Tanzania: Findings from a cross sectional study. African J Microbiol Res. 2017;11(25):1018–26.
10. Mhada T V., Fredrick F, Matee MI, Massawe A. Neonatal sepsis at Muhimbili National Hospital, Dar es Salaam, Tanzania; Aetiology, antimicrobial sensitivity pattern and clinical outcome. BMC Public Health [Internet]. 2012;12(1):1. Available from: BMC Public Health
11. Napolitano F, Izzo MT, Di Giuseppe G, Angelillo IF. Public knowledge, attitudes, and experience regarding the use of antibiotics in Italy. PLoS One. 2013;8(12):1–6.

Published by OJS
Doi: 10.4314/tmj.v34i1.623.g327

12. Nepal G, Bhatta S. Self-medication with Antibiotics in WHO Southeast Asian Region: A Systematic Review. Cureus. 2018;10(4).
13. Marwa KJ, Njalika A, Ruganuza D, Katabalo D, Kamugisha E. Self-medication among pregnant women attending antenatal clinic at Makongoro health centre in Mwanza , Tanzania : a challenge to health systems. 2018;1–8.
14. Al-shibani N, Hamed A, Labban N, Al-kattan R, Al-otaibi H, Alfadda S. Knowledge, attitude and practice of antibiotic use and misuse among adults in Riyadh, Saudi Arabia. 2017;38(10):0–2.