Student's Journal of Health Research Africa
Vol. 4 No. 9 (2023): September 2023 Issue
https://doi.org/10.51168/sjhrafrica.v4i9.859
Original article

ASSESSMENT OF THE KNOWLEDGE AND ATTITUDE TOWARDS ANTIBIOTIC RESISTANCE AMONG PEOPLE RESIDING IN NAMUWONGO, MAKINDYE EAST DIVISION KAMPALA, UGANDA, A QUALITATIVE AND DESCRIPTIVE CROSS-SECTIONAL STUDY

Safari Daniel[a*], *Atim Emilly Faith*[b], *Isaac Ogwal*[c], *Mwambi Bashir*[d], *Brenda Ann Nalubwama*[a]

[a*]*Medical Laboratory Science, Clarke International University, Bukasa, Kampala*

[b]*MBCHB, Makerere University, Kampala*

[c]*Head of Department Hematology, Nakasero Hospital, Kampala.*

[d]*Head of Department Microbiology, Clarke International University, Bukasa, Kampala*

ABSTRACT

Background

There is an increasing global concern about Antibiotic resistance causing a serious threat to public health with an estimated 700,000 deaths per year and it's estimated to increase to about 10 million deaths by 2050(WHO). The aim of this study was to assess the knowledge and attitude toward antibiotic resistance among people residing in Namuwongo, Makindye East Division, Kampala Uganda.

Methodology

A qualitative and descriptive cross-sectional study among 178 randomly selected participants through a structured questionnaire.

Results

Of the 178 respondents, the majority of the respondents were females 125/178 (70.22%).137 (76.97)of residents agreed that missing an antibiotic dose contributes to antibiotic resistance (mean score of 2.62±0.74). 122 (68.54) respondents agreed that consumption of antibiotics without a physician's prescription can contribute to antibiotic resistance. (mean score of 2.45±0.85). The majority of respondents agreed that antibiotic resistance is increasing (73.60%, Mean score 2.58±0.75). 135 (75.84) agreed that antibiotic resistance can be accelerated by the overuse of antibiotics. (mean score of 2.61±0.73). But 127 (71.35) also agreed that Antibiotics are effective for the treatment of both bacterial and viral infections (mean score of 2.56±0.75). . 93.82% agreed that the government should create more awareness of antibiotic resistance (Mean score 2.91±0.37).

Conclusion

There was poor knowledge about the usage of antibiotics in the treatment of viral infections. There is a need to raise more awareness and education on antibiotic resistance, particularly on proper antibiotic usage.

Recommendations

Each pharmacy should at least have a basic laboratory so that patients get tested before any prescription, this will curb the unnecessary and wrong usage of antibiotics for illnesses not caused by bacteria. Drug shops should strongly be advised only to dispense medicines, especially antibiotics provided the buyer has a genuine prescription note from a medical doctor, this practice shall thereby reduce self-medication that leads to irrational use of antibiotics in the treatment of viral infection

Keywords: Antimicrobial Resistance, Knowledge, Attitude, Viral Treatment.
Submitted: 2023-07-03 Accepted: 2023-07-07.

Corresponding author: *Safari Daniel*[a*]
Email: safaridaniel8@gmail.com

Medical Laboratory Science, Clarke International University, Bukasa, Kampala.

BACKGROUND

Since the introduction of the first effective antibiotics in 1937 namely, the sulfonamides, the development of specific mechanisms of resistance has plagued their therapeutic use. *Davies and Davies, "Origins and Evolution of Antibiotic Resistance.*" the development of these resistances in the bacteria has not retarded but has shown a consistent increase in the globe especially in third world countries.

Student's Journal of Health Research Africa
Vol. 4 No. 9 (2023): September 2023 Issue
https://doi.org/10.51168/sjhrafrica.v4i9.859
Original article

Antibiotic resistance is the condition when the antibiotic agent is compromised by the potential development of tolerance or resistance to that compound from the time it is first employed. *Davies and Davies,"Origins and Evolution of Antibiotic Resistance."*

Antibiotics are regimes used to kill bacteria. Over time, subgroups of these organisms may adapt to these drugs. These bacteria change whereby antibiotics can't kill them. *WORLD HEALTH ORGANISATION, "Antibiotic Resistance."*

Antibiotic resistance occurs when microorganisms, for example, learn how to resist the medications meant to kill them. That implies that these bacteria survive and develop. CDC, *"What Exactly Is Antibiotic Resistance?"*

This is made worse by the fact that the resistance is within the bacteria that are important pathogens in humans. Antibiotic resistance is undoubtedly becoming a silent pandemic and a threat to public health at large.

Causes of Antibiotic resistance

Overuse of antibiotics (related to self-medication), over-prescription of antibiotics, and patient's failure to finish the entire course of the recommended dosage of antibiotics, These factors that favor the development and spread of antimicrobial resistance. Overuse of antibiotics in livestock and fish farming, a high patient load, a high percentage of infection, poor hygiene and infection control, and inadequacy of diagnostic tests prior to treatment.

In developing countries especially in Africa, there has been a rise in the use of non-prescribed antibiotics which has been aggravated by non-prescription sales of antibiotics in pharmacies. Pharmacies and drug shops that sell these antibiotics without making a clear diagnosis to find out the actual disease before making any drug prescription have also led to the rapid rise of resistant bacterial strains. *Amy Norton, "Half of Antibiotics Given With No Infection Noted."*

Low human resource availability combined with a large number of infected patients can make it difficult for doctors to prescribe appropriate empirical antibiotic therapy to patients in these developing countries in Africa.

Most people who come to hospitals for treatment have taken antimicrobial drugs at home before going to the hospital, resulting in a 'prescribing cascade.' Before treating an infection, inadequate doses of antimicrobial agents are commonly provided to patients in the private sector; drugs are dispensed depending on the amount of money patients have, which is linked to insufficient regulation. At least four out of every ten people here in Africa who attend a healthcare facility are given antibiotics, often in incomplete doses. In health-care institutions, hygiene of amenities such as soap for hand washing are in short supply. It has been established that health staff in developing countries have poor understanding and attitudes towards infection management. *Elston et al., "Infection Control in a Developing World."*

Antibiotics are also being used more frequently in poultry and animal farms, not only to cure infections but also to stimulate growth and prevent disease. *Roth et al., "the Application of Antibiotics in Broiler Production and the Resulting Antibiotic Resistance in Escherichia Coli"*

Antimicrobials are widely seen as a universal remedy for the majority of ailments in Uganda, which offers a strong incentive for their use, they are commonly over-prescribed by healthcare professionals for a variety of reasons. In Uganda, for example, health providers will prescribe antibacterial medications to treat sickness symptoms caused by viral infections such as common colds. Antimicrobials are commonly available over the counter and in unregulated supply networks. *Odoi, "Anti-Microbial Resistance in Uganda."*

Consequences of Antimicrobial resistance

Antibiotics such as penicillin, first-generation cephalosporins, aminoglycosides such as gentamycin, polyketide antibiotics such as tetracycline, and others were the medications of choice until antibacterial agents against these drugs took a stance. The economic impact is an increase in the number of untreatable infectious diseases has been empirically demonstrated, it is clear that the usage of more expensive fourth-generation cephalosporins for treating most bacterial diseases is on the rise. Antimicrobial resistance allows the emergence of new infections as well as the reemergence of established ones. *Odoi, "Anti-Microbial Resistance in Uganda."*

When these bacterial strains become resistant to the antibiotics meaning they can't be killed they continue growing and multiplying leading to persistent infections that are hard to treat hence claiming lives.

A native of Wobulenzi in the Luwero district of central Uganda named Joy (not her real name) recently had an itchy and severe urinary tract infection (UTI). "I took some antibiotics, known as double colors in Uganda, but they weren't effective. Next, I was given an ointment that I had to insert and

some more tablets. The treatment went on for seven months," she says.

Joy represents numerous Ugandan women who are fighting antibiotic resistance. (AMR). Jenipher Asiimwe, "Antibiotic Resistance."

With time, this leads to high prevalence, mortality, and morbidity of bacterial-related diseases. *Guo et al.,"Prevalence and Therapies of Antibiotic-Resistance in Staphylococcus Aureus."*

An era is to come where the so-called simple and mild bacterial diseases will start being fatal and killing people if antibiotic resistance is not checked thoroughly. Under the aegis of the Uganda National Academy of Sciences, the Global Antibiotic Resistance Partnership Uganda Chapter financed a study in 2015 that demonstrated deteriorating patterns of resistance and decreasing antibiotic efficiency in both humans and animals in Uganda. As antibiotics become less efficient, a growing range of infections, such as pneumonia, TB, gonorrhea, and salmonellosis, are becoming more difficult to cure. High resistance rates to both -lactam and non—lactam antibacterial drugs have recently been found in district hospitals in Uganda. Multidrug resistance has also been documented at alarming levels. The following carbapenem resistance profile was discovered after a systematic analysis of the present state of carbapenem resistance in East Africa: A. baumannii is the most common (23 percent), followed by Pseudomonas aeruginosa (17%), Klebsiella pneumoniae (15%), Proteus mirabilis (14%), and Escherichia coli (12%) were the most common bacteria identified from the respiratory tract, blood, urine, and wound/pus. Multi-drug resistant bacteria, such as methicillin-resistant Staphylococcus aureus (MRSA) and extended-spectrum beta-lactamase (ESBL)-producing bacteria, are of particular concern since they transmit resistance to several sophisticated antibiotics. Odoi, "Anti-Microbial Resistance in Uganda."

In Uganda, there's limited information about the knowledge and attitude of people as far as antibiotic resistance is concerned, we however acknowledge various studies have been done about this particular topic, though many have focused on the specific strains of the bacteria that are resistant and others have gone further to assess the KAP among medical students and medical practitioners who we presume that already have an idea about ABR.

According to the Antimicrobial Resistance National Action Plan 2018-2023, one of the strategies made by MOH was to increase the awareness of AMR among Ugandans. This study done in Namuwongo with a total estimation of 15,000 residents *as of 27th June 2015 by global sound movement, will check the degree of antibiotic awareness among these residents* with different professional backgrounds. Results shall be used by relevant stakeholders to assess the effectiveness of the AMR awareness strategy proposed five years ago during the last Antimicrobial Resistance National Action Plan.

Specific objective

- To find out the knowledge on antibiotic resistance among the people residing in Namuwongo, Makindye East Division Kampala
- To assess the attitude towards antibiotic resistance among the people residing in Namuwongo, Makindye East Division Kampala

METHODOLOGY

Study design

This is a qualitative and descriptive cross-sectional study that was conducted in the community of Namuwongo, Kampala Uganda using primary data as a source of data.

It's a descriptive cross-sectional study among 178 randomly selected participants through a structured questionnaire.

Study area

The study was conducted in Namuwongo which located in Makindye Division, in Kampala Uganda .Its borders are Kisugu and Kabalagala to the south, Lugogo to the north, Muyenga to the southeast, Kibuli to the west, Kololo to the northwest, Nakawa to the northeast, Kiswa and Bugolobi to the east, The coordinates of Namuwongo are:0°18'29.0"N 32°36'44.0"E (Latitude:0.308050; Longitude:32.612223). Namuwongo is estimated to have a population of 30000 people.

Study population

The study targeted respondents who were present at the time of data collection have been residents of Namuwongo for at least one year and are above 18 years of age.

Inclusion criteria: All residents who live in the community of Namuwongo who are

Above 18 years.

Exclusion criteria: residents below the age of 18 and have not been living in Namuwongo for at least a year

Sampling Size and selection

The sample size was calculated using Slovin's formula. The sample size calculation was done at a 95% confidence level and a 5% margin of error. The people in the community will be chosen using simple random sampling from a total estimation of 5000 registered nationals who are above the age of 18 living in the community of Namuwongo.

Selection criteria;

The study involved respondents above the age of 18. This category of people will be selected based on the fact that they can ably reason, are capable of giving consent, and profoundly at some point they can ably purchase antibiotics.

Sampling Procedure

A Simple random sampling method was used where every member in the group had an equal chance of participation to limit bias.

Data collection tools and methods

Data collection was done using a structured self-administered questionnaire. the questionnaire was a hard copy form both in Luganda and English which was availed to the people of Namuwongo by physical means, who had signed the consent form and agreed to participate in the study.

The questionnaire was adopted and modified from those done in similar and related studies.

The questionnaire chosen was used for its simplicity, accuracy, clarity, understandability, and relevance. The questionnaire was particularly used to collect data on socio-demographic characteristics, knowledge, and attitudes of the people of the Namuwongo community as far as antibiotic resistance Is concerned.

Collection of data

We organized small groups of people per zonal level who were mobilized by the local council leaders. Before collection of data the chief investigator safari Daniel addressed the groups on what the research intends to do including the general overview about the importance of research.

A compensation fee was given to the participants after the collection of data, same procedure was done for all the zones until the anticipated target population was reached.

Appreciation letters were addressed to all the local council chairpersons for assisting us in the mobilization of the people during the study.

Study Period.

This study commenced from march15th 2022 to 15th august 2022.3.18.

Table 1 showing the days for data collection

DATE	NUMBER OF PARTICIPANTS	PLACE OF DATA COLLECTION
30TH MARCH 2022	56	ST. STEPHENS C.O.U MAIN TENT
5TH APRIL 2022	88	ST. STEPHENS C.O.U GARDENS
6TH -15TH APRIL 2022	34	N/A

RESULTS

Socio-demographic characteristics of respondents

A total of 178 respondents were involved in the study from five zones with the majority from Namwongo B (44.38%) followed by Yoka (40.45%) and the least being Kanyogago (1.69%). Females constituted the highest percentage (70.22%) and 29.78% males. The mean age of respondents was 31±10 years. Majority of the respondents were employed, 126/178 (70.79%).

Knowledge of residents on Antimicrobial resistance

According to this study, majority of the respondents,156/178 (87.64%) responded that antibiotics are effective for treatment of bacterial infections with mean score of 2.81±0.54. However,

Student's Journal of Health Research Africa
Vol. 4 No. 9 (2023): September 2023 Issue
https://doi.org/10.51168/sjhrafrica.v4i9.859
Original article

most of the respondents (66.85%) also agreed that antibiotics are effective for treatment of viral infections with mean score of 2.41±0.87. While 71.35% agreed that antibiotics are effective for treatment of both viral and bacterial infections with mean score of 2.56±0.75. Most of the respondents also agreed that bad use of antibiotics can contribute to antimicrobial resistance with mean score ranging from 2.45±0.8 to 2.62±0.74.

Attitude of respondents toward Antibiotic resistance

Overall, majority of responded agreed to antibiotic resistance is increasing (73.60%, Mean score 2.58±0.75). 93.82% agreed that the government should create more awareness of antibiotic resistance (Mean score 2.91±0.37). Most of the respondents also agreed that enough knowledge should be generated to prevent antibiotic resistance (91.01%, Mean score 2.86±0.47). Of concern in livestock, 80.34% of the respondents agreed that the use of antibiotics in poultry and dairy industries should be strictly monitored (Mean score 2.74±0.59).

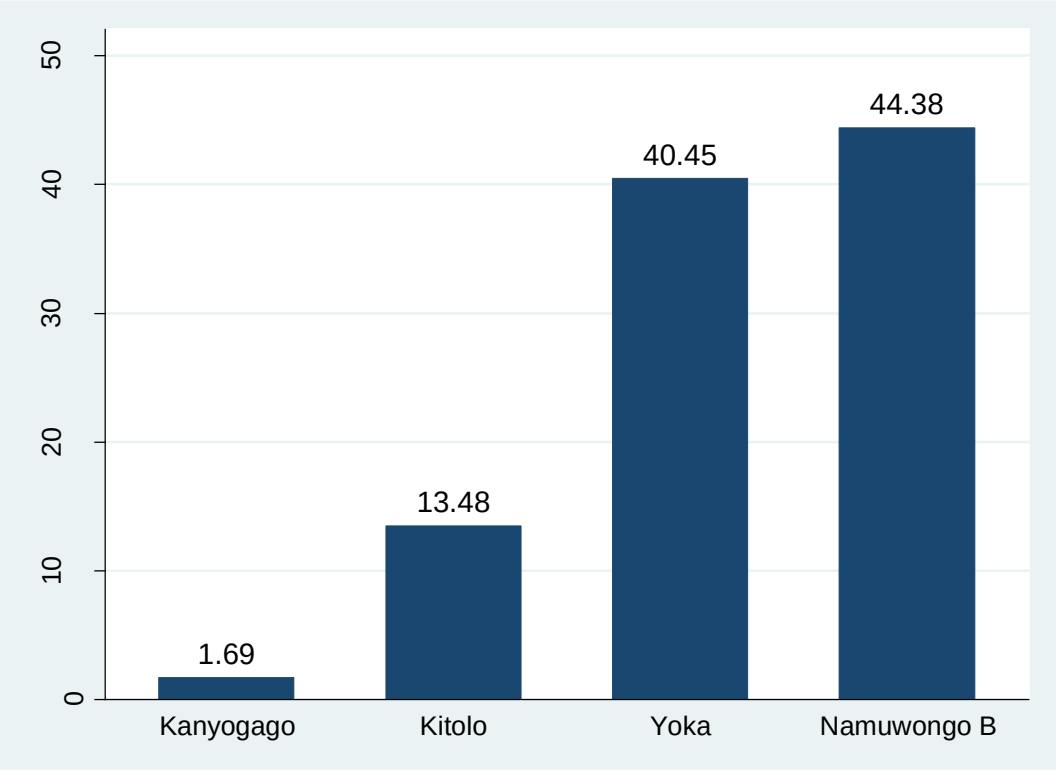

Figure 1 Percentage of respondents in by zones

Table 2 Percentage of residents by gender and employments status

Variable	Frequency	Percent
Gender		
Female	125	70.79
Male	53	29.78
Employment		
Employed	126	70.79
Unemployed	52	29.21

Student's Journal of Health Research Africa
Vol. 4 No. 9 (2023): September 2023 Issue
https://doi.org/10.51168/sjhrafrica.v4i9.859
Original article

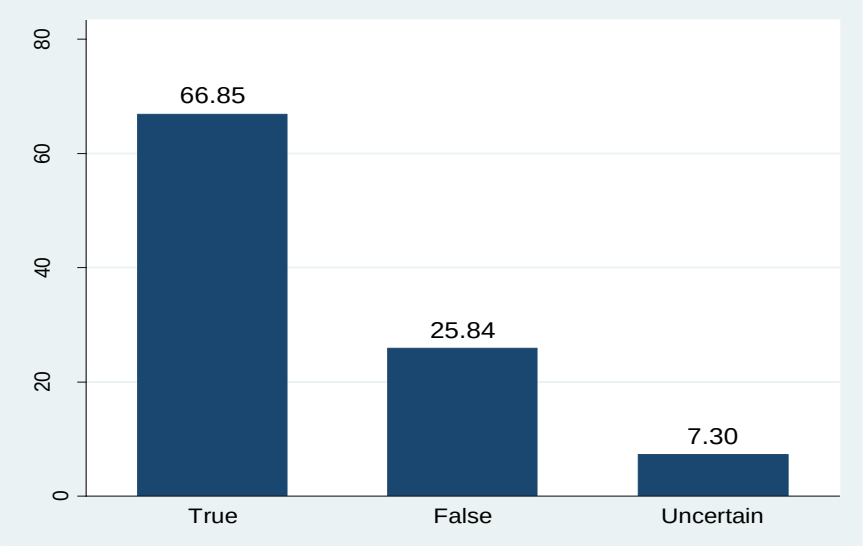

Figure 2 Percentage of response to antibiotics are effective against viral infections

Table 3 Knowledge score of residents on Antimicrobial resistance

Knowledge indicator	Response, n (%)			Mean±SD
	True	False	Un-certain	Likert scale
Antibiotics are effective for the treatment of bacterial infections	56 (87.64)	12 (6.74)	10 (5.62)	2.81±0.54
Antibiotics are effective for the treatment of viral infections	119 (66.85)	46 (25.84)	13 (7.30)	2.41±0.87
Antibiotics are effective for the treatment of both bacterial and viral infections	127 (71.35)	28 (15.73)	23 (12.92)	2.56±0.75
Antibiotic resistance is the loss of activity of an antibiotic	116 (65.17)	43 (24.16)	23 (12.92)	2.42±0.85
Missing an antibiotic dose contributes to antibiotic resistance	137 (76.97)	27 (15.17)	14 (7.87)	2.62±0.74
Antibiotic resistance can be caused by the overuse of antibiotics	135 (75.84)	26 (14.61)	17 (9.55)	2.61±0.73
Consumption of antibiotics without physician's prescription can contribute to antibiotic resistance	122 (68.54)	42 (23.60)	14 (7.87)	2.45±0.85

Likert scale

1.00-1.67 Disagree

1.68-2.34 Uncertain

2.35-3.00 Agree

Table 4 Attitude score of residents on Antimicrobial resistance

Attitude indicator	Response, n (%)			Mean±SD
	True	False	Un-certain	Likert scale
Do you think antibiotic resistance is increasing?	131 (73.60)	28 (15.73)	19 (10.67)	2.58±0.75
Do you think we should be more concerned regarding antibiotic consumption?	157 (88.20)	14 (7.87)	7 (3.93)	2.80±0.56
Government should create more awareness of antibiotic resistance	167 (93.82)	5 (2.81)	6 (3.37)	2.91±0.37
Enough knowledge should be generated to prevent antibiotic resistance	162 (91.01)	9 (5.06)	7 (3.93)	2.86±0.47
The uses of antibiotics in poultry and dairy industries should be strictly monitored	143 (80.34)	13 (7.30)	22 (12.36)	2.73±0.59
Do you think physicians often prescribe antibiotics unnecessarily?	118 (66.29)	44 (24.72)	16 (8.99)	2.41±0.86

DISCUSSION

Antimicrobial resistance is a global threat with an estimated 10 million deaths per year due to AMR by 2050 (FAO, 2016; Fox & Smyth, 2014). One of the recommended and talked about mitigation measures is to create awareness among users of antibiotics in both humans and livestock (FAO, 2016; Foster et al., 2011; Richardson, 2017). From the literature, most of the studies have been done among students to assess knowledge attitudes, and practices regarding AMR. Therefore, this study was aimed at determining the knowledge and attitude toward antibiotic resistance among people residing in Namuwongo, Makindye East Division, Kampala Uganda.

From this study, it was found that respondents had poor knowledge about the effectiveness of antibiotics in the treatment of viral infections whereas the majority agreed that antibiotics are effective in the treatment of viral infections. In contrast with the study done among 1141 adult Jordanians recruited at different settings.67.1% of respondents felt that antibiotics heal the common cold and cough based on their understanding of the effectiveness of, resistance to, and self-medication with antibiotics against bacterial, viral, and parasite disorders. (Shehadeh et al., 2012). This can explain why most of the respondents in this study as well agreed to antibiotics treating viral infections. This can greatly contribute to the irrational use of antibiotics among the population in the hope that it can cure common colds which is very common in Uganda. This has been evidenced in previous studies (Mukonzo et al., 2013; Ocean et al., 2014). This points out the need to implement effectively the AMR National action plan as stated to bridge the knowledge deficiencies (Ministry of National Health Services Regulations & Coordination Government of Uganda, 2017).

From this study, it was also found that most of the respondents agreed that bad practices such as overuse of antibiotics, consumption of antibiotics without prescription, and missing antibiotic doses can contribute to AMR. This is in agreement with a study done in Rwanda among students which reported that respondents demonstrated a good knowledge of antibiotics and antimicrobial resistance with 95% agreeing that the inappropriate use of antibiotics could lead to antibiotic resistance (Nisabwe et al., 2020). In a similar vein, research conducted among Ugandan students found that the majority of participants (87.5%) had adequate knowledge about antibiotic resistance, with a mean score of 85. (Kanyike et al., 2022).

The attitude of the respondents from this study majority of the respondents agreed that; antibiotic resistance is increasing, being more concerned regarding antibiotic consumption, the Government creating more awareness of antibiotic resistance, the generation of enough knowledge, and monitoring the use of antibiotics in livestock. This indicates that there is a positive attitude towards addressing the challenge of antimicrobial resistance. Attitudes are important because they can guide thought, behavior, and feelings (Petty et al., 1997). Any time an attitude

is altered, attitude change occurs. Thus, change occurs when a person goes from being negative to positive, from slightly positive to very positive, or from having no attitude to having one. This can be pivotal in the success of implementing mitigation measures for antimicrobial resistance among antibiotic users.

Attitude has been reported in many peer-reviewed articles to be associated with antimicrobial resistance (Fetensa et al., 2020, 2020; Higuita-Gutiérrez et al., 2020; Kanyike et al., 2022; Sa'adatu Sunusi et al., 2019). In another study, there was a significant relationship between respondents' knowledge and attitude, knowledge and practice, and attitude and practice (Dejene et al., 2022). Therefore, knowledge attitude and practice are interlinked in that to improve either one, the focus should be directed to all.

CONCLUSIONS

There was poor knowledge about the effectiveness of antibiotics in the treatment of viral infections. Respondents agreed that; antibiotic resistance increasing, being more concerned regarding antibiotic consumption, the Government creating more awareness of antibiotic resistance, need for knowledge and monitoring of the use of antibiotics in both humans and livestock.

LIMITATIONS

We had targeted a study population of 250 but due to the short of funds and resourses, we decided to work with a population of 178 respondents.

The problem of the language barrier, this also proved a problem, very few of the people were fluent with English and not all knew Luganda.

RECOMMENDATIONS

Each pharmacy should at least have a basic diagnostic laboratory so that patients get tested before any prescription, this will curb the unnecessary and wrong usage of antibiotics for illnesses that are not caused by bacteria. Drug shops should strongly be advised only to dispense medicines, especially antibiotics provided the buyer has a genuine prescription note from a medical doctor, this practice shall thereby reduce self-medication that leads to irrational use of antibiotics in the treatment of viral infections. Strategies should be in the creation of a consistent long-term government policy targeting and monitoring the use of antibiotics in poultry farms, especially the broiler farms where antibiotics are used to stimulate the fast growth of the birds. This can be achieved through government interventions and implementing partners.

ACKNOWLEDGEMENTS

I would love to acknowledge the staff of Clarke International University especially Atim Fiona, Emily Naiwumbwe, Ndagire Regina for the consistent support rendered to me through drafting recommendations and all the necessary documentations I needed. Nyesiga Edwinah and Namatovu denise who assisted in drafting the Luganda versions of both the questionnaire and the informed consent forms.

LIST OF ABBREVIATIONS/ACRONYMS AND ABBREVIATIONS

ABR- Antibiotic resistance

AMR- Antimicrobial resistance

KAP-Knowledge- Attitude and Practice

WHO- World Health Organisation

ADR- Adverse drug reactions

ESBL-PE - Extended spectrum beta lactamase producing enterobacteriacaea.

MOH- Ministry of Health.

Ethics approval and consent to participate

The study was ethically approved by Clarke International University with reference number, **CLARKE-2022-329:**

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests

FUNDING

"Research reported in this publication was supported by the Fogarty International Center of the National Institutes of Health, U.S. Department of State's Office of the U.S. Global AIDS Coordinator and Health Diplomacy (S/GAC), and President's Emergency Plan for AIDS Relief (PEPFAR) under Award Number 1R25TW011213. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health." The funds were used to facilitate for collection, analysis, and interpretation of data.

AUTHORS' CONTRIBUTIONS

MB contributed fervently in the proposal and manuscript development. CN critically revised the manuscript for important intellectual content. OI analyzed and interpreted the data, EFA and NBA

collected data.8All authors read and approved the final manuscript."

REFERENCES

1. Jairoun A, Hassan N, Ali A, Jairoun O, Shahwan M. Knowledge, attitude and practice of antibiotic use among university students: a cross sectional study in UAE. BMC Public Health. 2019 May 6;19(1):518. doi: 10.1186/s12889-019-6878-y. PMID: 31060543; PMCID: PMC6501289.
2. Kosiyaporn H, Chanvatik S, Issaramalai T, Kaewkhankhaeng W, Kulthanmanusorn A, Saengruang N, Witthayapipopsakul W, Viriyathorn S, Kirivan S, Kunpeuk W, Suphanchaimat R, Lekagul A, Tangcharoensathien V. Surveys of knowledge and awareness of antibiotic use and antimicrobial resistance in general population: A systematic review. PLoS One. 2020 Jan 16;15(1):e0227973.doi: 10.1371/journal.pone.0227973. PMID: 31945117; PMCID: PMC6964876.
3. Machowska A, Stålsby Lundborg C. Drivers of Irrational Use of Antibiotics in Europe. Int J Environ Res Public Health. 2018 Dec 23;16(1):27. doi: 10.3390/ijerph16010027. PMID: 30583571; PMCID: PMC6338985.
4. Sakr S, Ghaddar A, Hamam B, Sheet I. Antibiotic use and resistance: an unprecedented assessment of university students' knowledge, attitude and practices (KAP) in Lebanon. BMC Public Health. 2020 Apr 19;20(1):535. doi: 10.1186/s12889-020-08676-8. PMID: 32306940; PMCID: PMC7169022.
5. Ha TV, Nguyen AMT, Nguyen HST. Public Awareness about Antibiotic Use and Resistance among Residents in Highland Areas of Vietnam. Biomed Res Int. 2019 May 16;2019:9398536. doi: 10.1155/2019/9398536. PMID: 31223624; PMCID: PMC6541961.
6. Ahmed H, Bhimani S, Khanum I, Khan A, Khetpal A, Abbas MA, Godil F, Godil A, Makhdoom IUM. Knowledge, attitude and perception survey of doctors regarding antibiotic use and resistance in Karachi, Pakistan. J Pak Med Assoc. 2020 Jun;70(6):1023-1028. doi: 10.5455/JPMA.6239. PMID: 32810100.
7. Khan FU, Khan FU, Hayat K, Chang J, Saeed A, Khan Z, Ashraf M, Rasheed UM, Atif N, Ji W, Aziz MM, Fang Y. Knowledge, attitude and practices among consumers toward antibiotics use and antibiotic resistance in Swat, Khyber-Pakhtunkhwa, Pakistan. Expert Rev Anti Infect Ther. 2020 Sep;18(9):937-946. doi: 10.1080/14787210.2020.1769477. Epub 2020 Jun 9. PMID: 32516001.
8. Hamilton RM, Merrill KC, Luthy KE, Nuttall C. Knowledge, attitudes, and perceptions of nurse practitioners about antibiotic stewardship. J Am Assoc Nurse Pract. 2020 Jul 29;33(11):909-915. doi: 10.1097/JXX.0000000000000467. PMID: 32740336.
9. Schwendner AA, Lam TJGM, Bodmer M, Cousin ME, Schüpbach-Regula G, van den Borne BHP. Knowledge, attitude and practices of Swiss dairy farmers towards intramammary antimicrobial use and antimicrobial resistance: A latent class analysis. Prev Vet Med. 2020 Jun;179:105023. doi: 10.1016/j.prevetmed.2020.105023. Epub 2020 May 1. PMID: 32446003.
10. Firouzabadi D, Mahmoudi L. Knowledge, attitude, and practice of health care workers towards antibiotic resistance and antimicrobial stewardship programmes: A cross-sectional study. J Eval Clin Pract. 2020 Feb;26(1):190-196. doi: 10.1111/jep.13177. Epub 2019 May 21. PMID: 31115129.Patini R, Mangino G, Martellacci L, Quaranta G, Masucci L, Gallenzi P. The Effect of Different Antibiotic Regimens on Bacterial Resistance: A Systematic Review. Antibiotics (Basel). 2020 Jan 8;9(1):22. doi: 10.3390/antibiotics9010022. PMID: 31936186; PMCID: PMC7168150.
11. Okoche D, Asiimwe BB, Katabazi FA, Kato L, Najjuka CF. Prevalence and Characterization of Carbapenem-Resistant Enterobacteriaceae Isolated from Mulago National Referral Hospital, Uganda. PLoS One. 2015 Aug 18;10(8):e0135745. doi: 10.1371/journal.pone.0135745. PMID: 26284519; PMCID: PMC4540283.
12. Davies, Julian, and Dorothy Davies. "Origins and Evolution of Antibiotic Resistance." *Microbiology and Molecular Biology Reviews : MMBR* 74, no. 3 (September 2010): 417–33. https://doi.org/10.1128/MMBR.00016-10.
13. CDC. "What Exactly Is Antibiotic Resistance?" Centers for Disease Control and Prevention, December 13, 2021. https://www.cdc.gov/drugresistance/about.html.
14. Davies, Julian, and Dorothy Davies. "Origins and Evolution of Antibiotic Resistance." *Microbiology and Molecular Biology Reviews : MMBR* 74, no. 3 (September 2010): 417–33. https://doi.org/10.1128/MMBR.00016-10.
15. Jenipher Asiimwe. "Antibiotic Resistance: AMR a Health Threat in Uganda." Accessed December 25, 2021.

https://www.downtoearth.org.in/news/health/antibiotic-resistance-amr-a-health-threat-in-uganda-68932.

16. Irawati, L, Alrasheedy, A.A, Hassali, M.A. *et al* (2019)Low-income community knowledge attitudes and perceptions regarding antibiotics and antibiotic resistance in Jelutong Distrct, Penang, Malaysia: a qualitative study. BMC Public Health 19, 1292 (2019). Retrieved from; https://doi.org/10.1186/s12889-019-7718-9
17. A.R.McCullough, S. parekh,J. Rathbone, C,B Del Mar, T.C. Hoofmann A systematic review of the public's knowledge and beliefs about antibiotic resistance: Journal of Antimicrobial Chemotherapy, Volume 71, lssue 1, January 2016, pages 27-33 Retrieved from https://doi/org/10.1093/jac/dkv310
18. Malin Andre', Asa Vernby, Johanna Berg, Cecilia Stalsby Lundborg(2010) A survey of public knowledge and awareness related to antibiotics use and resistance in Sweden: Journal of Antimicrobial Chemotherapy , Volume 65, Issue 6, June 2010, page 1292-1296, retrieved from;https://dou.org/10.1093/jac/dkq1004
19. Cambaco,o., Alonso Menendez, Y., Kinsman, J. et al. (2020) Communities knwowldge and pravtices regarogn antibiotic use in rural Mozambique: where is the starting point for prevention of antibiotic resistance? BMC public health 20, 1183(2020), retrieved from; https://doi.org/10.1186/s12889-020-09243-x
20. Chukwu, E.E., Oladele, D.A., Awoderu, o.b. *et al.(*2020) A national survey of public awareness of antimicrobial resistance in Nigeria: Antimicrobial Resist Infect Control 9,72(2020) Retrieved from; https://doi.org/10.1186/s13756-020-00739-0
21. World Health Organization, 2015. Antibiotic Resistance. Retrieved from; www.who.int
22. Odoi, Richard. "Anti-Microbial Resistance in Uganda," 2019, 3.
23. Roth, Nataliya, Annemarie Käsbohrer, Sigrid Mayrhofer, Ulrike Zitz, Charles Hofacre, and Konrad J. Domig. "The Application of Antibiotics in Broiler Production and the Resulting Antibiotic Resistance in Escherichia Coli: A Global Overview." *Poultry Science* 98, no. 4 (April 1, 2019): 1791–1804. https://doi.org/10.3382/ps/pey539.

PUBLISHER DETAILS

Publishing Journal: Student's Journal of Health Research Africa.
Email: studentsjournal2020@gmail.com or admin@sjhresearchafrica.org

(ISSN: 2709-9997)

Publisher: SJC Publisher Company Ltd
Category: Non-Government & Non-profit Organisation
Contact: +256775434261(WhatsApp)
Email: admin@sjpublisher.org
Website: https://sjpublisher.org
Location: Wisdom Centre Annex, P.O. BOX. 113407 Wakiso, Uganda, East Africa.