



Knowledge of One Health Approach Policy and Antimicrobial Resistance Among the General Public: KAP Survey

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KEYWORDS Young Adult Risk Factor Adult Aging Gender Age Distribution Prevalence Age Factor Health	Abstract <i>Background:</i> The combination of patients' unsustainable use of antibiotics and doctors' inappropriate prescribing practices has resulted in challenges for disease control in the community and inadequate delivery of healthcare services. <i>Methods:</i> The General Public's understanding and awareness of AMR and the One Health Approach policy were evaluated through the use of a cross-sectional study questionnaire. Results were analysed statistically using SPSS software Study participants' knowledge, attitude, and perspective scores were predicted using ordinal logistic regression analysis. <i>Results:</i> Participants who were self-employed have good knowledge (41.8%) about AMR and One Health Approach policy and also had higher KAP scores (CI = 4.885). Factors like age and gender were observed to have no impact on aggregate KAP scores. <i>Conclusion:</i> In light of the knowledge gaps identified in our survey, development and implementation of health education and campaign will help to improve awareness among General Public.
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Introduction

Antibiotics and other antimicrobial agents are invaluable lifesavers against bacterial infections [1]. Sustainable use of antibiotics by patients together with inappropriate prescribing practices by clinicians to satisfy patient's requests have led to unresponsiveness and resistance of Multiple microbes to standard treatment modalities [2]. Antibiotic resistance is a common occurrence that happens when microorganisms come into contact with antibiotic medications. When exposed to antibiotics, bacteria that are vulnerable are either destroyed or

suppressed, while bacteria that are innately resistant or have developed antibiotic-resistant characteristics have a higher likelihood of thriving and reproducing [3]. Other significant factors that contribute to AMR include inappropriate selection of antibiotics, Antibiotics are available without prescription, diagnostic tests are not performed on time, irregular supply of certain medications resulting in their unavailability, health care providers relying on broad spectrum antibiotics for treating outpatients, leftover medicines are misused, Inadequate infection control measures etc [4].



The inadequate monitoring and control mechanism also contribute significantly to the emergence of antimicrobial resistance. Typically, samples are examined only in cases where patients do not show improvement with standard treatments. Despite the fact that microorganisms naturally evolve resistance, there are still effective interventional measures that can be implemented within the current healthcare system to prevent a significant portion of antimicrobial resistance [5]. AMR has numerous implications such as, patient enduring an extended period of illness, necessitating prolonged treatment typically involving costly and occasionally harmful medications. Consequently, this leads to heightened rates of morbidity and mortality [6]. The importance of effective antimicrobials cannot be overstated when it comes to the treatment and prevention of infections. Without them, critical medical procedures such as organ transplantation, cancer chemotherapy, and major surgery would be jeopardized [7]. Extended duration of infection reservoirs in hospitals and communities results in the transmission of infections to others. The economy at an individual level and the society as a whole are greatly affected by these circumstances [8]. Recently, the rapid expansion of worldwide trade and travel has facilitated the rapid dissemination of drug-resistant microorganisms to far-flung nations and continents eventually resulting in unsuccessful delivery of health care services and difficulty controlling diseases in the community [9]. Failure in treatment of bacterial infections due to Antimicrobial Resistance attributed to more than 700,000 deaths per annum as of 2016 [10].

Increased burden of AMR has paved the way for various numerous international and national initiatives over the past ten years. These initiatives include India Clen (Indian Clinical Epidemiology Network), has successfully gathered valuable data on antimicrobial resistance pathogens such as pneumococcus and influenzae throughout the nation. Another initiative, IIMAR (Indian Initiative for Management of Antibiotic Resistance), was initiated in March 2008 with the aid of the World Health Organization (WHO). This initiative, led by a collaboration of non-governmental organizations (NGOs), aims to enhance the responsible and judicious use of antimicrobial drugs. Additionally, the nation has established INSAR (Indian Network for Surveillance of Antimicrobial Resistance), a system consisting of 20 laboratories in both the private and

public sectors. This system plays a crucial role in generating high-quality data on AMR. Furthermore, the Indian Council of Medical Research (ICMR) arranged a maestro group meeting in December 2009, and an Indo-Swedish workshop was held in New Delhi on 2 February 2010. These events served as platforms for discussions on a joint strategy to effectively contain AMR [11-12]. The World Health Organization (WHO) launched the "One Health" strategy in 2015, as part of which collaborators from human and veterinary health, agriculture, environmental science, and economics joined forces to fight against antimicrobial resistance [13]. Several objectives were set out in the Action Plan, including increasing awareness, preventing infections, optimizing antibiotic use, and promoting sustainable investments in new medical approaches [14]. Also, A variety of interventions are used in antibiotic stewardship programs (ASPs) such as monitoring the susceptibility of antimicrobials on a global, national, regional, and local scale. Disseminating knowledge and education empowers patients, healthcare professionals, and various organizations to make informed decisions regarding the appropriate use of antimicrobials. Implementing advocacy programs to promote legislation that enhances patient safety, minimizes exposure, and combats the development of resistant infections to refine the appropriate prescription of antimicrobials and have been found to be worthwhile [15].

The "One Health" strategy promotes the use of existing vaccines and the development of new or improved vaccines to address infections that are difficult to treat due to antimicrobial resistance (AMR) [16]. Vaccination can decrease the prevalence of AMR through various pathways. Firstly, it reduces the number of infected cases that require antibiotic treatment. Effective vaccination programs can also help reduce the misuse of antibiotics and the empirical use of broad-spectrum antibiotics to treat clinical syndromes like pneumonia. Additionally, by preventing infections, vaccines limit the opportunities for pathogens to develop resistant strains [17].

Furthermore, through herd immunity, vaccinated individuals' contacts are less likely to acquire infections that would require antibiotic therapy. Vaccinations also protect the microbiome from disruption caused by broad-spectrum antibiotics, thereby preventing the development of resistant bacterial species. Lastly, vaccines can help reduce overcrowding in hospitals during epidemic periods, such as the influenza season,



which in turn lowers the circulation of bacteria within healthcare facilities [18]. In spite of all these initiatives, there is a need to understand general public's knowledge and awareness on AMR and translation of this knowledge. In order to effectively address AMR, strategies must be put in place both nationally and globally. In this Perspective, an online KAP survey was conducted among clinical practitioners in the country. Our survey has a wide scope as we have enlisted participants from multiple centres and diverse stages of their professional journey.

Experimental Section

Study Design

A survey was conducted on the General Public from diverse sectors in the Country using a cross-sectional approach.

Recruitment of Study Subjects

Participants were enlisted through an online survey, facilitated by a self-reported questionnaire, which was disseminated via popular social networking websites such as WhatsApp, Instagram, and Facebook. The questionnaire, formulated in English, was created using Google Forms and shared across India by distributing links. Participants were recruited based on convenient sampling technique.

Study Questionnaire

The questionnaire contained information regarding participants' demographics such as Age, Gender and Occupation. Participants' knowledge, Attitude and

Awareness towards AMR was assessed by set of 11 questions was administered that probed into the factors that foster its growth, factors reducing its burden and One Health Approach.

Statistical Analysis

The data was logged into Microsoft Excel 2021 and studied with the Statistical Package for Social Sciences. Appropriate diagrams and tables were designed, and conclusions were drawn using descriptive analytics. The participants' ages were divided into four groups: <20, 21–30, 31–40, and >40 years. An ordinal logistic regression analysis was implemented to detect the variables that forecast the combined scores of knowledges, attitude, and perspective among the study participants. The statistical significance was determined at a level of $p < 0.05$ [19].

Results and Discussion

51 completed questionnaires from different parts of the country were received and analysed. Among the participants 41.18% were male participants and 58.82% were female participants. Occupation characteristics of the participants: Majority of the respondents participated in the study were self-employed (41.18%), (31.37%) were IT professional, (23.53%) were from health care sector and (3.92%) were unemployed. Large majority of the respondents particularly self-employed group were cognizant of the fact that AMR poses a significant threat to public health in comparison to health care professionals.

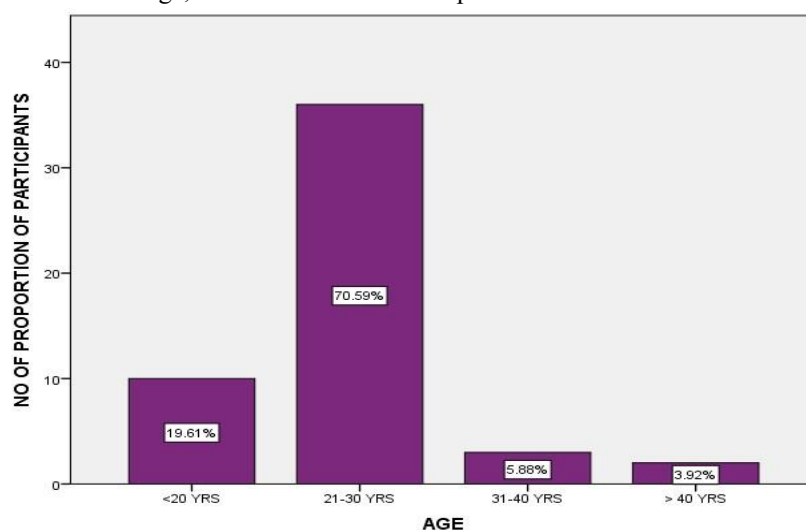


Figure 1: Depicts age distribution of study participants.

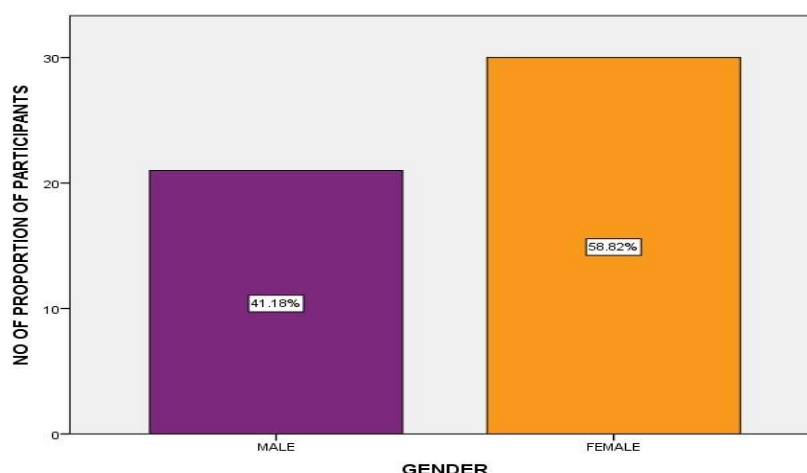


Figure 2: Depicts gender distribution of participants.

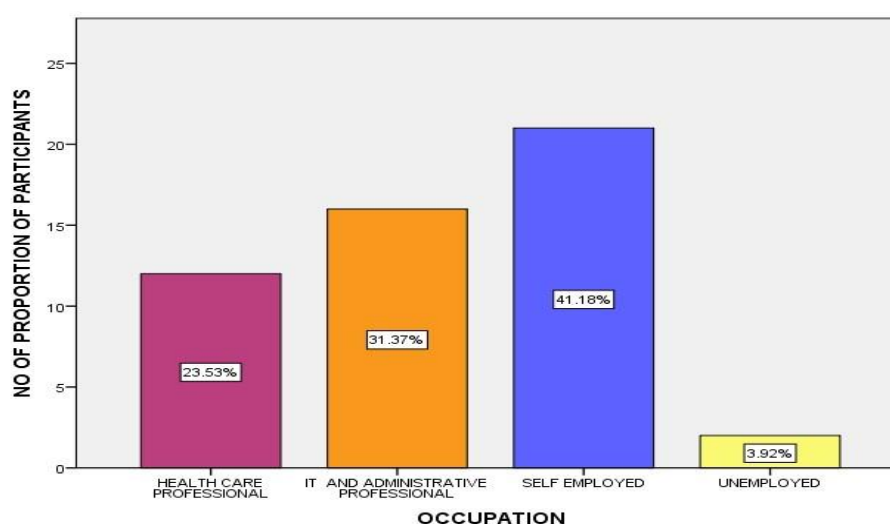


Figure 3: Demonstrates occupation profile of the participants.

Current survey was an effort to assess the understanding, beliefs, and viewpoint of the general population regarding AMR and the One Health approach policy, an endeavour is being made to identify areas of limited knowledge. The ultimate goal is to utilize this information to effectively control the spread of AMR. Most of the respondents (70.59%) belong to the age group of 21-30 yrs. Among the Participants, 41.18% were Male respondents and 58.2% were Female respondents.

In the survey, it was found that a large majority of the respondents (88.24%) were cognizant of the fact that AMR poses a significant threat to public health, while a small percentage (11.76%) were not aware of it.

Interestingly, the European survey revealed that a staggering 80% of the respondents had never even heard of the One Health Approach [20]. Furthermore, only 29.41% of the participants believed that advising broad spectrum antibiotics is always the better option, even in the presence of narrow spectrum antibiotics that are available. A study conducted by Wise et al disclosed that prescribing habits differ among various nations, and reduced usage of antibiotics is associated with lower levels of resistance [21]. Conversely, in their study, Albrich et al suggested that the decreased utilization of antibiotics in the Netherlands did not affect the dynamics of infectious diseases within the country [22].

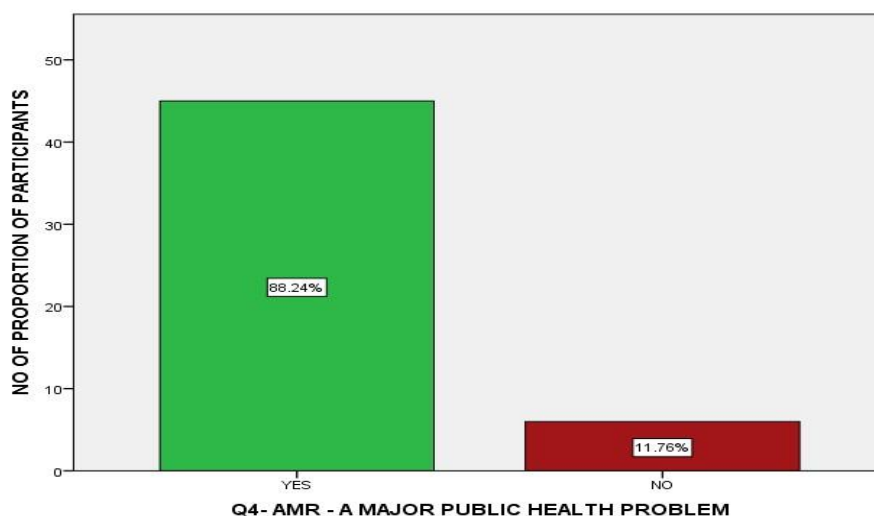


Figure 4: Depicts awareness of participants on AMR-as a major public health problem.

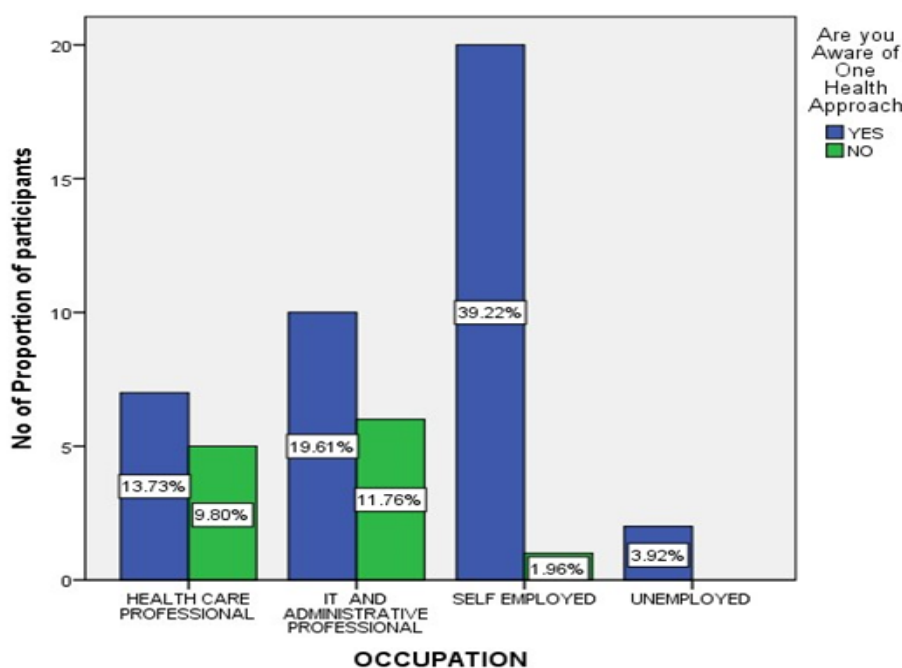


Figure 5: Depicts participants knowledge about one health approach.

In the current survey investigation, it was found that self-employed individuals exhibit a commendable understanding (41.8%) of AMR and the One Health Approach policy. This finding stands in opposition to the research conducted by Nemr et al, which contradicts their conclusion that healthcare providers possess a significantly higher level of knowledge (93.7%) concerning antibiotic prescription and resistance [23]. It is widely acknowledged that health care providers play a

crucial role in maintaining a robust health system [24]. However, present study shows fair knowledge among HCP this could due to the smaller sample size and convenience sampling of study participants. 70.59% of the respondents in our believe that one health approach involves regulation of production and sale of antibiotics. Though One Health approach does not directly regulate production and sale of antibiotics, it promotes development and use of vaccines and alternatives [25].

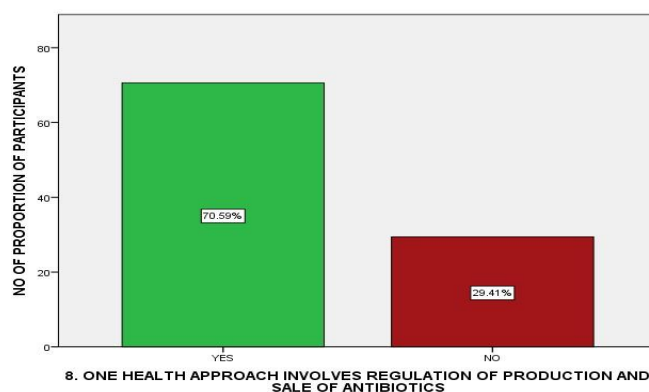


Figure 6: Participants knowledge about regulation of production and sale of Antibiotics by one health program.

56.86% of the respondents in our study believe that public lack adequate knowledge regarding appropriate use of antimicrobial drugs. In a research lead by shatla et al, it was discovered that a notable percentage of participants (51.1%) possessed limited comprehension of the function of antibiotics [26]. A comparable deficiency in awareness was inferred in a study by Azevedo et al, with 60% of respondents holding the belief that antibiotics should be advised for viral illnesses [27]. Furthermore, 27.45% of our participants expressed the belief that the varying prescription practices of healthcare professionals contribute to antimicrobial resistance. This concept is reinforced by a study conducted out by Sudhinaraset et al, which demonstrated that numerous healthcare providers in various countries fail to comply with national guidelines for the use of antimicrobials [28].

Only 9.8% of our participants believe that no control on sale of antibiotics would increase the burden of AMR. On the contrary, a significant ratio (80%) acknowledged the significance of minimizing the accessibility of antibiotics without a prescription and restricting their utilization to instances where bacterial infections have been confirmed as crucial steps in addressing the problem of antimicrobial resistance [29]. Only 9.8% of respondents in our study believe that Infection control, improvement in hygiene and sanitation can improve AMR. This discovery contrasts with the research guided by Chukwu et al, it was discovered that 53.8% of the participants were of the opinion that implementing infection control measures could effectively tackle the issue of AMR [30]. This fact is further supported by a survey conducted in Nigeria, which revealed that 88.5% of physicians adhere to appropriate hand hygiene practices in order to combat antimicrobial resistance (AMR) [31].

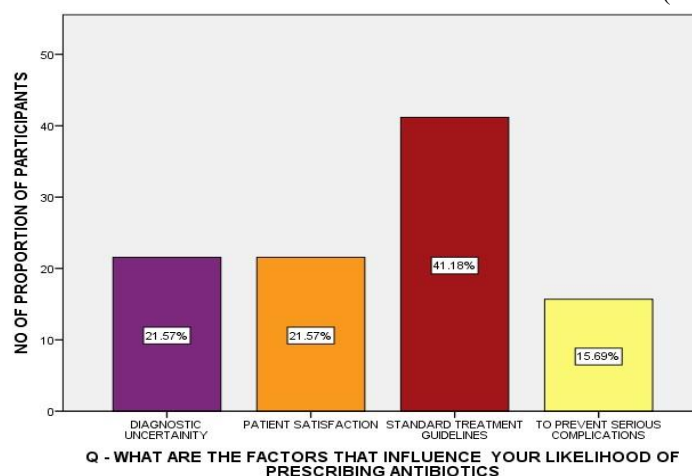


Figure 7: Factors that influence likelihood of prescribing antibiotics.



In the current study 41.18% of the respondents believe that standard treatment guidelines as a factor that influence the likelihood of prescribing antibiotics. According to the research conducted by Ogoina, Thakolkaran, and Nair, it has been highlighted that the

majority of study participants (62.3%) relied on National Treatment guidelines as their primary source of information when making decisions regarding antibiotic prescription [32-33].

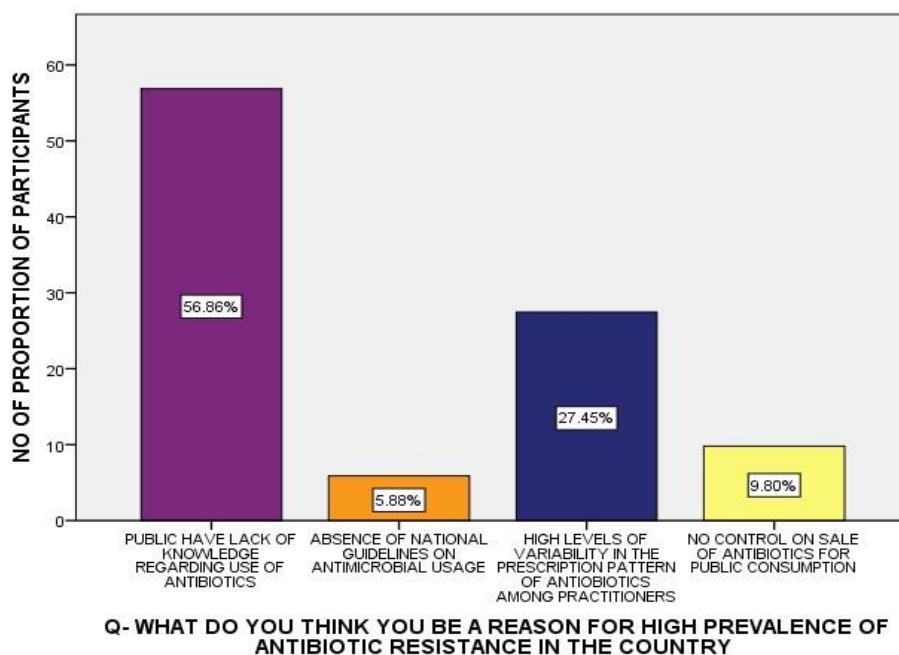


Figure 8: Shows participants attitude towards high prevalence of antibiotic resistance in the country.

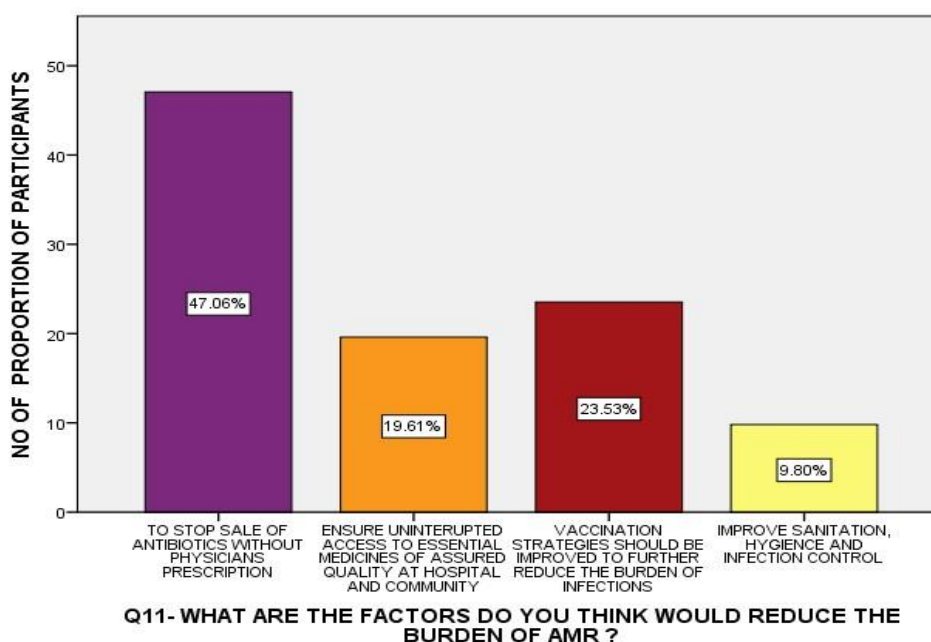


Figure 9: Participants attitude towards factors that reduce the burden of AMR and analysis of the predictors of aggregate score among participants using logistic regression.



Table 1: Shows participants who are self-employed have higher aggregate scores when compared to other respondents. Among the participants, factors like age and gender were observed to have no impact on aggregate KAP scores.

Occupation (Study Participants)	p-value	Odds ratio	Coincidence Interval 95%
Health Care and professional	.078	-4.301	.228
IT Administrative professional	.562	-2.858	1.553
Self Employed	.056	-.066	4.885
Unemployed	.936	-1.075	.991

Surprisingly in the present study Participants who were self-employed (CI = 4.885) Table 1 had higher KAP scores when compared to their counterparts. The aforementioned statement contradicts the research conducted by Chatterji et al. The findings of their research indicated that individuals in the field of basic medicine and allied sciences obtained higher KAP scores

in comparison to their surgical peers. This finding aligns with a previous survey conducted in India [34]. Furthermore, a survey performed in Jordan by Karasneh et al. highlighted that physician, specialists, and individual with longstanding experience exhibited significantly higher knowledge scores [35].

Table 2: Shows frequency distribution of age group of participants. 19.61% of the participants belong to age group below 20 years, 70.59% of the participants belong to age group between 21-30 years, 5.88% belong to age group between 31-40 years and 3.92% belong to age group above 40 yrs.

Age group	Frequency	Percent	Valid Percent	Cumulative Percent
19	4	7.5	7.5	7.5
20	4	7.5	7.5	15.1
21	9	17.0	17.0	32.1
22	3	5.7	5.7	37.7
23	2	3.8	3.8	41.5
24	4	7.5	7.5	49.1
25	6	11.3	11.3	60.4
26	7	13.2	13.2	73.6
27	2	3.8	3.8	77.4



28	5	9.4	9.4	86.8
29	1	1.9	1.9	88.7
30	1	1.9	1.9	90.6
34	1	1.9	1.9	92.5
36	1	1.9	1.9	94.3
39	1	1.9	1.9	96.2
40	1	1.9	1.9	98.1
43	1	1.9	1.9	100.0
Total	51	100.0	100.0	-

Limitations

The present study is constrained by a small sample size and a homogeneous ethnic group. Hence, it is imperative to carry out multicentred studies involving larger populations in order to validate this discovery. This study sets itself apart by offering valuable insights into the knowledge and awareness of the general public regarding the One Health Approach, despite the presence of these limitations.

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Conclusion

In light of the gaps in knowledge identified in our survey, it is clear that the improvement and execution of health education initiatives and campaigns will have a vital impact on raising awareness among the broader population. In addition to these factors, it is important to highlight the vital importance of infection prevention and control measures, particularly vaccination and hand hygiene, within the community.

Abbreviations

AMR: Anti-Microbial Resistance
NGO: Non-Governmental Organisation
INSAR: Indian Network for Surveillance of Antimicrobial Resistance

ICMR: Indian Council of Medical Research

ASP: Anti stewardship Program

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