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TITLE: “KNOWLEDGE, ATTITUDES, AND PRACTICES ON ANTIMICROBIAL RESISTANCE IN PUNE: A CROSS-SECTIONAL STUDY”

- 1. INTRODUCTION:** The WHO has identified antibiotic resistance as one of humanity's top ten worldwide public health challenges. To solve this issue, it must be addressed not just at the hospital but also in the community.[1] In this environment, knowing people's knowledge, attitudes, and practices about antibiotic resistance is crucial.[2] Antimicrobials are important in infection treatment and have helped to raise average life expectancy over the previous several decades. However, the rise of antimicrobial-resistant bacteria poses a danger to these advancements.[3] Antimicrobial resistance (AMR) arises by natural selection, but human activities might hasten its evolution. Antibiotic abuse and usage contribute to the fast global expansion of resistant bacteria.[4] Most notably, resistant infections are linked to low treatment success rates, extra morbidity, early death, and higher societal expenditures.[5, 6] To prevent the establishment of AMR, we must understand its theoretical foundation, how it arises and spreads, and how it affects public health.[7]
- 2. RESEARCH QUESTION:** To assess the knowledge, attitudes, and practices (KAP) of AMR in the general public in Pune, Maharashtra, and what are the prevailing trends in antibiotic use and procurement without prescriptions?"
- 3. OBJECTIVES:**
 1. To assess knowledge about antimicrobial resistance (AMR) in the public in Pune.
 2. To evaluate public perceptions and attitudes toward antimicrobial resistance and its public health implications.
 3. To examine patterns and practices of antibiotic use within the community.
 4. To identify the primary sources from which individuals procure antibiotics without a prescription.
 5. To assess the influence of lifestyle factors on AMR-related practices.
 6. To evaluate awareness of preventive strategies against AMR.
 7. To identify demographic and socio-economic factors influencing knowledge and practices regarding AMR.

8. To provide evidence-based recommendations for public health interventions to improve antimicrobial stewardship in the community.
4. **HYPOTHESIS:** There is a significant association between level of knowledge about AMR and the misuse of antibiotics (such as self-medication and incomplete dosage adherence) among the general public in Pune, Maharashtra.

MATERIAL AND METHODS:

5. STUDY DESIGN:

"Cross-sectional, community-based, observational, analytical study."

Explanation:

Cross-sectional: A cross-sectional study collects data at a particular moment in time to examine current knowledge, attitudes, and behavior.

Community-based: The study focuses on the population in Pune, rather than a specialized institutional group.

Observational: There is no intervention involved; you are simply watching naturally existing actions and knowledge levels.

Analytical: You're not simply documenting trends; you're also evaluating hypotheses (for example, the relationship between AMR awareness and antibiotic abuse), which necessitates the use of analytical tools like chi-square tests or logistic regression.

This method is ideal for:

1. Identifying connections between factors such as education, AMR knowledge, antibiotic source, and usage.
2. Informed future targeted public health initiatives.
3. Providing baseline data to help future longitudinal or interventional research.

SETTING: This research is to be conducted in Pune City. Pune City is a major city in of Maharashtra.

STUDY POPULATION

a. Inclusion Criteria

Participants will be included if they:

- Are residents of Pune city or peri-urban areas for at least the past 6 months.
- Are aged 18 years and above.
- Provide informed consent for participation.
- Are able to understand Hindi, Marathi, or English (questionnaire language).

b. Exclusion Criteria

Participants will be excluded if they:

- Are healthcare professionals (doctors, nurses, pharmacists) or students in health sciences (to avoid professional bias).
- Have a history of diagnosed cognitive impairment or severe mental illness affecting their ability to respond.
- Do not consent to participate.

2. STUDY TOOLS

- Structured Questionnaire (from WHO's "Antibiotic Resistance: Multi-country Public Awareness Survey".)
- Sections include:
 - Socio-demographic information
 - Knowledge about AMR
 - Attitudes toward antibiotic use
 - Self-reported antibiotic practices
 - Sources of antibiotics (prescription vs. non-prescription)
- The questionnaire will be translated into Marathi and Hindi, and validated via pilot testing with 20 participants.

3. DURATION OF STUDY

Total duration: 3 months

- Tool development & validation: March 2025
- Data collection: March–April 2025
- Data entry & analysis: April –May 2025
- Report writing: June 2025

4. SAMPLE SIZE

Sample Size Estimation Formula

Using the formula for single population proportion:

$$n = \frac{Z^2 \times p \times (1-p)}{d^2} \quad n = \frac{1.96^2 \times 0.283 \times (1-0.283)}{(0.05)^2} \approx 312$$

Where:

- $Z = 1.96$ for 95% confidence
- $p = 0.283$ (from the previous study, 28.3% used antibiotics without prescription)
- $d = 0.05$ (5% margin of error)

$$n = \frac{(1.96)^2 \times 0.283 \times (1-0.283)}{(0.05)^2} \approx 312 \quad n = \frac{(1.96)^2 \times 0.283 \times (1-0.283)}{(0.05)^2} \approx 312$$

Final Sample Size: 350 (after accounting for ~10–12% non-response rate)

5. SAMPLING TECHNIQUE

- Multistage Sampling:

- Stage 1: Random selection of wards in Pune city and peri-urban areas
- Stage 2: Systematic random sampling of households within each ward

6. DATA COLLECTION PROCEDURE

- Data will be collected by questionnaires and face-to-face interviews using printed or digital forms.
- Consent will be obtained prior to data collection.
- Survey will take ~15–20 minutes per participant.
- Surveyor will verify ~10% of the responses for accuracy and consistency.
- All collected data will be anonymized and stored on password-protected devices.

7. OPERATIONAL DEFINITIONS

Variable	Operational Definition
Antimicrobial Resistance (AMR)	Knowledge of AMR based on $\geq 75\%$ correct responses in the questionnaire
Antibiotic misuse	Use of antibiotics without prescription, not completing the course, using leftovers, etc.
Good KAP score	Correct responses on $> 70\%$ of knowledge, attitude, and practice items
Non-prescription access	Self-reported access from chemists, friends/family, online, etc., without a doctor's note

8. DATA ANALYSIS PLAN

- Software:
 - Microsoft Excel for tabulation
- Descriptive Statistics:
 - Frequencies, percentages, mean, SD for socio-demographic data
 - KAP scores will be categorized (e.g., poor, average, good)
- Inferential Statistics:
 - Logistic Regression: To identify predictors of antibiotic misuse
 - Chi-Square test
 - Significance level: $p < 0.05$

9. ETHICAL CONSIDERATIONS

- Informed consent: Written consent will be obtained from all participants.
- Ethics approval: No ethics approval is required for this study.
- Data privacy: Responses will be coded; no names or identifiers will be stored.
- Confidentiality: Data will only be used for academic purposes; stored securely.

10. IMPLICATIONS OF RESEARCH

- **Public Health Planning:** Will provide baseline data for designing AMR awareness programs in urban Indian communities.
- **Policy Impact:** Can inform stricter regulation of antibiotic dispensing in retail pharmacies.
- **Education:** Highlights areas for targeted health communication strategies, especially regarding misuse and procurement habits.
- **Future Research:** Serves as a foundational study for longitudinal or interventional AMR research in Indian cities.

11. REFERENCES (Vancouver Style)

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