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Driving Drug Resistance: A Pharmacotherapeutic Analysis of Self-Medication Practices in Bangladesh

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ORIGINAL ARTICLE

Abstract:

Drug resistance has arisen as a major public health challenge to global health, burdening low- and middle-income countries (LMICs), including Bangladesh, disproportionately because of fragile regulatory structures dynamics and limited access to quality healthcare. Haphazard practice of antibiotic self-medication (use of antibiotics without the prescriptions from qualified physicians) has been one of the leading causes of antimicrobial resistance (AMR) here. This article is a narrative review with the objective of rigorously assessing prevalence, pharmacotherapeutic behaviors, risk factors and clinical consequences of antibiotic self-medication in Bangladesh. Longitudinal study using a systematic literature review from PubMed, Google Scholar, ResearchGate, Bangladesh Journals Online, etc has been created by emphasizing on studies of recent years. Commonly misused classes of antibiotics are broad-spectrum agents (e.g., fluoroquinolones, macrolides, 3rd-generation cephalosporins) that are prescribed for inappropriate syndromes, incorrect durations of therapy and at sub-therapeutic doses. Community pharmacies, most of which work under minimal regulations, are the major suppliers of over-the-counter (OTC) antibiotics. Socioeconomic limitations, substantial out-of-pocket healthcare costs, poor access to licensed practitioners, reliance on personal cultural practices for self-treatment of infections with lack of knowledge about AMR risks and prior experience with antibiotics were key determinant identified. Moreover, poor enforcement of drug policies and the informal role pharmacy personnel play in clinical decision-making also contribute to inappropriate antibiotic use. The impact of these practices is substantial, resulting in elevated rates of multidrug-resistant (MDR) pathogens, treatment failure, prolonged illness, and increased healthcare costs. Antibiotic pharmacotherapeutic misuse harms individual patient outcomes and not only hinders the necessary future development of antibiotics but also sustains the growing threat to public health in AMR. A coordinated multilevel response is mandatory for addressing this issue; the need to strictly enforce prescription-only dispensing of antibiotics; strengthen pharmaceutical regulatory systems; program, and train pharmacists to be frontline antimicrobial stewards, and also organize large public awareness campaigns. Ensuring availability and affordability of quality healthcare facility is an equally vital component to discourage people from self-medication. The consequences are severe, though without urgent and sustained interventions, antibiotic resistance will continue to spiral out of control in Bangladesh with significant risks for national and global health security.

Successfully addressing drug resistance reduces the disease burden while simultaneously accelerating progress across a range of Sustainable Development Goals (SDGs).

Keywords: Self-medication, Drug Resistance, Behave pattern, Pharmacotherapy, Public Health, SDGs, Bangladesh.

Introduction:

Self-medication is defined as the use of medication by a patient on his own initiative or on the advice of a pharmacist or a lay person instead of consulting a medical practitioner (WHO, 2000). This definition includes the recurrent or continuous use of a drug by prescription from an authorized healthcare practitioner for a chronic or recurring symptom or disease. The World Health Organization (WHO) argues that responsible self-medication can help healthcare systems manage minor illnesses. Nevertheless, its stress is that such practice needs to be subject to strict regulatory scrutiny in order to lessen any potential harm, as well as to measure its efficacy.

1. Self-Medication in Bangladesh:

Many people take medicine on their own because of socioeconomic issues, access to medicine and not enough regulations to control it.

1.1 Specific context: Study illustrates, self-medication often goes beyond the responsible use of OTC drugs and often includes the use of prescription only antibiotic (POM) without a licensed Physician's supervision:

- **Prevalence:** About 26.7% people self-administered antibiotics (Biswas et al., 2014).
- **Common medications:** The most common was Metronidazole (50.4%), followed by Azithromycin, Ciprofloxacin, Amoxicillin (Biswas et al., 2014).
- **Drivers:** Main drivers were previous personal consumption (45.8%), advice from others (28.2%), and perceived knowledge about antibiotics (Biswas et al., 2014).

1.2 Demographic spectrum: People from different areas and backgrounds take medicine on their own in different ways. Study shows that people living in cities and villages demonstrate different behaviors regarding self-medication. (Shahjalal, 2016).

- **Gender distribution:**

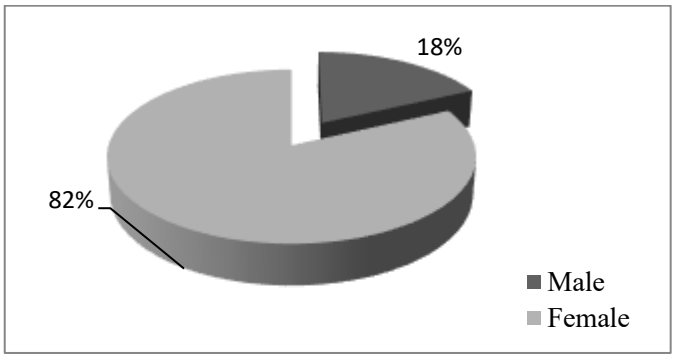

Figure 01: 82% of the respondents were male, suggesting self-medication were predominantly reported by males (n=530) (Shahjalal, 2016).

- **Age distribution:**

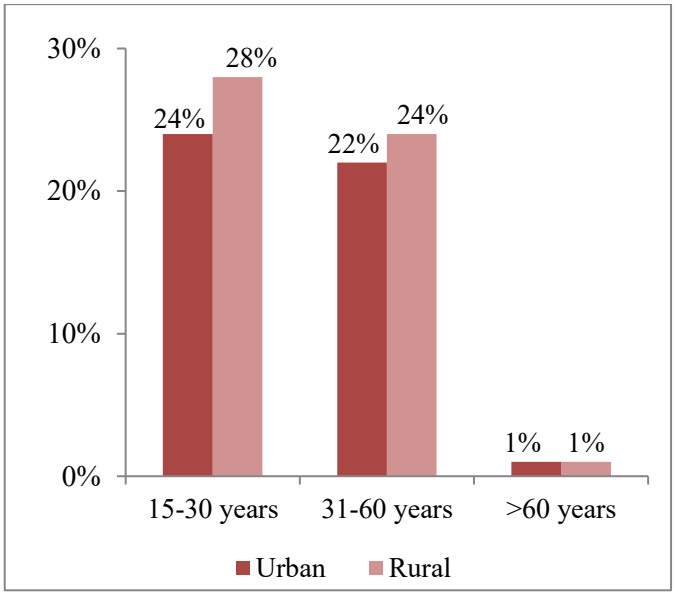

Figure 02: 24% urban and 28% rural participants were aged 15–30 years, while 22% urban and 24% rural were aged 31–60 years. Participants over 60 had equal urban and rural representation (n=530) (Shahjalal, 2016).

- **Place of residence:**

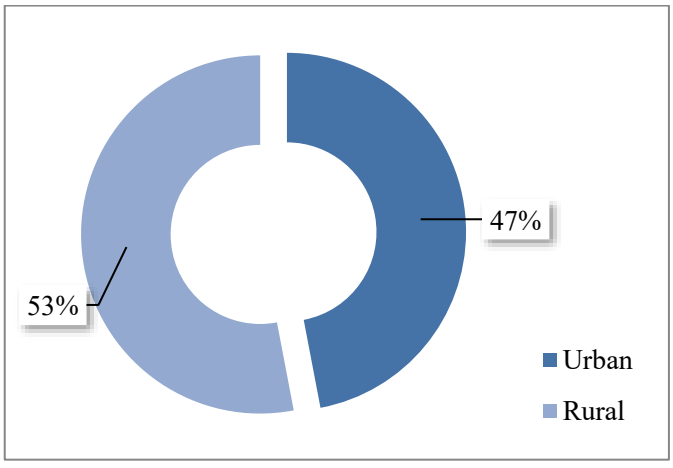

Figure 03: 53% of the respondents were from rural areas and 47% from urban areas, indicating a slightly higher response rate among rural participants (n=530) (Shahjalal, 2016).

- **Comparison of Urban and Rural male and female:**

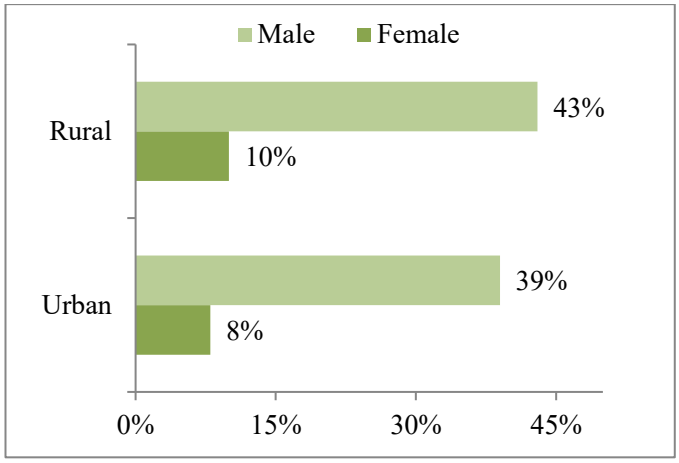

Figure 04: Among the 530 respondents, 39% were urban males and 8% urban females, while 43% were rural males and 10% rural females (Shahjalal, 2016).

- **Marital status of Rural and Urban respondents:**

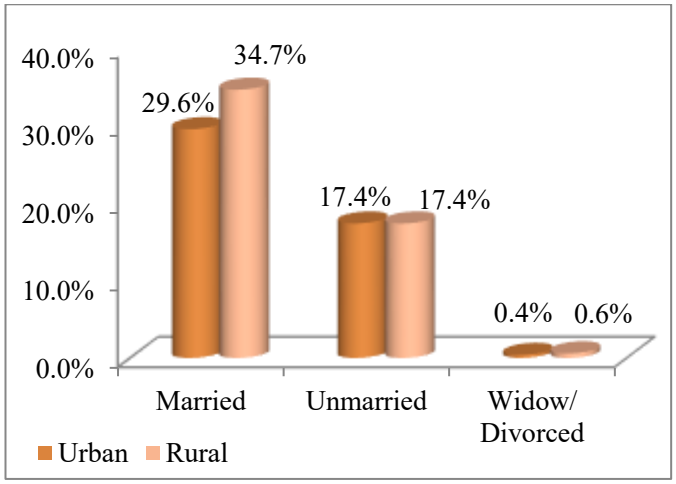

Figure 05: Married participants in rural areas had the highest response rate (34.7%), followed by urban married individuals (29.6%). Unmarried respondents accounted for 17.4% in both settings. Widowed and divorced participants were the smallest groups (n=530) (Shahjalal, 2016).

- **Educational stage:**

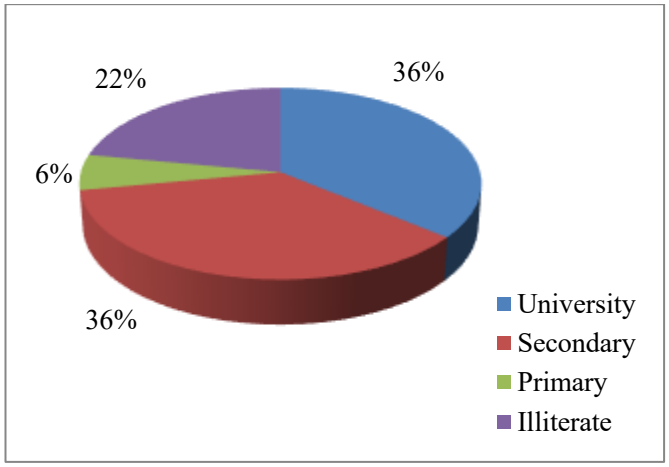

Figure 06: Educated individuals were more likely to practice self-medication (n=530) (Shahjalal, 2016).

- **Educational point of respondents in rural and urban areas:**

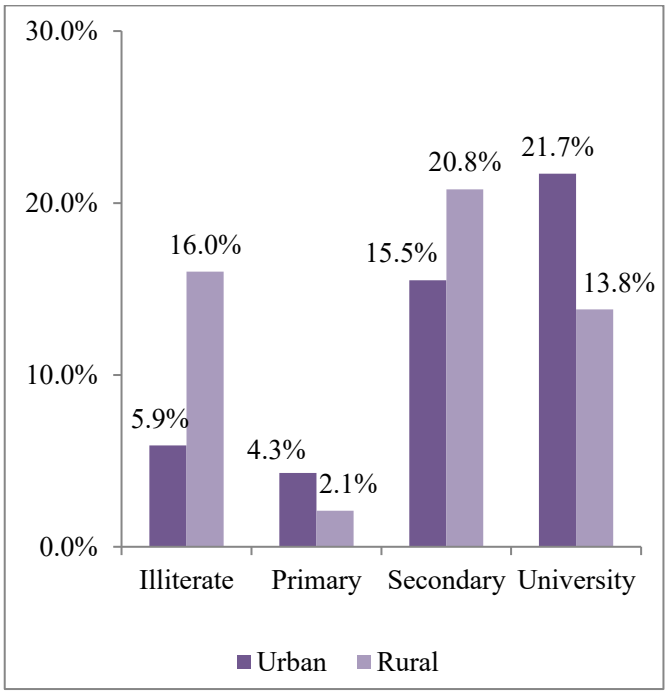

Figure 07: Participation was highest among urban university graduates (21.7%) and rural residents with secondary education (20.8%). Those with only primary education had the lowest engagement, while 16.0% of rural participants were illiterate (n=530) (Shahjalal, 2016).

- **Occupational distribution:**

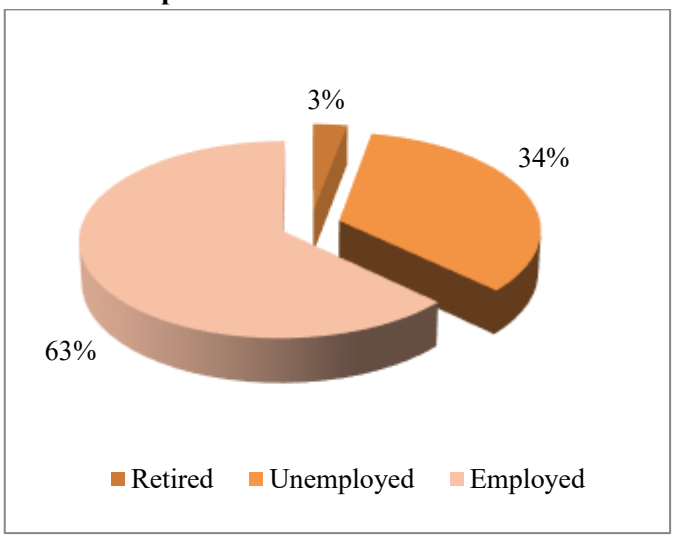

Figure 08: Among the 530 respondents, 63% were employed, 34% unemployed, and 3% retired, indicating that self-medication practices were common among the working people (Shahjalal, 2016).

- **Proportional monthly income (BDT) of rural and urban respondents:**

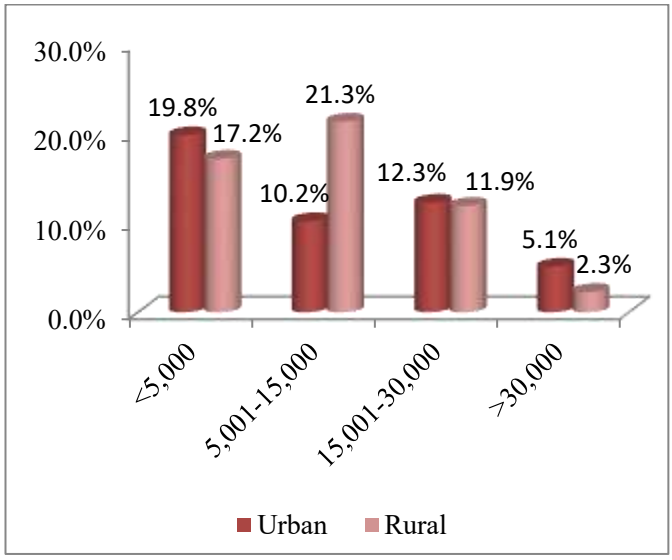

Figure 09: About 70% of the respondents earn <15,000 taka, with the largest group being lower-middle-income rural residents (21.3%), while those earning over 30,000 taka are the smallest at 7.4%, indicating self-medication is most common among lower to middle-income groups (Shahjalal, 2016).

- **Reasons of self-medication:**

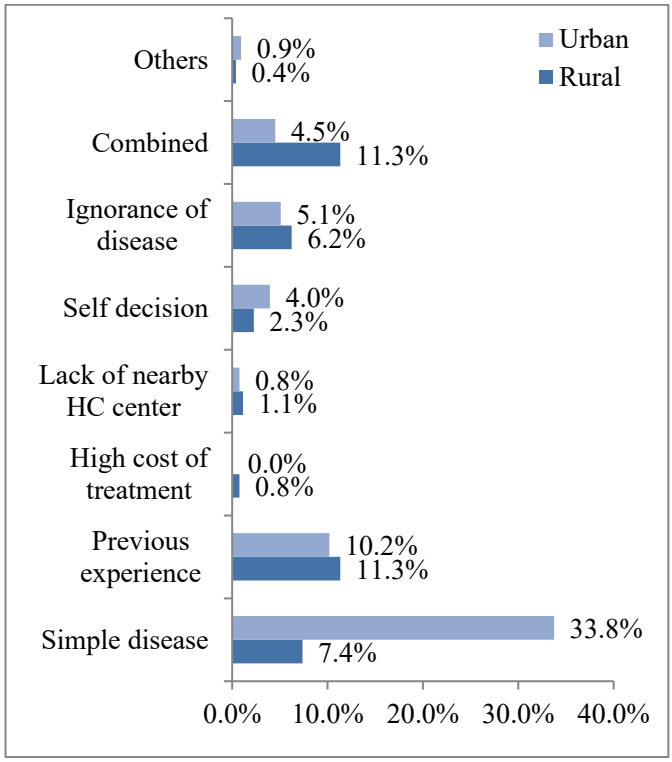

Figure 10: Among urban respondents, main reason for self-medication was a 'simple case of disease' (33.8%), while in rural areas, previous experience and guidance from others were equally cited (11.3% each). Ignorance played a minimal role, and structural barriers like cost or distance were reported by less than 2% (Shahjalal, 2016).

- **Frequent indications of self-medication:**

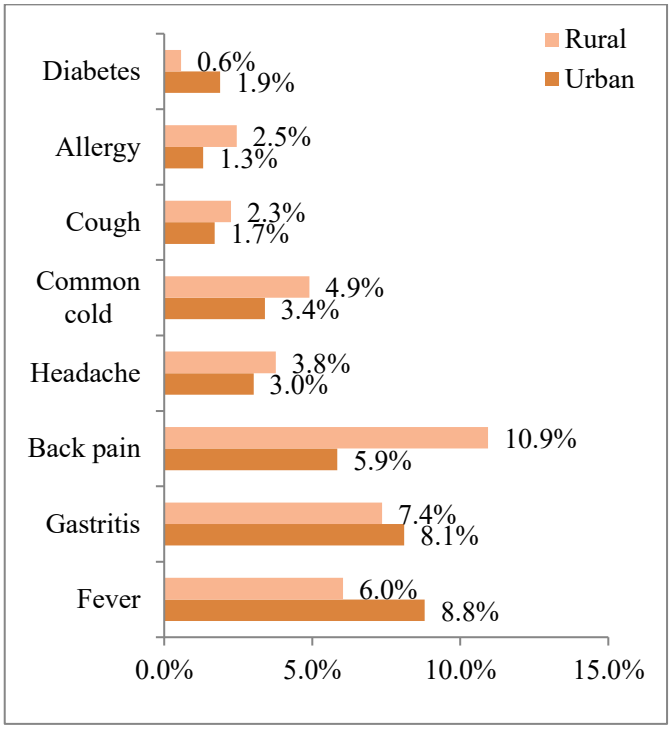

Figure 11: Rural residents most often self-medicated for physical strain, especially back and muscle pain (10.9%), while urban residents commonly treated fever (8.9%) and gastritis (8.1%). Flu and headaches were slightly more prevalent among rural self-medication users (Shahjalal, 2016).

- **Information sources of self-medication:**

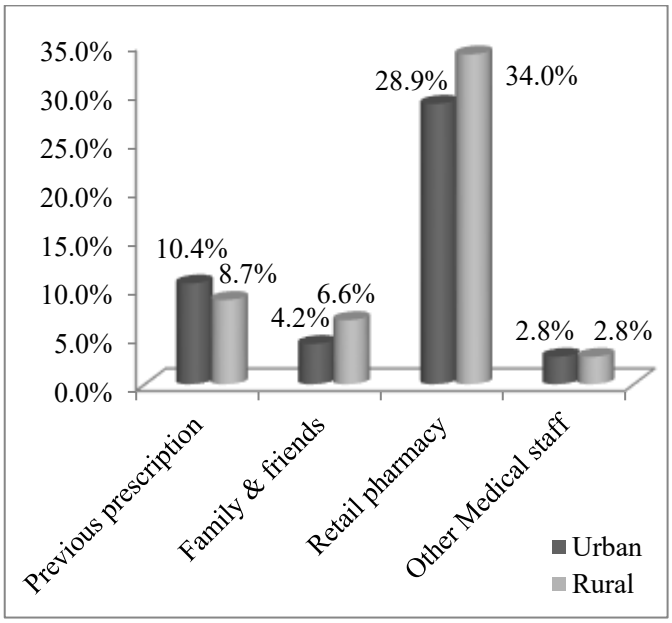

Figure 12: Retail pharmacies were the main source of self-medication information in both regions, with higher utilization in rural (34.0%) than urban (28.9%) areas. Urban respondents relied more on prior prescriptions (10.4%), while rural respondents depended more on advice from family and friends (6.6%) (Shahjalal, 2016).

- **Medications used in self-medication:**

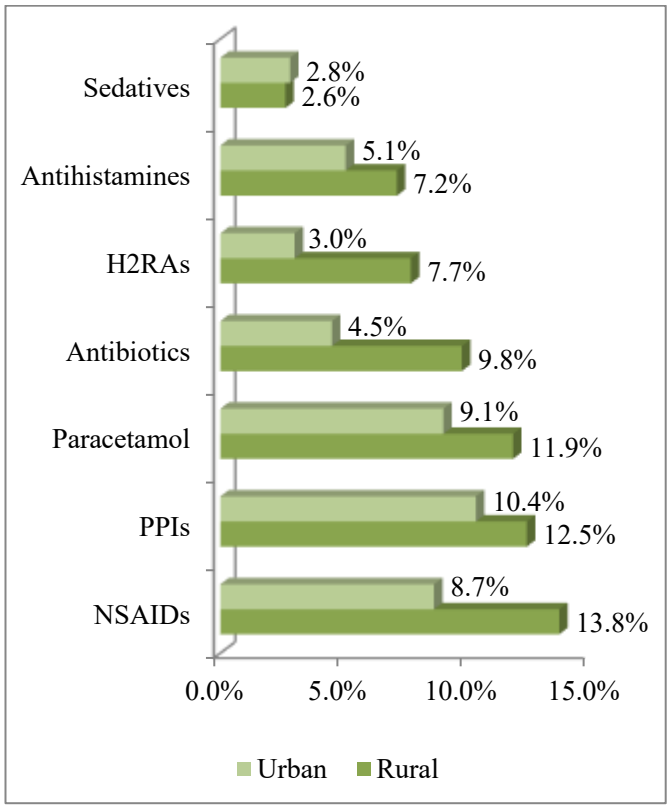

Figure 13: Rural residents most commonly self-medicated NSAIDs (13.8%), followed by PPIs (12.5%) and Paracetamol (11.9%); while urban residents primarily used PPIs (10.4%) followed by Paracetamol (9.1%) and NSAIDs (8.7%) (Shahjalal, 2016).

- **Frequency of self-medication:**

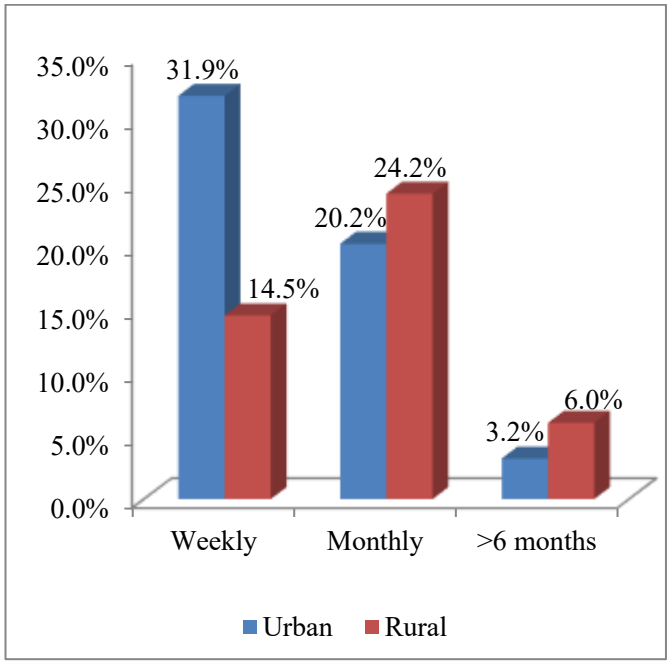

Figure 14: In urban areas, self-medication was most commonly weekly (31.9%), while in rural areas it was most frequently monthly (24. 2%). A small proportion practiced it rarely (every six months or more), with 3.2% in urban and 6.0% in rural areas (Shahjalal, 2016).

2. Dual Nature of Self-Medication:

Self-medication, the intentional use of drugs to treat self-diagnosed conditions, presents a dual public health impact: it can empower patients and ease healthcare burdens, but its misuse significantly drives AMR (Bennadi, 2014). Abuse of antimicrobials is the main driver in the development of drug-resistant pathogens.

2.1. Right self-care: When properly applied, the WHO recognizes self-medication to be an essential part of self-care.

- **Think to use OTC drugs:** Responsible self-medication involves using OTC drugs as directed (Bennadi, 2014).
- **Minor and frequent illnesses:** Self-medication is commonly used for minor, self-limiting illnesses such as colds, headaches, muscle pain, or heartburn. When practiced wisely, it can save time and money for both patients and healthcare professionals.
- **The pharmacist solution:** A key support of responsible self-medication is the oversight of an eligible pharmacist, who ensures the patient understands details about drugs (Bennadi, 2014).

2.2. Risky and irrational self-medication: Self-medication without a Physicians advice is a problem. It happens when people take medicines that need a Physicians prescription. This is like a 'silent pandemic' that is making AMR worse.

- **Abuse of antibiotics**: A key reason for self-medication is using antibiotics for viral infections (e.g., Flu, COVID-19). Antibiotics don't work on viruses so this just helps bacteria get stronger and fight back (Nainu et al., 2021).
- **Inadequate dosing and duration of treatment:** When people self-medicate they often take too little medicine or stop taking it as soon as they feel better. This lets the bacteria survive, mutate and multiply (Ferraz, 2024).
- **Sources of irrational supply:** The risk gets bigger because people often use leftover medicine at home or gets antibiotics from places that don't follow the rules (Alhomoud et al., 2017).
- **Consequences:** Besides putting their health at risk people who self-medicate can also help spread strong bacteria in their communities.

3. Drug Resistance – A Global Issue in Today's Medicine:

3.1. Basic ideas and types: Drug resistance happens when microorganisms change to stay alive and multiply even when they come into contact with antimicrobials

(Nainu et al., 2021). AMR is a process that is hard to stop but people have made it happen much quicker (Ferraz, 2024).

There are different types of drug resistance:

a. Antimicrobial resistance (AMR)
b. Multidrug resistance (MDR)
c. Extensive drug resistance (XDR)
d. Pan drug resistance (PDR)
e. TB-specific resistance.

3.2. Basic ways that help in resistance: When faced with antimicrobials, pathogens employ clever survival strategies. These tactics include neutralizing the drugs or expelling them. There are four major biochemical strategies that microorganisms use to resist medicines. Often these tricks work together to create strong 'superbugs' that can survive many kinds of antibiotics (Vivekanandan et al., 2025).

3.2.1. Enzymatic inactivation: One common mechanism is to make enzymes that break down or change the medicine. For example, some bacteria make beta-lactamases that break the beta-lactam ring of Penicillins and Cephalosporins making the antibiotic inactive (Reygaert, 2018).

3.2.2. Target modification: Medicines work by attaching to specific targets like proteins or ribosomes in microorganisms. When genetic mutations happen these targets can change, preventing the medicine from attaching and making the treatment fail (Ray et al., 2017).

3.2.3. Efflux pumps: Efflux pumps are transport proteins located in the bacterial cell membrane that actively push antimicrobials out of the cell. This process requires energy, typically from ATP hydrolysis or the proton motive force, and works by moving antibiotics from inside of the cell to external environment (Almutairy, 2024).

3.2.4. Decreased permeability: Some microorganisms block the entry of medicines by closing the entrances of the cell.

- **Porin loss:** In gram-negative bacteria, the outer membrane has porin channels that let antibiotic enter. When these porins are changed or reduced it significantly reduces drug diffusion into the cell (Basak et al., 2016).
- **Biofilm formation:** Bacteria can form biofilm that acts as a physical barrier which significantly reduces drug penetration (Nainu et al., 2021).

4. Spectrum of Practices Analysis:

In Bangladesh, unregulated pharmacy retailing, limited healthcare access, and socio-economic restrictions drive self-medication practices that foster AMR.

4.1. Re-use of previous prescriptions: Patients may stop antibiotics once symptoms improve and save the remaining pills for future use or for family members. This leads to sub-therapeutic dosing, which fails to eliminate the full bacterial population and promotes survival of resistant strains.

4.2. Non-physician clinician diagnosis and dispensing: In many rural and semi-urban areas, local pharmacies serve as primary medical consultants. Untrained attendants often act as quasi-physicians, diagnosing patients and dispensing potent antimicrobials. Driven by profit, these outlets frequently prescribe antibiotics for minor viral infections.

4.3. Family, friend, and neighbor-based guidance: This significantly influences medical decision-making in Bangladesh. Culturally, people commonly suggest medicines to neighbors and family based on past experiences. This informal system bypasses professional diagnosis, encouraging inappropriate drug use that risks worsening diseases and increasing AMR. Socioeconomic and lifestyle factors were the leading influences on this behavior.

4.4. Competitive assessment of POM and OTC drugs: Although there are laws distinguishing POM from OTC drugs, they are poorly enforced. Antibiotics classified as POM are often sold more easily than OTC drugs. This provides fast access to medication for the poor but removes regulatory oversight, enabling irrational use of reserve antibiotics.

4.5. Combining traditional and allopathic pharmacopoeia: Bangladesh has a long-standing culture of pluralistic healthcare, where people alternate between allopathic and traditional systems like Ayurvedic, Unani, or homeopathic medicine. Many patients use these alongside allopathic drugs without informing their physicians. This overlap risks dangerous drug interactions or dose duplication, especially when herbal remedies secretly contain synthetic ingredients.

5. Major Pharmacological Classes as Self-medication:

The self-medication environment is characterized by certain groups of pharmaceuticals, which are easily obtained without the supervision of professionals. Although some of them may be regarded as rather safe

to treat symptoms, there are groups of agents, especially antibiotics, which pose severe systemic dangers of the entire population in the world (Bennadi, 2014).

5.1. Leading offenders are antimicrobials: These represent the most radical category of the range of self-medication, which is mainly because of correlating directly with the stimulation of the emergence of AMR.

5.2. Analgesics and Non-steroidal anti-inflammatory drugs (NSAIDs)**:** These are the most commonly used pharmacological drugs for self-medication in the world, and represent the first modality of drugs for control of nociceptive pain and pyrexia.

5.3. Antiulcerant and antidiarrheal agents: The gastrointestinal complaints were self-managed by patients quite often since they are enticed by potential acute symptom fixation provided by these pharmacologic agents.

5.4. Respiratory drugs (antihistamines, bronchodilators): Symptoms of respiratory disorder are the predominant force of the behavior of pharmacy-hopping and self-care.

5.5. Sedatives and tranquilizers: The self-treatment of psychoactive drugs is a growing problem in the jurisdiction of the lack of regulatory control.

6. Connection between Self-Medication and Drug Resistance:

In Bangladesh, the link between AMR and self-medication is intensified by systemic vulnerabilities, where uncontrolled access to potent drugs and public ignorance often escalate common illnesses into MDR infections.

6.1. Dose-response gap in local practices:

Economic constraints lead patients to purchase only one-to two-day courses of antibiotics from local pharmacies rather than completing the full prescribed regimen.

- **Biological consequence:** Incomplete treatment creates sub-lethal exposure where the Minimum Inhibitory Concentration (MIC) is not reached, allowing bacteria with low-level resistance to survive, mutate, and become the dominant strain within the host (Vivekanandan et al., 2025).
- **Community spread:** Since these resistant strains are not eliminated, they spread easily through poor sanitation and overcrowding - turning an individual's self-medication choice into a societal threat.

6.2. Widespread diversion of watch and reserve pharmaceuticals: The WHO's AWaRe (Access, Watch, Reserve) classification system aims to control AMR by restricting certain antibiotic groups. In Bangladesh, however, Watch category agents like Azithromycin and Ciprofloxacin remain among the most commonly self-medicated antibiotics.

- **Resistance flow:** Repeated improper self-prescription of broad-spectrum antibiotics has significantly increased resistance rates in common pathogens like *Escherichia coli* and *Salmonella Typhi* across Bangladesh.
- **Therapy implications:** When first-line Watch drugs fail due to prior self-medication, few treatment options remain, often forcing reliance on costly hospital-based reserve antibiotics that are financially out of reach for most citizens (Ferraz, 2024).

6.3. Informal healthcare sector role: The lack of mandatory prescription checks in retail pharmacies directly links widespread self-medication to the rise of AMR.

- **Non-professional diagnosis:** Unskilled pharmacy personnel frequently recommend antibiotics for viral symptoms, driving improper exposure that selects for resistance determinants within the patient's microbiota.
- **Genetic reservoir:** These resistance determinants can transfer to pathogens via horizontal gene transfer, turning the human gut into a reservoir for AMR genes (Almutairy, 2024).

6.4. Adulteration hazards of traditional medicine: The point of convergence of allopathic and traditional medicinal practices is a significant issue in Bangladesh.

- **Unseen resistance:** Unregulated traditional preparations are often adulterated with synthetic antibiotics. Patients self-treating with these 'natural' remedies unknowingly consume sub-therapeutic doses, accelerating the development of resistant microbial strains.

7. Bangladeshi Landscape: Key Research and Existing Gaps:

AMR is described as a silent epidemic pervading Bangladesh. Recent research (2024–2026) highlights a critical gap - while public awareness of antimicrobials is broad, understanding of the biological consequences of misuse remains sharply limited (Tasneem, 2024).

7.1. Significant results of the modern empirical research: Recent surveys and surveillance findings have traced the state of the severity of the crisis on the part of various demographics.

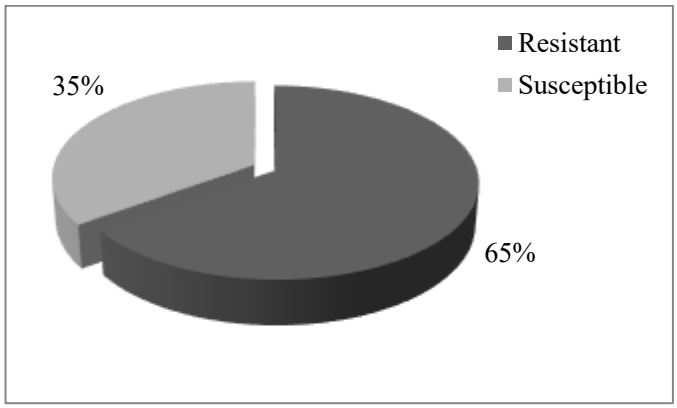

Figure 15 (a): 3rd-generation Cephalosporin resistance in *E. coli* from uncomplicated UTIs.

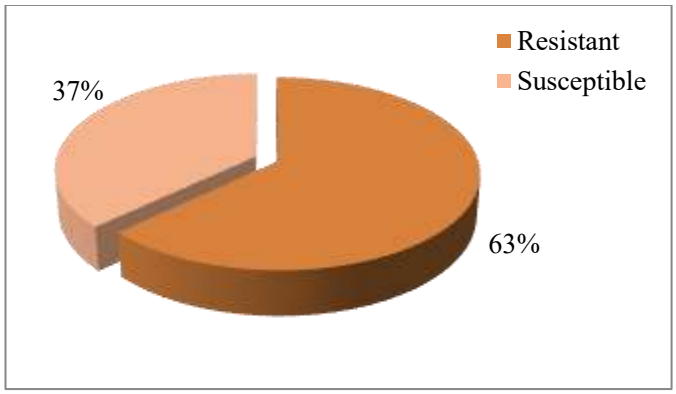

Figure 15 (b): 3rd-generation Cephalosporin resistance in *K. pneumoniae* from bloodstream infections.

Figure 15 (a & b): National resistance data from 2025–2026 is disheartening (CBMJ, 2026).

7.1.1. Rural vs. urban disparity: In rural areas, over 70% of antibiotics are sold without consultation with a licensed physician (CBMJ, 2026).

7.2. Gaps identified in the existing framework: Despite the introduction of the National Action Plan (NAP) on AMR (2021-2026) much is still lacking that contributes to the ongoing resistance cycle.

- **Enforcement gap of the red label policy:** The Directorate General of Drug Administration (DGDA) mandates red 'Prescription only' labels on antibiotic packaging, but the policy's impact is undermined by weak enforcement, particularly among the estimated 100,000 unregistered pharmacies operating nationwide (JBCPS, 2025).
- **Fragmented surveillance:** Current AMR data comes primarily from tertiary hospitals in major cities like Dhaka, leaving a significant gap in community-level surveillance - especially in rural areas and the private sector - which hinders comprehensive resistance mapping (WOAH, 2025).
- **The coordination lag in the one health model:** Despite documented policies, coordination across human health, animal farming, and environmental sectors remains weak. Untreated poultry and aquaculture effluents continue to pollute water bodies, creating unmonitored environmental reservoirs of resistance (MPTF, 2023).
- **Diagnostic deficit:** The absence of rapid diagnostics drives irrational antibiotic prescribing. In rural practices, physicians often resort to empirical use of broad-spectrum agents due to delays or unavailability of culture and sensitivity testing (CBMJ, 2026).

8. Epidemiological Patterns and Prevalence of Self-Medication Practices:

In Bangladesh, self-medication is not an individual deviation but a deeply embedded, systemic component of the healthcare environment. Empirical research confirms this, reporting prevalence rates between 40-80%, one of the highest in South Asia, with variations linked to regional and demographic factors.

8.1. Demographic associates of self-medication: While self-medication in Bangladesh is a general practice across all socio-economic levels, the underlying reasons for it vary significantly.

- **Low income groups:** For low-income groups, self-medication is primarily driven by economic constraints, leading them to rely on advice from drugstores to avoid physician and diagnostic fees.
- **University students:** Self-medication is particularly prevalent among university students, driven by convenience, time constraints, and an overestimation of their own medical knowledge (Ahsan AHM, et al, 2025).
- **Gender trends:** In rural areas, self-medication among women is common for minor complaints, driven by restricted mobility and cultural norms regarding male healthcare providers (Tasneem, 2024).

8.2. Conditions-specific trends: The trends of self-medication within Bangladesh have high levels of integration with seasonal and endemic health problems.

- For gastrointestinal issues like diarrhea and abdominal discomfort, symptoms often lead to the widespread use of antiprotozoals and antiulcerants.
- Although fever is typically managed with antipyretics, it is also commonly treated with prophylactic antibiotics (CBMJ, 2026).
- Older people and day laborers frequently self-administer NSAIDs for chronic pain, a practice linked to increased risk of unnoticed renal and gastric complications (Bennadi, 2014).
- Acute respiratory infections (ARIs) often have symptoms such as cough and sore throat, the most

common reasons for patients to personally use antibiotics.

8.3. Medication and information sources: In Bangladesh, information infrastructure is often done outside the formal clinical pathways.

- **Pharmacies as pseudo-clinics:** Retail drugstores are the most common source of medicine and advice, despite the fact that 70-80% of antibiotic prescriptions are provided by pharmacologically untrained pharmacy technicians (JBCPS, 2025).
- **Social networks:** Advice from family, friends, and neighbors, known as 'peer prescription', is a major influence on drug choice, especially in rural areas.
- **Media and internet:** Among urban youth, the rise of online health information has fueled Google-guided self-diagnosis, often leading to incorrect dosages. (Ahsan AHM, et al, 2025).

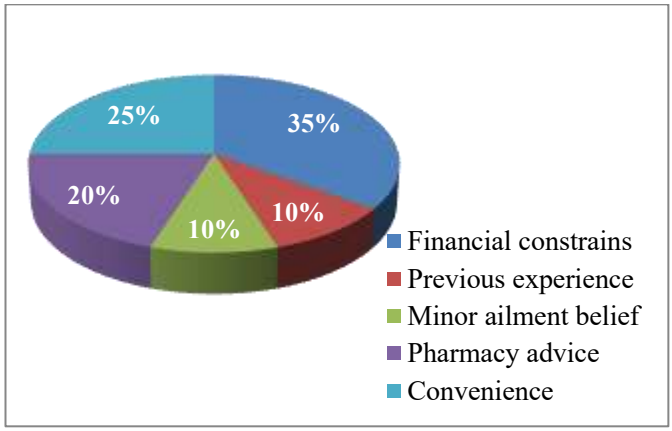

Figure 16: Primary determinants of self-medication in Bangladesh.

9. Pharmacotherapeutic Analysis:

Self-medication poses clinical risks by bypassing pharmacotherapeutic guidelines. Without professional oversight, pharmacodynamic and pharmacokinetic principles are often disregarded, resulting in therapy failure and toxicity (Almutairy, 2024).

9.1. Effect of misuse of antibiotics on progression of AMR: Antibiotic use creates a Mutant selection window, a drug concentration range that kills susceptible bacteria but allows resistant strains to proliferate (Vivekanandan et al., 2025). Drug concentrations between the MIC and MPC create a danger zone where susceptible bacteria are eliminated but resistant mutants survive. Self-medication often sustains levels within this range, directly promoting resistance.

9.1.1. Broad spectrum vs. narrow spectrum: In Bangladesh, there is a strong preference for broad-spectrum antibiotics over narrow-spectrum ones. Patients and informal vendors often choose broad-spectrum antibiotics to ensure therapeutic effect. This non-selective use disrupts the gut microbiota, leading to dysbiosis and colonization by MDR pathogens (Nainu et al., 2021).

9.1.2. Weak dose and reduced dose history: In Bangladesh, self-medication often involves purchasing only two- or three- days' worth of medicine rather than a full course. Early discontinuation of therapy upon symptom relief leaves a partially resistant bacteria subpopulation. These surviving bacteria may develop compensatory mutations, rendering the same treatment completely ineffective upon re-exposure (Ray et al., 2017).

9.1.3. Prevention & just-in-case use of antibiotic: Antibiotics are often used prophylactically for minor viral infections or lacerations. For example, taking them for the common cold exerts selection pressure on native bacterial flora with no therapeutic benefit (Ferraz, 2024).

9.2. Outside the antibiotics: Although AMR is a worldwide issue, the misuse of other classes of pharmacologic solutions in Bangladesh has an immediate hazard to the patients.

9.2.1. Overdose of NSAIDs and corticosteroids: Long-term NSAIDs use without gastric protection predisposes individuals to peptic ulcers and acute kidney injury due to reduced renal perfusion. Inadvertent corticosteroid use can cause immunosuppression, hypertension and endocrine imbalance, often when taken as weight-gain or energy supplements (Bennadi, 2014).

9.2.2. Improper use of anti-diarrheal and antiemetic drugs: During infectious diarrhea, defecation helps eliminate enteric toxins. However, habitual use of motility inhibitors delays pathogen clearance, increasing the risk of complications (Bennadi, 2014).

9.2.3. Polypharmacy and drug-drug interactions: Patients often combine multiple drugs for the same symptoms. Co-administration of NSAIDs with antibiotics or traditional preparations can amplify hepatotoxicity and disrupting drug metabolism.

9.3. Role and impact of non-professional pharmaceutical dispensers: In Bangladesh, 'chemist and druggist' shops are a primary source of medical advice. Sellers often prescribe drug combinations solely based on symptoms, without examination or testing. Profit margins on broad-spectrum antibiotics frequently drive their recommendations (JBCPS, 2025).

10. Driving forces, multifaceted determinants of self-medication:

Self-medication in Bangladesh is driven by systemic, economic, and cultural factors, not consumer choice alone - making a thorough understanding of these determinants essential for effective public health interventions.

10.1. Determinants of healthcare system: The setup of healthcare system of Bangladesh often forces the patient to go for their self-care.

- **Workforce shortages:** With only 13 health workers per 10,000 people, formal consultations remain inaccessible to a large portion of the population (Tasneem, 2024).
- **High consultation costs:** High out-of-pocket costs for physician fees and diagnosis drive 16.8-19.2% of people to resort to self-medication.
- **Systemic strain:** Overcrowding and long waits at public hospital OPDs push many to seek quick fixes from local pharmacies (CBMJ, 2026).

10.2. Socio-economic factors: Economic pressures prioritize short-term productivity over long-term health.

- **Opportunity cost of time:** For day laborers and low-income workers, a clinic visit means lost wages, and 27.5% of Dhaka residents cite lack of time as the main reason for self-medicating (Ahmed et al., 2020).
- **Education paradox:** Interestingly, some studies show self-medication rates are higher among more educated individuals, likely due to greater confidence in their own medical knowledge.

10.3. Cultural and psychological stigma: Internalized beliefs and past successes play a great role in self-medications.

- **Perceived mildness:** Over 58% self-medicate because they consider their illness too minor to warrant seeing a physician.
- **Prior success:** Patients often reuse old prescriptions, assuming a drug that worked before is suitable for all similar episodes, without considering secondary infections (Ahsan AHM et al., 2025).

10.4. Deficiencies in the regulatory and policy implementation: The nexus of self-medication and AMR is facilitated by effortless availability of medicines.

- **Enforcement gap:** Although antibiotics are classified as POM, around 80% of respondents report having purchased them without a prescription.
- **Red label limitation:** Despite DGDA rules requiring red labels on antibiotic packaging to indicate prescription necessity, the lack of on-site checks at over 100,000 retail outlets enables continued Behind-the-counter (BTC) dispensing (JBCPS, 2025).

10.5. Aggressive pharmaceutical marketing practices and effects of social media: Contemporary influences are changing how Bangladeshis interact with pharmacological agents.

- **Marketing pressure:** Aggressive pharmaceutical detailing, often paired with incentives, encourages retail drug sellers to recommend specific broad-spectrum brand-name drugs to consumers (JBCPS, 2025).
- **Digital misinformation:** Social media has enabled internet-led self-diagnosis, with young adults relying on online sources for health information - often leading to inappropriate medication use based on unverified anecdotal claims (Ahsan AHM et al., 2025).

Public Health Impacts:

Self-medication, once viewed as an individual health issue, has become a national public health crisis in Bangladesh. By 2026, its collective effects have fueled a 'silent epidemic' impacting mortality, economic outcomes, and the effectiveness of modern medicine in the region (BMRC, 2026).

1. Epidemiological Effect:

The most direct consequence is increased mortality from previously controllable infections.

- **Mortality trends:** In 2021, an estimated 23,500 deaths in Bangladesh were attributed to AMR, with 96,900 deaths from resistant infections. Without intervention, this could rise to around 110,000 annually by 2030 (IHME, 2024).
- **Morbidity trends:** The rise of superbugs is driven by growing resistance in major pathogens like MRSA and *Klebsiella pneumoniae* to Carbapenems - last-line drugs. In some clinical settings, resistance rates increased by 11% between 2017 and 2023, with certain drugs losing up to 82% efficacy (IEDCR, 2024).
- **Vulnerable populations:** While mortality in children under five has declined due to immunization programs, the greatest risk of death from drug-resistant bloodstream infections and pneumonia has shifted to older adults aged 70 and above (IHME, 2024).

2. Economic Implications of the Poverty Trap:

Drug resistance in Bangladesh works like a 'poverty multiplier', creating a self-sustaining cycle of financial calamities among poor households.

- **Out-of-pocket expenditures:** Patients with resistant infections often need expensive second- or third-line therapies that are frequently unavailable in public hospitals, forcing families to sell assets or take high-interest loans to cover costs.
- **Productivity impairment:** Prolonged hospitalization and recovery from resistant infections lead to significant labor productivity losses. Globally, AMR is projected to reduce economic output by $1.7 trillion annually by 2050 which is a major obstacle for Bangladesh in achieving middle-income status (OECD, 2024).
- **Treatment paradox:** Self-medication, chosen by 14.8% of individuals to cut costs, drives AMR, leading to treatment failure and ultimately higher costs than a proper initial consultation (BMRC, 2026).

3. Clinical Aspect:

AMR endangers the safety of routine medical interventions based on the use of prophylactic antibiotics.

- **Post-operative risks:** Surgical operations, like cesareans and appendectomies, are becoming more and more dangerous. In the absence of effective antibiotics for preventing surgical-site infections, mortality associated with conventional surgeries is increasing (JBCPS, 2025).
- **Immunocompromised care:** Those suffering from cancer and undergoing chemotherapy, or from chronic Non-communicable diseases (NCDs), are at significantly increased risk due to their immune defense system being too weak to combat MDR pathogens.

4. Socio-Environmental Implications of One Health Crisis:

Self-medication practices are not limited to the household, but also spread into the environment.

- **Environmental reservoirs:** Excessive antibiotic use in humans, combined with residues from livestock and aquaculture, has contaminated water sources in Bangladesh. This environmental residue trains bacteria, creating a reservoir that allows resistance to circulate back to humans through water and food (Sryahwa Publications, 2024).
- **Tragedy of the commons:** Each irrational 'quick relief' dose taken by an individual diminishes the drug's efficacy for the entire community which is a social dilemma where short-term private gain comes at the long-term expense of all (World Bank, 2024).

The Sustainable Development Goals (SDGs):

Framing AMR as an SDG terminator, this analysis examines its intersection with self-medication in Bangladesh, where irrational pharmaceutical use without professional diagnosis creates a ripple effect that undermines sustainable development.

- **SDG 1- No poverty:** While self-medication is often adopted to reduce healthcare costs, it frequently backfires when ineffective treatment requires expensive interventions. This often forces households into debt to purchase reserve-class antibiotics after first-line therapy fails.
- **SDG 2- Zero hunger:** In Bangladesh, the 'One Health' paradigm is essential for food security, yet antibiotics misused in poultry and aquaculture, often the same drugs people self-administer, drive resistant bacteria into the food chain, undermining nutritional stability.
- **SDG 3- Good health & wellbeing:** The urgency of this crisis is underscored by how self-medication accelerates multidrug-resistant tuberculosis and neonatal sepsis, directly undermining Target 3.8 by eroding the efficacy of essential medicines.
- **SDG 4- Quality education:** A significant "knowledge-practice gap" persists in Bangladesh, where even highly educated populations, such as university students, engage in high rates of self-medication. This underscores the need for targeted health literacy on the mechanisms of AMR.
- **SDG 5- Gender equality:** In rural Bangladesh, women's limited access to formal healthcare leads to greater reliance on self-medication for themselves and their dependents, placing them at disproportionate risk of AMR-related health complications.
- **SDG 6- Clean water & sanitation:** Poor sanitation and self-medication allow resistant "superbugs" from human waste to contaminate water sources, creating a vicious cycle of reinfection and further resistance.
- **SDG 7- Affordable & clean energy:** Though indirect, the energy-intensive production of newer, more potent antibiotics, necessitated by rising resistance, adds to the pharmaceutical industry's carbon footprint.
- **SDG 8- Decent work & economic growth:** AMR-driven morbidity and lost workdays threaten the productivity of Bangladesh's labor-intensive ready-made garment industry, posing a significant challenge to GDP.

- **SDG 9- Industry, Innovation & Infrastructure:** The prevalence of self-medication is driving AMR faster than the pharmaceutical industry can innovate, placing unsustainable strain on existing drug supplies.
- **SDG 10- Reduced inequalities:** AMR widens health inequity by deepening the divide between those who can afford expensive last-resort medicines and those who cannot.
- **SDG 11- Sustainable cities:** High population density in cities like Dhaka accelerates the spread of resistant strains stemming from self-medication, enabling rapid transmission of AMR.
- **SDG 12- Responsible consumption:** Self-medication represents a form of irresponsible consumption that directly compromises the global stock of effective antibiotics.
- **SDG 13- Climate action:** Climate change-induced flooding in Bangladesh increases waterborne pathogens, driving higher rates of self-medication and consequently fueling AMR.
- **SDG 14 & 15- Life below water & Life on land:** Antibiotic residues from human waste and agricultural runoff contaminate soils and river systems like the Buriganga, promoting the growth of environmental resistomes.
- **SDG 16- Peace, Justice & Strong Institutions:** Institutional governance failures in Bangladesh's pharmaceutical sector, exemplified by the illicit sale of prescription-only drugs OTC, highlight a systemic lack of regulatory enforcement.
- **SDG 17- Partnerships for the goals:** Combating AMR in Bangladesh requires global collaboration, as a superbug emerging in Dhaka can reach London or New York within hours.

Recommendations:

To combat AMR from self-medication in Bangladesh, a coordinated strategy integrating clinical pharmacology, regulatory enforcement, and public education is essential. These recommendations align with the National Action Plan (2021–2026).

1. Interventions Within Regulatory & Policy:

- **Prescription-only enforcement**: We need to make sure people can only buy antibiotics with a prescription. The DGDA has to make sure pharmacies only sell 'Watch' and 'Reserve' antibiotics to people who have a prescription.
- **Supply chain oversight**: Government could form the Drug Distribution and Control Board (DDCB) to watch the supply chain to check how many medicines are imported and sold.

2. Pharmacy Level Stewardship:

- **Mandatory pharmacist oversight**: Require all retail pharmacies to employ a registered Grade A or B pharmacist to serve as a triage officer, providing non-antibiotic advice for minor ailments and referring complex cases to physicians.
- **Remove sales incentives**: Prohibit pharmaceutical companies from offering bonus stock or monetary incentives to retailers for informal dispensing.

3. Public Health & Community Engagement:

- **National awareness campaigns:** Use mass and social media to counter the 'antibiotics for fever' myth, emphasizing their ineffectiveness against viral infections.
- **School-based education:** Integrate AMR topics into secondary school curricula and use tools like 'Tinu-Minu and Superbug' to build a health-literate generation that influences family medication habits.
- **Expand health coverage**: Broaden access to low-cost health insurance and universal health coverage to eliminate financial barriers that push disadvantaged populations toward self-medication.

4. Strategies to Strengthen Clinics & Diagnosis:

- **Affordable diagnostics:** Provide government subsidies for rapid diagnostic tests in rural health facilities to help clinicians differentiate viral from bacterial infections, reducing unnecessary 'just-in-case' prescriptions.
- **One health surveillance:** Establish an integrated surveillance system to monitor AMR patterns across human hospitals, poultry, livestock, and aquaculture for drug classes commonly misused across sectors.

Conclusion:

Self-medication in Bangladesh is a devastating problem for public health. This is because people can buy drugs easily without a licensed Physicians prescription, they do not have money and they do not know much about it. People often say they take these medicines for health problems but they actually take strong antibiotics that only Physicians should prescribe. The main objects we found out are:

- 27% of people in Bangladesh take antibiotics without a Physicians advice. Antibiotics that people misuse the most are Metronidazole, Azithromycin and Ciprofloxacin.

- Patients usually take these medicines for a time like one or two days to save money which makes bacteria stronger and harder to eradicate with medicines.
- Even though there are laws, 80% of antibiotics are sold without a licensed Physicians prescription. This is because the laws are not enforced properly and there are huge numbers of non-registered pharmacies.

If the government does not make sure that people follow the rules for taking antibiotics and if people do not learn about the dangers of taking antibiotics without Physicians advice, then modern medicine will not work properly. The problem of self-medication with antibiotics, in Bangladesh needs to be solved at the earliest to keep people healthy.

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