

# ABSTRACT

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Title of Doctoral Thesis **Non-prescribed antibiotic use in some developing countries and its association with drug resistance**

## Background and Aims:

The global emergence and spread of antimicrobial resistance remain a major challenge to infection control and a predominant reason for therapy failure. Non-prescription access to antimicrobials is common, and self-prescribing is increasingly popular in a society with non-regulated access to antimicrobials. It is crucial to avoid self-medication in order to combat antimicrobial resistance. This research need has been addressed within 4 scientific projects with the following aims:

P1: We examined knowledge, attitude and practices of antibiotic use in 3 Asian countries and estimated the frequency and reasons for self-medication. P2: This study aimed to evaluate the extent of delay in diagnosis and treatment of tuberculosis in Uzbekistan and identify associated risk factors. P3: To evaluate knowledge of antibiotics, race, gender and age as independent risk factors for self-medication. P4: The aim of this study was to assess the attitudes of community pharmacists regarding antibiotic use and self-medication in Saint Petersburg, the Russian Federation.

## Methods:

P1: A nationwide cross-sectional study was conducted with 1 200 adults of well-educated population segment in large cities in Yemen, Saudi Arabia and Uzbekistan. Data were analyzed using descriptive statistics.

P2: A cross-sectional study was performed on hospital patients with newly diagnosed TB in Tashkent and Aral Sea region, Uzbekistan. The time between the onset of respiratory symptoms and initiation of anti-tuberculosis treatment was assessed and delays were divided into patient, health system and total delays. Univariable and multivariable logistic regression analysis was used to evaluate determinants of diagnostic and treatment delay.

P3: A cross-sectional survey study was conducted among residents and population from different regions of Saudi Arabia. There were 1 310 participants, whose data were recorded anonymously. The questionnaire was distributed randomly in person interview of participants and included sociodemographic characteristics, antibiotics knowledge, attitudes and behavior with respect to antibiotics usage. Population aggregate scores on questions and data were analyzed using univariate logistic regression to evaluate the influence of variables on self-prescription of antibiotics.

P4: We conducted a cross-sectional study of community pharmacists in the Saint-Petersburg and Leningrad region, Russia. A self-administered questionnaire was used to assess antibiotic use and self-medication practices. The data were analysed using logistic regression and Pearson chi-squared tests.

## Results:

P1: We identified socio-demographic factors associated with inappropriate use of antibiotics. The prevalence of non-prescription use was high and ranged from 48% in Saudi Arabia to 78% in Yemen and Uzbekistan. Pharmacies were the main source of non-prescribed antibiotics. In all 3 countries studied together the most common indication for antibiotic use was cough (40%) and influenza (34%); 49% stop taking antibiotics when feel better. Although awareness of the dangers of antibiotic use correlated with decreasing self-medication, understanding about the appropriate use of antibiotics was limited and associated with older age and higher education.

P2: Among 538 patients enrolled, the median delay from onset of symptoms until treatment with anti-tuberculosis drugs was 50 days. Analysis of the factors affecting health-seeking behaviour and timely

treatment showed the presence of the patient factor. Self-medication was the first health-seeking action for 231 (43%) patients and proved to be a significant predictor of delay ( $p = 0.005$ ), as well as coughing ( $p = 0.009$ ), loss of weight ( $p = 0.001$ ), and visiting private and primary health care facilities ( $p = 0.03$  and  $p = 0.02$ , respectively).

P3: The response rate was 87.7%. Alarming, 63.6 % of participants reported to have purchased antibiotics without a prescription from pharmacies; 71.1% reported that they did not finish the antibiotic course as they felt better. The availability of antibiotics without prescription was found to be positively associated with self-medication (OR 0.238, 95% CI 0.17- 0.33). Of those who used prescribed or non-prescribed antibiotics, 44.7% reported that they kept left-over antibiotics from the incomplete course of treatment for future need. Interestingly, 62% of respondents who used antibiotics without prescription agreed with the statement that antibiotics should be access-controlled prescribed by physician. We also found significant association between storage, knowledge/attitudes and education.

P4: Of the 316 pharmacists (77.07%) who completed the questionnaire, 230 (72.8%) self-medicated with antibiotics. Antibiotics were mostly used to self-treat upper (53.3%) and lower respiratory tract infections (19.3%), relying on their own knowledge (81.5%), previous treatment experience (49%) and patients' prescriptions (17%). The most commonly used antibiotics were macrolides (33.2%). Characteristics such as age, education and experience were related to antibiotic use and self-medication.

Conclusions:

P1: The prevalence of self-medication with antibiotics in adult people in the studied 3 Asian countries is alarmingly high. Educational interventions involving health professionals and the public can help reduce inappropriate use of antibiotics.

P2: Tuberculosis diagnostic and treatment delay was mainly contributed to by patient delay and should be reduced through increasing public awareness of tuberculosis symptoms and improving public health-seeking behaviour for timely initiation of anti-tuberculosis treatment. Efforts should be made to minimise irrational use of antibiotics and support interventions to restrict over-the-counter availability of antibiotics in order to contain the spread of infection.

P3: The overall level of awareness on antibiotics use among residents in Saudi Arabia is low. This mandates public health awareness intervention programs to be implemented on the use of antibiotics.

P4: The study confirmed that self-prescription of antibiotics is a common practice amongst pharmacists in Saint Petersburg and also identified personal and professional characteristics of pharmacists strongly associated with self-medication.