

# Factors associated with knowledge, attitude, practice and training interest of drug sellers in shaping antimicrobial resistance: A cross-sectional study in urban Bangladesh

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## Background:

- Antimicrobial resistance (AMR) is a global threat.
- The World Health Organization (WHO) has warned that AMR could cause 10 million deaths per year by 2050 if no action is taken.
- Bangladesh has a high burden of AMR, with many bacteria and fungi showing resistance to common antibiotics.
- A study revealed 72% of Escherichia coli isolates from hospitalized patients in Bangladesh were resistant to at least one antibiotic and 26% were resistant to three or more antibiotics.
- Drug sellers potentially play an important part in increasing threat to AMR by selling antibiotics without prescription and counterfeit antibiotics, or providing incorrect advice on its use.

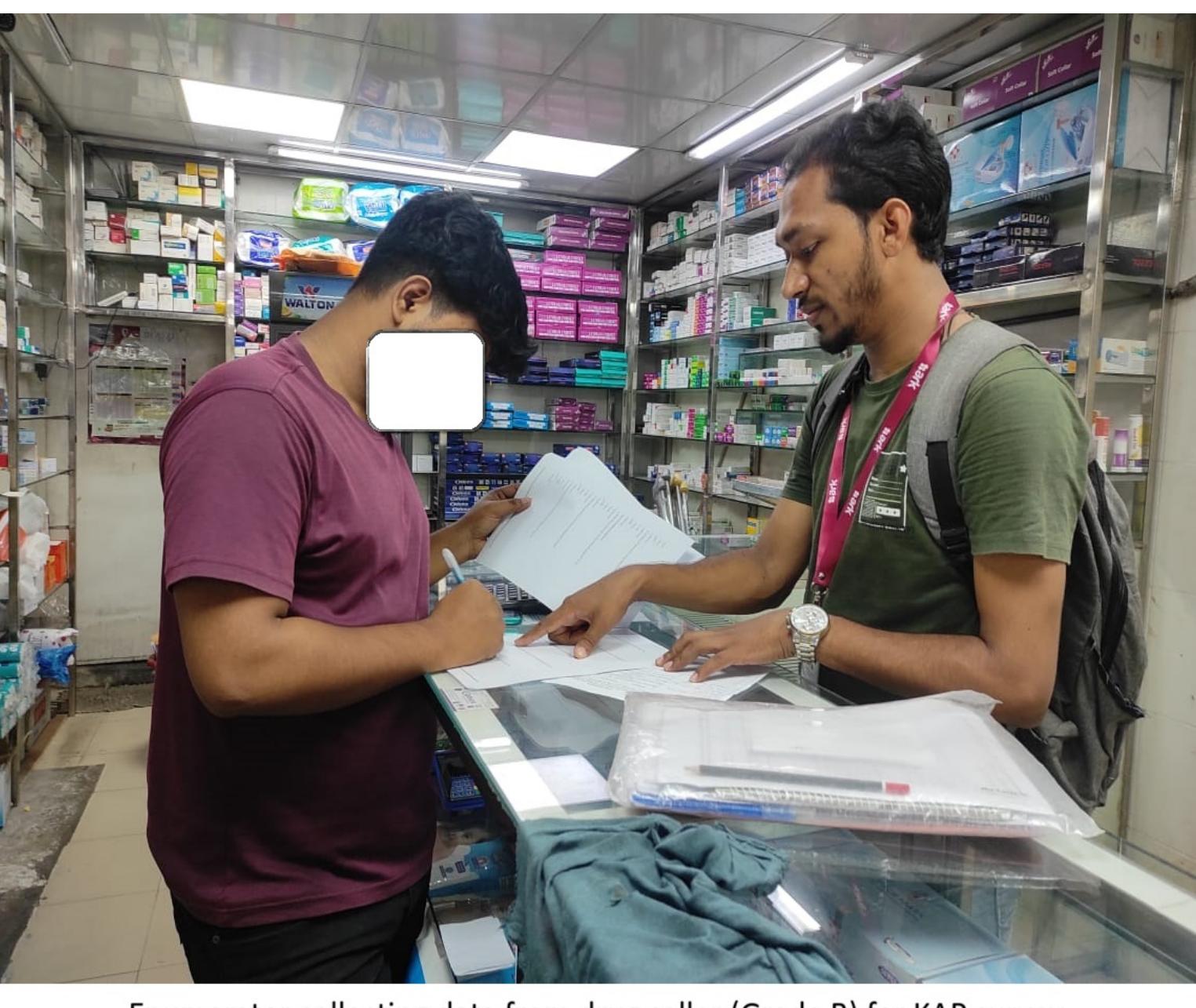
In view of above under CHORUS Innovation fund round 2, with the technical support of University of Leeds, ARK Foundation designed and conducted a research study named "Drug sellers and AMR" in partnership with Directorate General of Drug Administration (DGDA) in urban Bangladesh.

## Objective:

- To understand the position and role of drug sellers working in formal (licensed) and informal (non-licensed) pharmacies and
- Explore factors and challenges associated with their knowledge, attitude, practice, training interest regarding antibiotics and antimicrobial resistance (AMR) in shaping approach to AMR in urban Bangladesh.

## Methods:

- Mirpur was the study site which is one of Dhaka's most densely populated areas with population of 21,42,650 spread over 34.3 sq.km. and divided into 7 metropolitan administrative zone (Thana).
- We mapped 1100 pharmacies in Mirpur between March-April'2024.



- A survey was conducted in September-October'2024 among randomly selected 400 drug sellers from those pharmacies to understand their educational qualification, training or experience, pharmacy type, age, KAP means knowledge (7 questions), attitude (25 questions), practice (13 questions), training interest (5 questions) regarding antibiotics, its dispensing rules and AMR issues.
- Attitude questions were to know perception of drug sellers about status of playing expected role of themselves and other stakeholders in preventing AMR.
- KAP questions were in open sentence statement with positive node and drug sellers provided response in 5-point Likert scale. In ideal situation agreed or strongly agreed response of each question was considered as correct or positive response and we computed number of questions for which drug sellers provided such responses. Then calculated mean and termed as mean score of correct knowledge, positive attitude, good practice, positive training interest.
- To ensure quality of data consistency checking, editing and cleaning were done
- With quantitative data for bivariate analysis we calculated mean, mean difference, p value and done t test. For multivariate analysis we fitted GLM quasi poisson model with log link with good practice score outcome variable and concerned independent variables and calculated rate ratio, confidence interval and p value to understand their relative association.
- Two focus group discussion (FGDs) were conducted in May'2025 among interested drug sellers to explore challenges they face in antibiotic drug dispensing along with explaining customers to comply rule of regulatory body to prevent AMR.
- Content and thematic analysis were done with qualitative data.

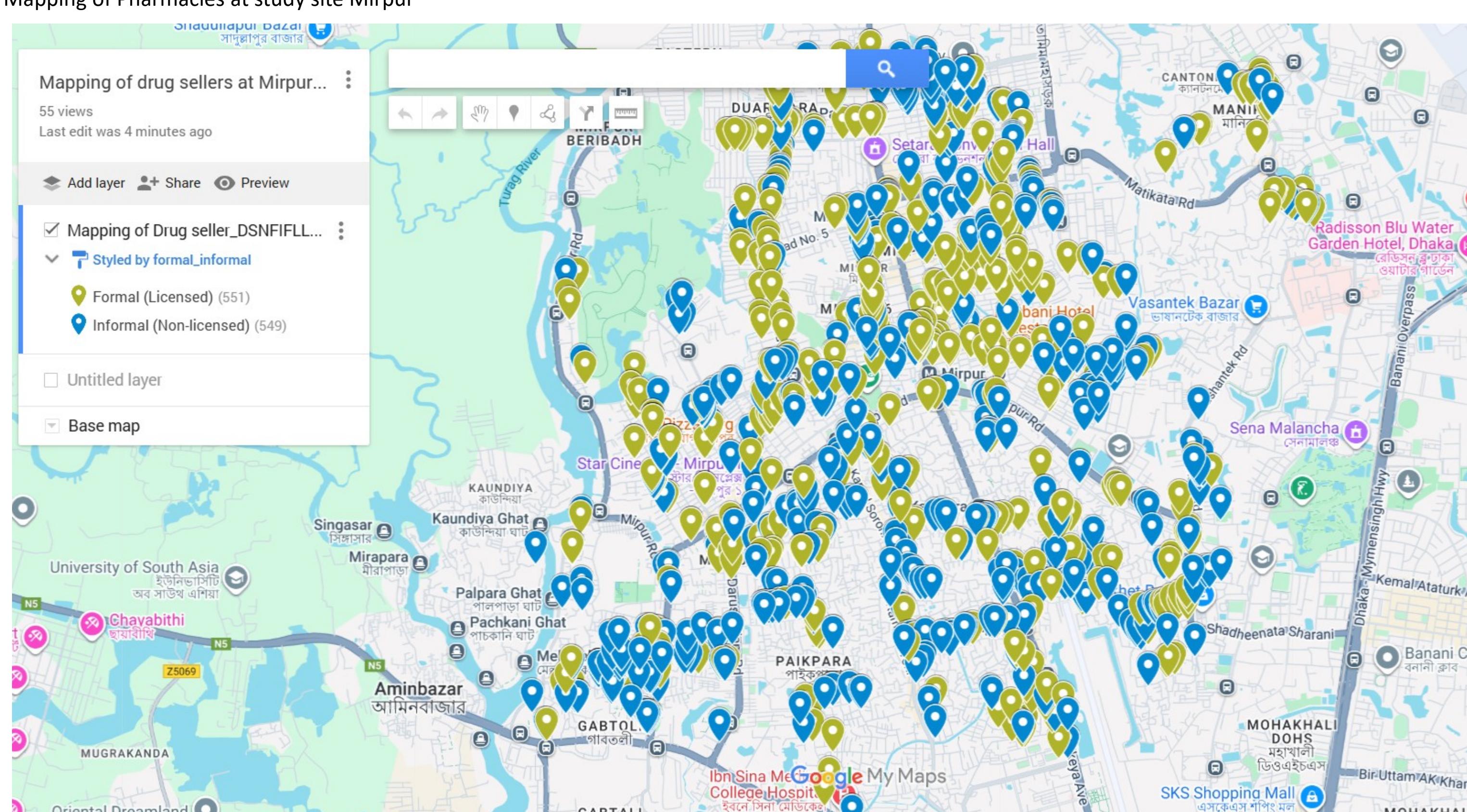


## Results:

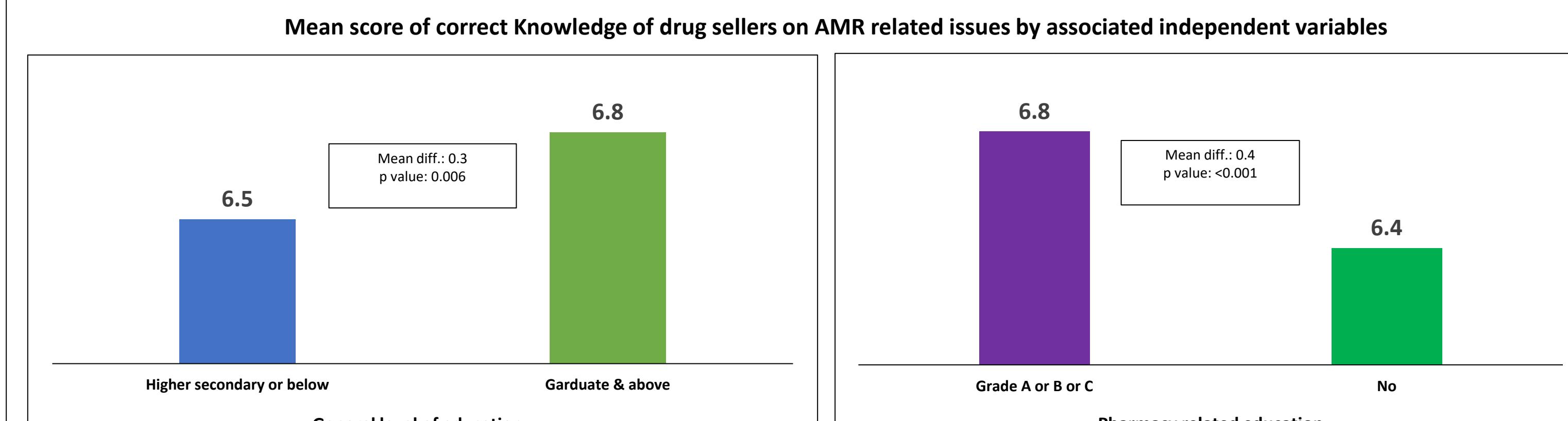
### Mapping:

- We mapped 1100 pharmacies in study site Mirpur
- Half of 1100 pharmacies from mapping were formal and half were informal

### Mapping of Pharmacies at study site Mirpur

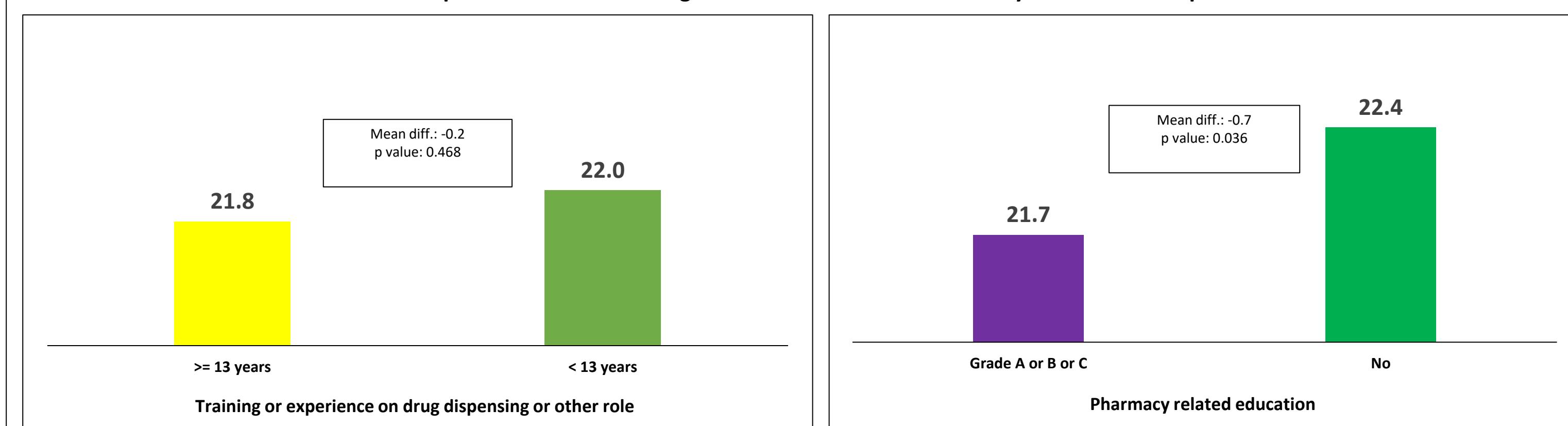


### KAP survey:



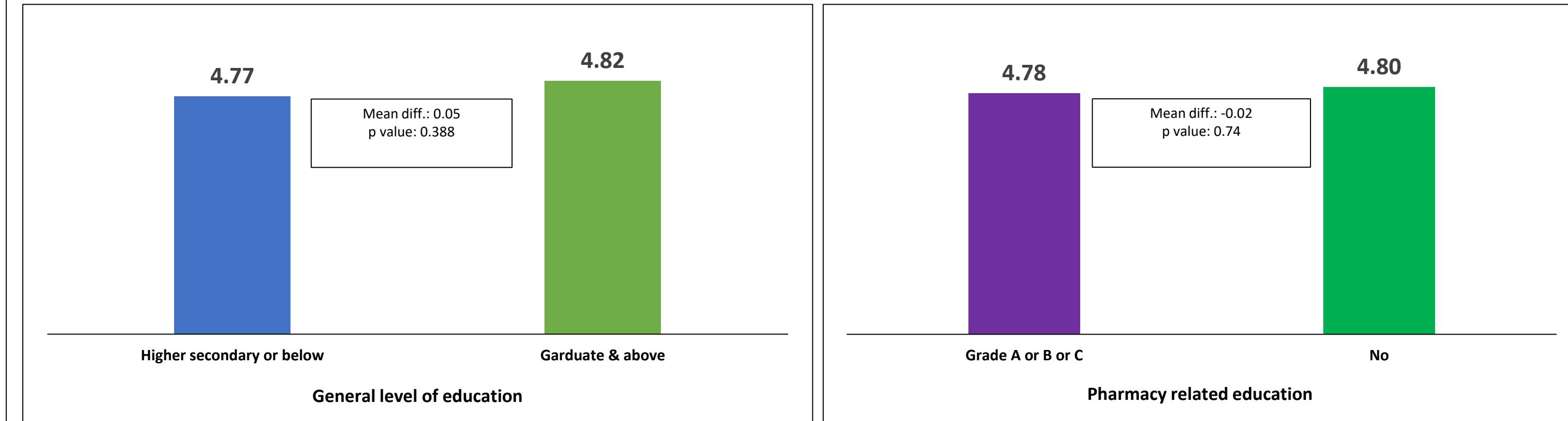
Mean score of self reported correct knowledge of drug sellers on antibiotic drug dispensing and AMR related issues were found higher for those having higher duration ( $\geq 13$  years) of training or experience on pharmacy or drug dispensing (6.7 vs 6.6), found quite similar for those belong to formal pharmacy and those having higher age group ( $\geq 40$  years) (6.7 vs 6.7) than their respective counterpart.

### Mean score of positive attitude of drug sellers on AMR related issues by associated independent variables



Mean score of positive attitude of drug sellers regarding antibiotic drug dispensing and AMR related issues were found almost similar for drug sellers having graduate or above level of general education (21.9 vs 21.9), of higher age group (21.9 vs 21.9) while mean score of positive attitude was found slightly higher (21.99 vs 21.88) for drug sellers whose type of pharmacy was formal compared to respective counterpart.

### Mean score of training interest of drug sellers on AMR related issues by associated independent variables



Mean score of training interest regarding AMR issues were found slightly higher for drug sellers having higher duration of training or experience on drug dispensing, counseling customer (4.81 vs 4.77), whose type of pharmacy was formal (4.80 vs 4.78) while almost similar mean score of training interest was found for drug sellers of lower age group (4.8 vs 4.8) compared to respective comparison group.

### Rate ratio of self-reported good practice of drug sellers regarding AMR issues adjusted for concerned variables

Variable	RR (95% CI)	p-value
(Intercept)	9.355 (8.886–9.843)	2.31e-256
General education (Graduate or above)	1.015 (0.981–1.05)	0.402
Pharmacy education (Grade A or B or C)	0.975 (0.94–1.012)	0.18
Duration of training/experience ( $\geq 13$ years)	1.03 (0.992–1.069)	0.128
Type of pharmacy (Licensed)	1.04 (1.005–1.076)	0.0256
Age group ( $\geq 40$ years)	0.987 (0.95–1.025)	0.489
Correct knowledge on AMR ( $\geq 7$ )	1.147 (1.098–1.199)	2.39e-09

Drug sellers from formal pharmacy (RR = 1.04) as well as having higher correct knowledge on AMR (RR = 1.15) were significantly associated with higher good practice scores for prevention of AMR compared to that of respective counterpart. This seems to be a positive influence of regulatory environment on practice quality and better knowledge significantly contributes to improved practices.

### FGDs:

Challenges faced by drug sellers for compliance of rules in dispensing antibiotics along with explaining customers about its use, AMR issues:

- Peer pressure of nearby drug sellers
- Economic motivation
- Fear of losing customers
- Influence of pharmaceutical companies
- Lack of knowledge of drug sellers and customers
- Financial crisis of customers

### Quotation of drug sellers regarding factors associated with selling antibiotic drugs without prescription:

"We (drug seller) seek prescription of registered physician when a customer seek antibiotic without prescription. In many cases customers fail to show any prescription of registered physician. In some cases customers state he/she has heard about the antibiotic from their known person(s) or from earlier prescription prescribed by registered physician for similar type of morbidity. In some cases the customer state that he/she has not enough money or want to save the money required to consult with registered physician. First he/she wants to consult with drug seller like me in pharmacy about the morbidity he/she or their family member(s) is/are suffering and according to discussion and/or suggestion with us (drug seller) first he/she will buy few pieces of an antibiotic drug and start to use and if the patient feels improvement after using few dose of the antibiotic then he/she will purchase remaining course of the antibiotic or discontinue."

We (drug seller) suggest the customer to complete the course of the antibiotic though in many cases the customer do not buy the full course of the antibiotic. After being suggested by us (the drug seller) to bring the prescription of registered physician for purchasing antibiotic drug when the customer attempt to go to nearby another pharmacy then we (drug seller) think if the nearby drug seller sell antibiotic to the customer without any prescription then my drug selling business will be hampered and also in future we may lose that customer and also other customers who may be prohibited by that customer for not visiting my pharmacy to buy drug. Thinking so we stop the customer before leaving the pharmacy and sell the antibiotic drug to him/her as he/she first sought."

So from the drug sellers' side generally following factors are associated with selling of antibiotic drugs without prescription of registered physician: economic motivation, fear of losing customers, peer pressure of nearby drug sellers, influence of pharmaceutical company representative, lack of knowledge etc. Besides from the customer's side generally following factors are associated with seeking antibiotic drug by the customer at pharmacy without prescription of registered physician and/or improper use of antibiotic drug: due to financial crisis, lack of proper knowledge, lack of interest or lack of giving priority" – Quoted by one of the drug seller of a pharmacy at Mirpur.

Besides drug sellers opined on following issues about - taking necessary steps by concerned authority for strengthening capacity of drug seller's community and awareness of community people, regular monitoring and supervision by regulatory body for licensing, compliance of rule and regulations in antibiotic drug dispensing.

### Conclusion:

Concerned authority should take necessary steps for shaping AMR in urban Bangladesh including –

- Arrange regular training for drug sellers on antimicrobial drugs, its dispensing, AMR issues,
- Regular monitoring and supervision of pharmacies for licensing,
- Regular monitoring and supervision of drug sellers for proper dispensing of antibiotic drug along with explaining customers about importance of its correct use.