

Pilot Study to Evaluate the Feasibility of a Patient Questionnaire for the Purpose of Investigating the Extent of Purchasing Antibiotics without a Prescription in a Rural Province in South Africa: Rationale and Implications

Tiyani Milta Sono^{1,2}, Morgan Tiyiselani Maluleke², Nishana Ramdas¹, Ana Golic Jelic³, Stephen Campbell^{1,4}, Vanda Markovic-Pekovic³, Natalie Schellack⁵, Santosh Kumar⁶, Brian Godman^{1,7}, Johanna Catharina Meyer^{1,8}

¹Department of Public Health Pharmacy and Management, School of Pharmacy, Sefako Makgatho Health Sciences University, Ga-Rankuwa, South Africa, ²Saselamani Pharmacy, Saselamani, South Africa, ³Department of Pharmacy, Faculty of Medicine, University of Banja Luka, Banja Luka, Republic of Srpska, Bosnia and Herzegovina, Balkans, ⁴Centre for Epidemiology and Public Health, School of Health Sciences, University of Manchester, Manchester, UK, ⁵Department of Pharmacology, Faculty of Health Sciences, University of Pretoria, Pretoria, South Africa, ⁶Department of Periodontology and Implantology, Karnavati School of Dentistry, Karnavati University, Gandhinagar, Gujarat, India, ⁷Department of Pharmacoepidemiology, Strathclyde Institute of Pharmacy and Biomedical Sciences, University of Strathclyde, Glasgow, UK, ⁸South African Vaccination and Immunisation Centre, Sefako Makgatho Health Sciences University, Ga-Rankuwa, South Africa

Abstract

Introduction: There are concerns with rising rates of antimicrobial resistance (AMR) across countries with appreciable impact on morbidity, mortality and costs. Amongst low- and middle-income countries, a key driver of AMR is the excessive use of antibiotics in ambulatory care, with a critical area being the appreciable selling of antibiotics without a prescription often driven by patient demand and limited knowledge. There is currently conflicting evidence in South Africa regarding this practice. Consequently, there is a need to explore these critical issues amongst patients, especially in more rural areas of South Africa. A pilot study was undertaken to address this. **Methods:** A two-step descriptive approach was undertaken. This involved two questionnaires amongst patients exiting chain and independent community pharmacies followed by cognitive interviews. **Results:** Overall, 21 patients were approached for an interview, including 11 for Part 1 of the questionnaire with 3 declining, and 10 for Part 2, with 2 declining. Subsequently 8 patients completed each part of the questionnaire. On average, it took 2 min 13 s to complete both parts. 3 of the 5 patients being dispensed an antibiotic were dispensed one without a prescription, with all 3 patients exiting from independent pharmacies. Key reasons for self-purchasing included money and convenience. There was mixed knowledge regarding antibiotics and AMR amongst the 8 patients interviewed with Part 2. Overall, there was a satisfactory understanding of the Part 1 questions, although some modifications were suggested. Some participants had difficulty with fully understanding the questions in Part 2, with a number of suggestions made to improve this for the main study. **Conclusion:** There were concerns with the extent of purchasing antibiotics without a prescription in this pilot study as well as the knowledge of patients regarding antibiotics and AMR. Both areas need addressing and will be explored further in the main study.

Keywords: Antibiotics, antimicrobial resistance, patients, pharmacies, purchasing antibiotics, South Africa

INTRODUCTION

The global rise in antimicrobial resistance (AMR) has appreciably increased morbidity, mortality and costs, with the greatest burden from AMR currently seen in sub-Saharan Africa.^[1-4] As a result, there are now multiple national and global initiatives to reduce AMR. These include the World Health Organization with its Global Action Plan alongside National Action Plans (NAPs) to reduce AMR.^[5-8] A key focus

Address for correspondence: Prof. Brian Godman, Department of Public Health Pharmacy and Management, School of Pharmacy, Sefako Makgatho Health Sciences University, Molotlegi Street, Garankuwa, Pretoria 0208, South Africa. E-mail: brian.godman@smu.ac.za

Submitted: 11-Dec-2023 **Revised:** 16-Dec-2023
Accepted: 23-Dec-2023 **Published:** 05-Mar-2024

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Sono TM, Maluleke MT, Ramdas N, Jelic AG, Campbell S, Markovic-Pekovic V, *et al.* Pilot study to evaluate the feasibility of a patient questionnaire for the purpose of investigating the extent of purchasing antibiotics without a prescription in a rural province in South Africa: Rationale and implications. *Adv Hum Biol* 2024;14:138-47.

Access this article online

Quick Response Code:



Website:
www.aihbonline.com

DOI:
10.4103/aihb.aihb_140_23

as part of the NAPs for health authorities and governments across low- and middle-income countries (LMICs), including African countries, is to improve the prescribing and dispensing of antibiotics in ambulatory care. This is important because ambulatory care currently accounts for 90%–95% of total human antibiotic consumption in LMICs.^[9-12] Within ambulatory care in LMICs, including amongst African countries, a key area to address is currently high rates of antibiotics being purchased without a prescription,^[13-17] often for self-limiting conditions including acute respiratory infections (ARIs), driving up AMR.^[14,17-21]

We are aware of the critical role that patients play across Africa in influencing the prescribing and dispensing of antibiotics, especially for essentially self-limiting conditions.^[14] Inappropriate pressure on pharmacists or their assistants to obtain antibiotics, including being dispensed without a prescription, is often fuelled by a lack of knowledge amongst patients about antibiotics and AMR. Alongside this, patients' previous experience with antibiotics for the successful treatment of their infectious diseases, including often for self-limiting conditions, enhances this pressure.^[22-27]

A number of key factors have been identified fuelling the purchasing of antibiotics without a prescription across Africa. These include issues of affordability, pressure from patients, limited enforcement of regulations prohibiting the purchasing of antibiotics without a prescription, lack of knowledge regarding antibiotics and AMR amongst patients as well as prior experience with antibiotics to successfully treat previous infections [Table 1].

Across countries, there are concerns with the knowledge and understanding of patients regarding antibiotics and whether they are effective against self-limiting conditions such as ARIs.^[14,21,36,38-40] This includes South Africa.^[41] Alongside this, concerns with a lack of understanding of terms such as AMR and the implications amongst patients and their families potentially exacerbating inappropriate prescribing and dispensing of antibiotics.^[29,42,43] Consequently, it is crucial that patients are a key element of any targeted programmes by governments, health insurance companies and others to improve future antibiotic utilisation in ambulatory care in LMICs thereby reducing AMR.^[21] We have seen especially in higher-income countries that patients are generally more aware that coughs, influenza-like symptoms and colds are caused by viruses, and that antibiotics should only be prescribed where needed, including for bacterial and not for viral infections.^[44,45] However, there can still be challenges with their knowledge and understanding, along with the implications of AMR.^[46]

There are a number of ongoing initiatives in South Africa to improve the utilisation of antibiotics in ambulatory care given ongoing concerns, thereby seeking to reduce AMR.^[47-50] These are summarised in Chigome *et al.* and Sono *et al.*, and centre around the National AMR Strategy Framework for 2017–2024.^[47,51,52] Despite specific legislation regarding the dispensing of prescription-only medicines in South Africa,

there is evidence that the purchasing of antibiotics without a prescription does take place in the country.^[14] However, this is variable depending on the pharmacy type, location and patient characteristics.^[22,52-54]

As a result of ongoing concerns in South Africa regarding AMR, as well as variable findings regarding current rates of purchasing of antibiotics without a prescription in the country, there is a need to explore these issues further. This includes patient behaviour and their knowledge regarding antibiotics and AMR, building on earlier studies.^[41] The first step includes ascertaining current rates of purchasing of antibiotics without a prescription in South Africa, and the rationale for this action, given variable findings including knowledge of antibiotics and AMR amongst pharmacists and their assistants.^[52]

The second step is to gain a greater understanding of the extent and rationale why patients seek antibiotics without a prescription in South Africa from community pharmacies. Along with this, their understanding of key aspects of antibiotics and AMR given a current paucity of such knowledge in South Africa. As stated in our previous publication, we chose a rural province in South Africa for this study since there are typically extended travelling distances for patients to healthcare facilities and long waiting times to see a healthcare professional (HCP), including for self-limiting conditions such as ARIs, with resultant resource implications.^[52] These circumstances could lead to patients putting pressure on pharmacists and pharmacists' assistants in community pharmacies to dispense antibiotics without a prescription, exacerbated by concerns with their knowledge of antibiotics and AMR.^[14,52]

Our approach was to initially undertake a small-scale preliminary pilot study with a structured questionnaire amongst patients as they leave community pharmacies as proof of concept. This is seen as important since we were already aware that a questionnaire survey amongst community pharmacists and their assistants may under-estimate the extent of dispensing of antibiotics without a prescription in LMICs.^[55] As before, the concept is to investigate the feasibility of administering the proposed questionnaire amongst patients as they leave community pharmacies. At the same time, seeking to minimise implementation challenges brought about by these circumstances before embarking on the main study. Coupled with this, seek to understand the experiences and views of patients regarding the relevance of the questions being asked and their understanding of these questions. In addition, seek to ascertain the time taken to interview patients with the questionnaire, which is an important factor to consider for busy patients on side-walks. The findings of the pilot study, including suggestions from patients, will enhance the validity of the main study through amending the questionnaire and data collection process as required. In view of this, we report on the findings of the pilot study and the subsequent implications for the final data collection instrument and process in this paper.

Table 1: Key patient factors influencing the dispensing of antibiotics without a prescription amongst community pharmacies and drug outlets across Africa

Country	Author/year	Key patient factors
Multiple African countries	Belachew <i>et al.</i> , 2021 ^[28]	Study involving multiple African countries including Cameroon, Ethiopia, Eritrea, Kenya, Malawi, Sudan, Tanzania, Uganda, Zambia and Zimbabwe Key drivers for the purchasing of antibiotics without a prescription included: <ul style="list-style-type: none"> • Pressures from patients exacerbated by their expectations based on previous experiences and outcomes • No or limited enforcement of any regulations banning the purchasing of antibiotics of antibiotics without a prescription • Limited knowledge and/or poor attitudes amongst personnel in community outlets regarding antibiotics and their use
	Yeika <i>et al.</i> , 2021 ^[29]	Study involving 19 African countries: Algeria, Cameroon, DR Congo, Egypt, Eritrea, Ethiopia, Ghana, Ivory Coast, Kenya, Libya, Malawi, Mozambique, Namibia, Nigeria, Rwanda, Senegal, Sudan, Tanzania and Uganda Common reasons for the purchasing of antibiotics without a prescription included limited or no real education amongst patients to really consider key issues surrounding antibiotics and AMR
	Li <i>et al.</i> , 2023 ^[16]	Systematic review including 40 papers with 25% from sub-Saharan African countries Common major reasons for purchasing of antibiotics without a prescription included: <ul style="list-style-type: none"> • Strong patient demand • Currently weak social and legal regulations
Cameroon	Njungkeng <i>et al.</i> , 2019 ^[30]	Principal reasons for purchasing antibiotics without a prescription included past experiences from the use of antibiotics with similar symptoms (29.3% of patients surveyed)
Congo	Shembo <i>et al.</i> , 2022 ^[31]	Key reasons for purchasing antibiotics without a prescription included relying on previous experiences with antibiotics - hence no need to trouble a physician and just request them from the pharmacy
Ethiopia	Gebretekle and Serbessa, 2016 ^[32]	Common reasons for purchasing of antibiotics without a prescription included: <ul style="list-style-type: none"> • Limited education amongst patients • Patient pressure on pharmacists to dispense antibiotics without a prescription
Ghana	Afari-Asiedu <i>et al.</i> , 2018 ^[33]	Key factors for purchasing antibiotics without a prescription included: <ul style="list-style-type: none"> • Demand from patients based on their previous knowledge of the effectiveness of antibiotics for their current condition • Poor implementation of current regulations by the health authorities in Ghana banning such practices
Ghana	Mensah <i>et al.</i> , 2019 ^[34]	Key factors for purchasing antibiotics without a prescription included: <ul style="list-style-type: none"> • Influence from others included friends and relatives (32.7%) • Perceived mild severity of the illness negating the need to visit a physician (17.7%)
Nigeria	Khalid <i>et al.</i> , 2019 ^[35]	Principal reasons for purchasing antibiotics without a prescription included previous knowledge of the effectiveness of antibiotics in similar infectious disease episodes (40.4%), even if not required
Malawi	Machongo and Mipando 2022 ^[36]	Patients frequently request and use antibiotics inappropriately believing that they will be effective in treating coughs and colds in children
Mozambique	Torres <i>et al.</i> , 2020 ^[19]	Principal reasons for purchasing antibiotics without a prescription included: <ul style="list-style-type: none"> • Patients' demands and expectations are enhanced by their beliefs in the healing power of antibiotics • Fragile law enforcement or absence of accountability mechanisms to currently rectify the situation
Tanzania	Emgård <i>et al.</i> , 2022 ^[37]	Principal reasons for purchasing of antibiotics without a prescription included the fact that they are often perceived as universal treatments for common diseases Consequently, pressure on pharmacists to dispense them even without a prescription
Uganda	Musoke <i>et al.</i> , 2023 ^[21]	Many patients going to community pharmacists are not knowledgeable about antibiotics and AMR Consequently, requested and consumed antibiotics whenever and however they wanted, fuelling self-medication and AMR

AMR: Antimicrobial resistance

METHODS

Study approach and setting

A descriptive approach was employed for this pilot study, which built on the successful pilot study we conducted recently amongst pharmacists and their assistants in the same province using a self-administered questionnaire.^[52] Consequently, the current study was conducted without making any changes to the research environment. As a result, the patients were approached from some of the same pharmacies where pharmacists and their assistants took part in the pilot

study.^[52] Both pharmacy types, i.e. chain and independent pharmacies, were important for this pilot study as we observed in the previous pilot study that pharmacists from chain pharmacies were reluctant to participate in the study.^[52] In addition, community pharmacists and their assistants may underestimate the extent of dispensing antibiotics without a prescription in self-administered questionnaires due to fear of sanctions and beliefs of more appropriate prescribing and dispensing behaviour than observed in reality.^[55] Consequently, for this pilot study, six community pharmacies in the same province (three independent and three chain pharmacies), all

within a 45 km radius from each other, were selected based on convenience and/or being part of previous the pilot study.

For this pilot study, we used a two-step approach. Step 1 involved initial interviews with a limited number of patients, who were exiting community pharmacies using an interviewer-administered questionnaire. Step 2 involved cognitive interviews with the same patients to evaluate their comprehension of the survey questions and terminology used, as well as to seek their suggestions on potential adaptations to the questionnaire for the main study.

Data from the interviewer-administered questionnaires were entered into a Microsoft Excel® spreadsheet and summarised descriptively, using frequencies and percentages.

Patient questionnaire

The patient questionnaire was developed drawing from existing literature.^[27,42,56,57] In view of concerns regarding the length of the questionnaire, which we observed in our experience with the community pharmacists and their assistants, we divided the patient questionnaire into two parts, each with its own objectives. As far as possible, closed-ended questions or statements were provided with suitable response options to assist with timely completion.

The objectives of the first part of the questionnaire (Part 1) were to (i) determine the extent of purchasing antibiotics without a prescription amongst both chain and independent pharmacies; and (ii) understand the rationale for this activity, including the condition/problem for which antibiotics were purchased. The second part of the questionnaire (Part 2) sought to evaluate patients' knowledge of key aspects of antibiotics and AMR current concerns.

The initial questionnaire, including Part 1 and Part 2, was reviewed by the co-authors based on their considerable experience in this area across LMICs and subsequently adapted before the pilot study [Supplementary Tables 1 and 2]. We have used this approach before when developing questionnaires where no standardised questionnaire was available.^[50,58-60] The questionnaire was exclusively provided in English due to concerns related to the lack of standardised terminology across the different languages used in South Africa, which could potentially impact the reliability and consistency of the research instrument. However, during data collection, explanations were provided in the relevant native language when necessary.

Enrolment and data collection

For the purpose of the pilot study, the aim was to administer each part of the questionnaire to between 8 and 10 patients. Two different sets of patients would be interviewed for Part 1 and Part 2, respectively. This was done deliberately to be able to fully undertake the cognitive interviews with each participating patient after completion of the questionnaire and not be rushed.

Patients who came out of the pharmacies holding medication bags were approached and invited to participate in a pilot

study. Those who indicated their willingness to participate were given more information about the study and requested to provide written informed consent before the start of the interview. Participation was completely voluntary, and patients were informed that they could withdraw from the study at any time without providing reasons for their withdrawal.

All interviews were conducted by the lead author (TMS), with responses recorded manually on the questionnaire for both Parts 1 and 2. Interviews took place outside the pharmacies in a convenient semi-private area such as where benches or chairs were available in the vicinity of the pharmacy.

Follow-up cognitive interviews

For each participant, on completion of the interviewer-administered questionnaire, a cognitive interview was conducted by TMS. This interview was started by asking the participants what they generally thought about the questionnaire. This was followed by going through each question with the patient and asking them for possible areas to improve the questionnaire if pertinent. More in-depth questioning was used where it was perceived that patients had difficulty understanding a question, or had misunderstood it when answering. All patient responses were manually noted on an extra sheet of paper and the responses collated.

Ethical approval

Ethical approval for the study was obtained from the Sefako Makgatho University Research Ethics Committee (MUREC/P/229/2023:PG). Permission to conduct the study from the National Department of Health was not required, as no public sector facilities were included in this study. The pilot study only commenced after ethical clearance was received. All patient responses remained confidential and data are stored securely in a password-protected computer with access to TMS only. Data will be discarded minimum 5 after publication of the results years, according to institutional policies.

RESULTS

Summary of questionnaire responses from patients

Overall, 11 patients were approached for an interview to complete Part 1 of the questionnaire. Two patients from chain pharmacies were in a hurry and consequently declined participation. One patient exiting from an independent pharmacy also declined participation stating they were not interested in the study. For Part 2 of the questionnaire, 10 patients were approached. One patient exiting from a chain pharmacy and one from an independent pharmacy said they were in a hurry, and consequently could not participate.

Eight patients eventually participated in the interview to complete Part 1 of the questionnaire, with the same number but different patients participating in the interview to complete Part 2 of the questionnaire. Patient characteristics including the extent of medicines and antibiotics dispensed are summarised in Table 2.

The average time taken to administer Part 1 of the questionnaire was 1 min and 47 s, and for Part 2 this was 2 min and 39 s.

Table 3 contains feedback on the nature of antibiotics dispensed to the five patients interviewed with Part 1 of the questionnaire, whether these were dispensed without a prescription or not, and the rationale for this activity. Three of the five patients being dispensed an antibiotic were dispensed an antibiotic without a prescription. All three patients were exiting from an independent pharmacy. No patient exiting from a chain pharmacy was dispensed an antibiotic without a prescription in this pilot study.

There was mixed knowledge regarding antibiotics and AMR amongst the eight patients interviewed with Part 2 of the questionnaire [Table 4].

Responses to the cognitive interviews

Part 1 of the questionnaire

Out of 8 participating patients, 6 demonstrated a satisfactory understanding of the questionnaire, indicating that the questions were generally clear and well-formulated. One

patient suggested including an option to indicate completion of ABET (adult education certificate for those who did not finish high school) as an additional category under the education level. Another patient recommended expanding the scope of the questionnaire beyond antibiotics to include all medications. However, this is outside of the scope of the current study.

Participants typically indicated the need to receive instructions regarding how to use, store and discard antibiotics. This though is also outside the scope of the current study. Alongside this, participants generally emphasised the importance of assessing patients' understanding of how to take antibiotics and why they were being prescribed or dispensed in the first place. This underscores the relevance of evaluating patients' comprehension of their prescribed treatment when discussed or dispensed to gain insights into their decision-making process relating to the purchasing of antibiotics without a prescription.

Based on administering the questionnaire in an interview and feedback from patients, overall, the following changes were suggested to Part 1 of the pilot study version of the questionnaire [Supplementary Table 1]:

- It was recommended to include Question 8 for all participants, regardless of their response to the previous question. This will allow for a comprehensive assessment of all patients' experiences and behaviours relating to the purchasing of antibiotics without a prescription
- More space should be added for Question 9 regarding other medications dispensed to capture a complete picture of medications dispensed without a prescription. This will enable a more comprehensive understanding of this practice in reality
- In the event of a child being the recipient of antibiotics, Question 12 should be revised to gather more specific information about the relationship between the respondent and the child. The revised question should provide additional options to include parent, guardian or other, allowing participants to accurately indicate their relationship with the child
- After careful consideration, it is suggested to remove Question 14 from the questionnaire. This question may

Table 2: Patient characteristics and medicines dispended

Patient characteristics	Number of patients	
	Questionnaire Part 1	Questionnaire Part 2
Sex		
Male	3	3
Female	5	5
Age range (years)	28–60	30–53
Education		
Primary completed	1	-
Secondary completed	-	1
Diploma	3	4
Bachelors/Honours degree	4	3
Pharmacy type where medicines were dispensed		
Independent pharmacies	5	4
Chain pharmacies	3	4
Dispensed medicines	8	Not applicable
Dispensed antibiotics	5	Not applicable

Table 3: Key information regarding the nature of antibiotics dispensed and rationale for this amongst patients interviewed with Part 1 of the questionnaire (n=5)

Patient	Dispensed with a prescription	Pharmacy type	Diagnosis – Child or adult	Antibiotic dispensed	Rationale for dispensing without a prescription	Other medicines offered before antibiotics
1	Yes (electronic)	Chain	Not recorded	Co-amoxiclav	Not applicable	Not applicable
2	No	Independent	Skin and soft tissue infection	Cephalexin suspension	Pharmacist recommendation	Yes
3	No	Independent	STI (female)	Azithromycin*/ Metronidazole	Pharmacist recommendation; No money	Recommended to see a physician before antibiotics dispensed
4	Yes (Electronic)	Independent	STI (male)	Azithromycin*/ Metronidazole	No time to see a HCP or regular pharmacist	Not applicable
5	No	Independent	Diarrhea in their child	Co-trimoxazole suspension	No money for a physician; long waiting times to see a HCP in a public clinic	Yes

*Antibiotics recommended for STIs in the South African Standard Treatment Guidelines. HCP: Healthcare professional, STIs: Sexually transmitted infections

Table 4: Responses to the knowledge statements amongst patients interviewed with Part 2 of the questionnaire ($n=8$)

Question	True	False	Don't know
1. Antibiotic resistance occurs when your body becomes resistant to antibiotics and they no longer work as well	8*	0	0
2. When people take too many antibiotics germs become resistant to them	7*	1	0
3. Antibiotics can treat colds and coughs	6	2*	0
4. Antibiotics are good for treating germs called bacteria	7*	1	0
5. Taking antibiotics when not needed can lead to antibiotic resistance	7*	1	0
6. Completing the course is important, even when I feel better	8*	0	0
7. I can share my antibiotics with someone else who is also ill or who needs them	0	8*	0
8. In South Africa, community pharmacists are legally allowed to dispense antibiotics without a prescription	0	7*	1
9. Pharmacists should educate patients on proper antibiotic use	8*	0	0
10. I must take antibiotics only when prescribed by a doctor or nurse	6*	2	0
11. I can discard leftover antibiotics	1	6*	1
12. Antibiotic resistance is something the community is concerned about	3*	3	2
13. Healthcare personnel are the only ones responsible for addressing and preventing antibiotic resistance	3	5*	0
14. Everyone needs to take responsibility for using antibiotics responsibly	7*	1	0
15. Government and regulatory bodies are also responsible for addressing and preventing antibiotic resistance	7*	0	1

*Correct or ideal response to knowledge question/statement

not contribute significantly to the study findings especially if Question 12 is rephrased.

Part 2 of the questionnaire

Amongst the eight participants, three expressed difficulties with understanding the concept of AMR and openly admitted to guessing their response to the first question. In addition, another participant expressed confusion regarding the term 'resistant.' As a result, this participant did not comprehend how germs can exhibit resistance [Question 2, Table 4], mistakenly believing it is antibiotics themselves that possess resistance. This participant also suggested adding HCPs including dentists and pharmacists to Question 10 [Table 4]; however, this is outside the scope of this study. It is possible that a pharmacist could facilitate obtaining a prescription from a doctor without the patient seeing the doctor, as this participant directly visits the pharmacy when she falls ill.

Regarding Question 12 [Table 4], one participant indicated that the community cannot be concerned about something they are unaware of. Consequently, it was proposed to rephrase the question to highlight that the community should be concerned about AMR. This participant also perceived the responsibility for proper antibiotic use rests solely with HCPs [Question 13, Table 4], and this should be taken into account when considering future modifications to the question-wording.

Furthermore, another participant suggested including the following statements:

- I am knowledgeable on how to take my antibiotics
- I have been informed on how to take my antibiotics
- I have been provided with explanations for the reasons behind taking my antibiotics.

Consequently, overall recommendations to the Part 2 of the pilot study version of the questionnaire [Supplementary Table S2] included the following:

- Revising the wording of Question 1 to enhance clarity

and ensure that participants grasp the concept of AMR. Potentially, utilise layman's terms and possibly include a brief explanation to aid comprehension

- Clarifying the language in Question 2 to avoid semantic misunderstandings
- Providing concise definitions or explanations when administering the questionnaire to ensure participants correctly interpret the terms used in the question
- Adjust the wording of Question 12 to highlight the significance of community awareness and concern regarding AMR. Ensure the question encourages participants to reflect on the broader community perspective
- Refining the wording of Question 13 to account for the diverse perspectives on the responsibility for antibiotic use, including both HCPs and the general public
- Integrate the suggested statements into the first questionnaire, possibly as additional items to gauge participants' knowledge and awareness regarding antibiotic use and its associated information.

Updated questionnaire

Table 5 (Part 1) and Table 6 (Part 2) contain the updated questionnaire for inclusion in the main study following feedback from the pilot study participants (Part 1 and 2) [Supplementary Tables 1 and 2] and experience in administering the questionnaire in an interview.

DISCUSSION AND NEXT STEPS

Overall, there was appreciable utilisation of antibiotics amongst the surveyed patients (62.8% in Part 1) reflecting the importance of seeking ways to improve future utilisation to reduce AMR in South Africa.

From our small pilot study, the purchasing of antibiotics without a prescription seems to be higher compared to Anstey Watkins *et al.* and Do *et al.*,^[22,53] but similar to the findings of Mokwele *et al.* amongst independent pharmacies.^[54] However,

Table 5: Final Questionnaire Part 1

PATIENT QUESTIONNAIRE PART 1

Date: _____ Participant no: _____

Greet the patient and invite them to participate in the survey. Provide the patient with the participant information sheet or read it for them. Upon agreement to participate in the survey, obtain signed informed consent.

G 1. Age _____ years Prefer not to disclose age

2. Biological sex assigned at birth Male Female Prefer not to answer

3. Home language Xitsonga Tshivenda Sepedi English Other (Specify)

4. Educational level No education Primary school completed High school completed ABET certificate College certificate
Diploma Bachelor's degree Honours degree Master's degree Doctorate

5. Were you dispensed or sold any medication at the pharmacy today? Yes No

6. Did you have a prescription from a doctor? Yes No

7. Does the medication include any antibiotics? Yes No Don't know

8. For what condition did you visit the pharmacy?
How many items were dispensed/sold to you? Yes No Note: If no antibiotics were dispensed, end the interview and thank the patient for their time

9. If antibiotics were dispensed, ask to have a look at the antibiotics dispensed and enter the details
Antibiotics dispensed Other medication
1. 1.
2. 2.
3. 3.
4. 4.

10. What were the antibiotics indicated for? URTI (Upper respiratory tract infection) SSTI (Skin and soft tissue infection)
STI (Sexually transmitted disease) UTI (Urinary tract infection)
Other (Please specify)

11. Who were the antibiotics for? Adult Child Both

12. If the medication is for a child under 12, are you the parent or guardian? Parent Guardian Other (specify)

13. If the medication is for a child, how old are they? _____ years/months

14. If any antibiotics were obtained without a prescription, what were the reasons?
Clinic too far Long waiting times
No money to see a doctor Used the same antibiotics before
Lack of knowledge Don't know
Pharmacist recommended them Patient insisted on an antibiotic
Other (Please specify)

16. Was something else offered before the antibiotic? Yes No

17. Why did you choose this pharmacy? Accessibility Friendly staff
Affordability Easy parking
No strict policy with dispensing Familiar with staff
Good customer service Convenience
Other (Please specify)

the findings of this pilot study resonated with the conclusions of Mokwele *et al.* in that no antibiotics were dispensed without a prescription in franchised (chain) pharmacies.^[54] Having said this, the number of patients in this pilot study was small.

The reasons for patients requesting antibiotics without a prescription [Table 3] were similar to previous studies [Table 1]. These included economic reasons and circumstances as well as no time to take off work to see a HCP.

Our pilot study suggests that patients report a higher prevalence of antibiotic dispensing without a prescription when asked

directly compared to feedback from pharmacists and their assistants.^[52] This is similar to the findings when using simulated patients versus questionnaires with pharmacists, justifying our approach.^[55,61] Nevertheless, the sample sizes in both pilot studies are too small to draw definitive conclusions, with further investigation is needed before drawing any firm conclusions.

The first part of the questionnaire proved effective in documenting antibiotic purchasing without a prescription, patient demographics and reasons behind the behaviour. Nonetheless, we received feedback for questionnaire improvement, and these suggestions have been integrated into an updated questionnaire [Table 5].

Downloaded from https://journals.lww.com/ahp by BMDMFerPHKav12Eoum1tQIN4a+kLHEZgbsH04XMI0hCwWCX1AW on 03/07/2024

Table 6: Final Questionnaire Part 2

PATIENT QUESTIONNAIRE PART 2			
Date: _____		Participant no: _____	
Greet the patient and invite them to participate in the survey (if different to Part 1). Provide the patient with the participant information sheet or read it for them. Upon agreement to participate in the survey, obtain signed informed consent.			
1. Age	_____ years	Prefer not to disclose age	
2. Biological sex assigned at birth	Male	Female	Prefer not to answer
3. Home language	Xitsonga	Tshivenda	English
		Sepedi	Other (Specify)
4. Educational level	No education	Primary school completed	High school completed
	Diploma	Bachelor's degree	Honours degree
			ABET certificate
			Master's degree
Please select the best option below			
5. Antibiotic resistance occurs when your body becomes resistant to antibiotics and they no longer work as well		True	False
6. When people take too many antibiotics the germs become resistant to them		True	False
7. Antibiotics can treat colds and coughs		True	False
8. Antibiotics are good for treating germs called bacteria		True	False
9. Taking antibiotics when not needed can lead to antibiotic resistance		True	False
10. Completing the course is important, even when I feel better		True	False
11. I can share my antibiotics with someone else who is also ill or who needs them		True	False
12. In South Africa, community pharmacists are legally allowed to dispense antibiotics without a prescription.		True	False
13. If patient answered "True" to Question 12 above, then ask under which condition?			
14. Pharmacists should educate patients on proper antibiotic use		True	False
15. I must take antibiotics only when prescribed by a doctor or nurse		True	False
16. I can discard leftover antibiotics		True	False
17. Antibiotic resistance is something the community should be concerned about		True	False
18. Healthcare personnel are the only ones responsible for addressing and preventing antibiotic resistance		True	False
19. Everyone needs to take responsibility for using antibiotics responsibly		True	False
19. Government and regulatory bodies are also responsible for addressing and preventing antibiotic resistance		True	False

There were more concerns with the second part of the questionnaire in terms of understanding amongst participants.

Language plays a crucial role in interviews with patients on AMS in South Africa due to the country's diverse linguistic landscape. South Africa has 11 official languages, and it is essential to consider the linguistic diversity of the country when conducting interviews on AMS to ensure that the questions are understood by all respondents. The language in the questionnaire has been updated following the feedback ready for the main study [Table 6], and the researchers administering the revised questionnaire in the main study will be aware of these issues when asking the questions.

It was feasible to undertake both questionnaires in a rapid time to fully engage with patients throughout the survey, which is encouraging. As a result, justifying the initial rationale to divide the questionnaire into two, with each part having different objectives. However, given a combined interview length of not more than 5 min to administer both questionnaires, these can potentially be combined for the main study without compromising the findings. This approach would potentially increase the number of participants in this rural setting [Tables 5 and 6] and will be undertaken in the main study where feasible.

The next phase of our study will involve conducting the main study with pharmacists and their assistants across this rural

province using the updated questionnaire.^[52] The findings from this study with pharmacists and their assistants will subsequently be used to determine the number of patients needed for the patient questionnaire study. This will be based on the likely percentage of patients being dispensed antibiotics without a prescription in this rural province, bearing in mind the feedback from pharmacists and their assistants is likely to be a conservative estimate.

CONCLUSION

Similar to the pilot study amongst pharmacists and their assistants in rural South Africa, this pilot study raised considerable concerns regarding the extent of purchasing antibiotics without a prescription. There was also a concern regarding the knowledge of whether antibiotics can treat colds and coughs, as well as knowledge of AMR amongst patients. These issues will be explored further in the main study to provide future direction to the authorities as the Government in South Africa seeks to improve antibiotic utilisation and reduce AMR in line with the goals of the NAP.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Antimicrobial Resistance Collaborators. Global burden of bacterial antimicrobial resistance in 2019: A systematic analysis. *Lancet* 2022;399:629-55.
2. Cassini A, Högberg LD, Plachouras D, Quattrocchi A, Hoxha A, Simonsen GS, *et al.* Attributable deaths and disability-adjusted life-years caused by infections with antibiotic-resistant bacteria in the EU and the European economic area in 2015: A population-level modelling analysis. *Lancet Infect Dis* 2019;19:56-66.
3. Dadgostar P. Antimicrobial resistance: Implications and costs. *Infect Drug Resist* 2019;12:3903-10.
4. Janssen J, Afari-Asiedu S, Monnier A, Abdulai MA, Tawiah T, Wertheim H, *et al.* Exploring the economic impact of inappropriate antibiotic use: The case of upper respiratory tract infections in Ghana. *Antimicrob Resist Infect Control* 2022;11:53.
5. World Health Organization. Global Action Plan on Antimicrobial Resistance; 2015. Available from: https://apps.who.int/iris/bitstream/handle/10665/193736/9789241509763_eng.pdf?sequence=1. [Last accessed on 2023 Dec 01].
6. Charani E, Mendelson M, Pallett SJ, Ahmad R, Mpundu M, Mbamalu O, *et al.* An analysis of existing national action plans for antimicrobial resistance-gaps and opportunities in strategies optimising antibiotic use in human populations. *Lancet Glob Health* 2023;11:e466-74.
7. The World Bank. Final Report – Drug-Resistant Infections. Threat to Our Economic Future; 2017. Available from: <https://documents1.worldbank.org/curated/en/323311493396993758/pdf/final-report.pdf>. [Last accessed on 2023 Dec 02].
8. OECD Health Policy Studies. Stemming the Superbug Tide; 2018. Available from: <https://www.oecd-ilibrary.org/sites/9789264307599-en/index.html?itemId=/content/publication/9789264307599-enandmimeType=text/html>. [Last accessed on 2023 Dec 01].
9. Sharland M, Zanichelli V, Ombajo LA, Bazira J, Cappello B, Chitanga R, *et al.* The WHO essential medicines list AWaRe book: From a list to a quality improvement system. *Clin Microbiol Infect* 2022;28:1533-5.
10. Zanichelli V, Sharland M, Cappello B, Moja L, Getahun H, Pessoa-Silva C, *et al.* The WHO AWaRe (access, watch, reserve) antibiotic book and prevention of antimicrobial resistance. *Bull World Health Organ* 2023;101:290-6.
11. Duffy E, Ritchie S, Metcalfe S, Van Bakel B, Thomas MG. Antibacterials dispensed in the community comprise 85%-95% of total human antibacterial consumption. *J Clin Pharm Ther* 2018;43:59-64.
12. Kanan M, Ramadan M, Haif H, Abdullah B, Mubarak J, Ahmad W, *et al.* Empowering low- and middle-income countries to combat AMR by minimal use of antibiotics: A way forward. *Antibiotics* 2023;12:1504.
13. Torres NF, Chibi B, Kuupiel D, Solomon VP, Mashamba-Thompson TP, Middleton LE. The use of non-prescribed antibiotics; prevalence estimates in low-and-middle-income countries. A systematic review and meta-analysis. *Arch Public Health* 2021;79:2.
14. Sono TM, Yeika E, Cook A, Kalungia A, Opanga SA, Acolatse JE, *et al.* Current rates of purchasing of antibiotics without a prescription across sub-Saharan Africa; rationale and potential programmes to reduce inappropriate dispensing and resistance. *Expert Rev Anti Infect Ther* 2023;21:1025-55.
15. Belachew SA, Hall L, Selvey LA. Non-prescription dispensing of antibiotic agents among community drug retail outlets in Sub-Saharan African countries: A systematic review and meta-analysis. *Antimicrob Resist Infect Control* 2021;10:13.
16. Li J, Zhou P, Wang J, Li H, Xu H, Meng Y, *et al.* Worldwide dispensing of non-prescription antibiotics in community pharmacies and associated factors: A mixed-methods systematic review. *Lancet Infect Dis* 2023;23:e361-70.
17. Belachew SA, Hall L, Selvey LA. "Handing out non-prescribed antibiotics is storing up trouble for the next generation!" Unpacking multistakeholder views of drivers and potential solutions in Ethiopia. *BMC Health Serv Res* 2023;23:830.
18. Bahta M, Tesfamariam S, Weldemariam DG, Yemane H, Tesfamariam EH, Alem T, *et al.* Dispensing of antibiotics without prescription and associated factors in drug retail outlets of Eritrea: A simulated client method. *PLoS One* 2020;15:e0228013.
19. Torres NF, Solomon VP, Middleton LE. Identifying the commonly used antibiotics for self-medication in urban Mozambique: A qualitative study. *BMJ Open* 2020;10:e041323.
20. Mboya EA, Sanga LA, Ngocho JS. Irrational use of antibiotics in the Moshi municipality Northern Tanzania: A cross sectional study. *Pan Afr Med J* 2018;31:165.
21. Musoke D, Lubega GB, Gbadesire MS, Boateng S, Twesigye B, Gheer J, *et al.* Antimicrobial stewardship in private pharmacies in Wakiso district, Uganda: A qualitative study. *J Pharm Policy Pract* 2023;16:147.
22. Do NT, Vu HT, Nguyen CT, Punpuing S, Khan WA, Gyapong M, *et al.* Community-based antibiotic access and use in six low-income and middle-income countries: A mixed-method approach. *Lancet Glob Health* 2021;9:e610-9.
23. Bahta M, Weldemariam DG, Tesfamariam S, Tesfamariam EH, Russom M. Determinants of dispensing antibiotics without prescription in Eritrea: A mixed-method qualitative study on pharmacy professionals' perspective. *BMJ Open* 2021;11:e049000.
24. Green DL, Keenan K, Fredricks KJ, Huque SI, Mushi MF, Kansiime C, *et al.* The role of multidimensional poverty in antibiotic misuse: A mixed-methods study of self-medication and non-adherence in Kenya, Tanzania, and Uganda. *Lancet Glob Health* 2023;11:e59-68.
25. Russom M, Bahta M, Debesai M, Bahta I, Kessele A, Afendi A, *et al.* Knowledge, attitude and practice of antibiotics and their determinants in Eritrea: An urban population-based survey. *BMJ Open* 2021;11:e046432.
26. Kibuule D, Kagoya HR, Godman B. Antibiotic use in acute respiratory infections in under-fives in Uganda: Findings and implications. *Expert Rev Anti Infect Ther* 2016;14:863-72.
27. Kretchy JP, Adase SK, Gyansa-Lutterodt M. The prevalence and risks of antibiotic self-medication in residents of a rural community in Accra, Ghana. *Sci Afr* 2021;14:e01006.
28. Belachew SA, Hall L, Erku DA, Selvey LA. No prescription? No problem: Drivers of non-prescribed sale of antibiotics among community drug retail outlets in low and middle income countries: A systematic review of qualitative studies. *BMC Public Health* 2021;21:1056.
29. Yeika EV, Ingelbeen B, Kemah BL, Wirsiy FS, Fomengia JN, van der Sande MA. Comparative assessment of the prevalence, practices and factors associated with self-medication with antibiotics in Africa. *Trop Med Int Health* 2021;26:862-81.
30. Amin ET, Charles N, Fondugallah JA, Fualefac A, Njunkeng PA, Ako-Arrey D, *et al.* Prevalence of antimicrobial self-medication among patients attending two hospitals in the Buea health district, Cameroon. *Arch Community Med Public Health* 2019;5:24-8.
31. Shembo AK, Musumari PM, Srithanaviboonchai K, Tangmunkongvorakul A, Dalleur O. A qualitative study on community use of antibiotics in Kinshasa, Democratic Republic of Congo. *PLoS One* 2022;17:e0267544.
32. Gebretekle GB, Serbessa MK. Exploration of over the counter sales of antibiotics in community pharmacies of Addis Ababa, Ethiopia: Pharmacy professionals' perspective. *Antimicrob Resist Infect Control* 2016;5:2.
33. Afari-Asiedu S, Kinsman J, Boamah-Kaali E, Abdulai MA, Gyapong M, Sankoh O, *et al.* To sell or not to sell; the differences between regulatory and community demands regarding access to antibiotics in rural Ghana. *J Pharm Policy Pract* 2018;11:30.
34. Mensah BN, Agyemang IB, Afriyie DK, Amponsah SK. Self-medication practice in Akuse, a rural setting in Ghana. *Niger Postgrad Med J* 2019;26:189-94.
35. Khalid GM, Jatau AI, Ibrahim UI, Dungus FM, Shitu Z, Sha'aban A, *et al.* Antibiotics self-medication among undergraduate pharmacy students in Northern Nigeria. *Med Access Point Care* 2019;3:1-8.
36. Machongo RB, Mipando AL. "I don't hesitate to use the left-over antibiotics for my child" practices and experiences with antibiotic use among caregivers of paediatric patients at Zomba central hospital in Malawi. *BMC Pediatr* 2022;22:466.
37. Emgård M, Mwangi R, Mayo C, Mshana E, Nkini G, Andersson R, *et al.* Antibiotic use in children under 5 years of age in Northern Tanzania: A qualitative study exploring the experiences of the caring mothers. *Antimicrob Resist Infect Control* 2022;11:130.

38. McCullough AR, Parekh S, Rathbone J, Del Mar CB, Hoffmann TC. A systematic review of the public's knowledge and beliefs about antibiotic resistance. *J Antimicrob Chemother* 2016;71:27-33.
39. Duan L, Liu C, Wang D, Lin R, Qian P, Zhang X, *et al.* The vicious cycle of the public's irrational use of antibiotics for upper respiratory tract infections: A mixed methods systematic review. *Front Public Health* 2022;10:985188.
40. Fuller W, Kapona O, Aboderin AO, Adeyemo AT, Olatunbosun OI, Gahimbare L, *et al.* Education and awareness on antimicrobial resistance in the WHO African region: A systematic review. *Antibiotics (Basel)* 2023;12:1613.
41. Farley E, van den Bergh D, Coetzee R, Stewart A, Boyles T. Knowledge, attitudes and perceptions of antibiotic use and resistance among patients in South Africa: A cross-sectional study. *S Afr J Infect Dis* 2019;34:118.
42. Mokoena TT, Schellack N, Brink AJ. Driving antibiotic stewardship awareness through the minibus-taxi community across the Tshwane district, South Africa-a baseline evaluation. *JAC Antimicrob Resist* 2021;3:dlab106.
43. Manderson L. Prescribing, care and resistance: Antibiotic use in urban South Africa. *Humanit Soc Sci Commun* 2020;7:77.
44. Biezen R, Grando D, Mazza D, Brijnath B. Dissonant views – GPs' and parents' perspectives on antibiotic prescribing for young children with respiratory tract infections. *BMC Fam Pract* 2019;20:46.
45. Boiko O, Gulliford MC, Burgess C. Revisiting patient expectations and experiences of antibiotics in an era of antimicrobial resistance: Qualitative study. *Health Expect* 2020;23:1250-8.
46. Bakhit M, Del Mar C, Gibson E, Hoffmann T. Exploring patients' understanding of antibiotic resistance and how this may influence attitudes towards antibiotic use for acute respiratory infections: A qualitative study in Australian general practice. *BMJ Open* 2019;9:e026735.
47. Chigome A, Ramdas N, Skosana P, Cook A, Schellack N, Campbell S, *et al.* A Narrative review of antibiotic prescribing practices in primary care settings in South Africa and potential ways forward to reduce antimicrobial resistance. *Antibiotics* 2023;12:1540.
48. Lagarde M, Blaauw D. Levels and determinants of overprescribing of antibiotics in the public and private primary care sectors in South Africa. *BMJ Glob Health* 2023;8:e012374.
49. Gasson J, Blockman M, Willems B. Antibiotic prescribing practice and adherence to guidelines in primary care in the cape town metro district, South Africa. *S Afr Med J* 2018;108:304-10.
50. Guma SP, Godman B, Campbell SM, Mahomed O. Determinants of the empiric use of antibiotics by general practitioners in South Africa: Observational, analytic, cross-sectional study. *Antibiotics* 2022;11:1423.
51. Department of Health Republic of South Africa. South African Antimicrobial Resistance National Strategy Framework; A One Health Approach – 2017-2024; 2017. Available from: <https://www.knowledgehub.org.za/system/files/elibdownloads/2020-03/AMR%20National%20Action%20Plan%202018%20-%202024.pdf>. [Last accessed on 2023 Dec 01].
52. Sono TM, Maluleke MT, Jelić AG, Campbell S, Marković-Peković V, Schellack N, *et al.* Potential strategies to limit inappropriate purchasing of antibiotics without a prescription in a rural province in South Africa: pilot study and the implications. *Adv Hum Biol* 2024;14:60-7.
53. Anstey Watkins J, Wagner F, Xavier Gómez-Olivé F, Wertheim H, Sankoh O, Kinsman J. Rural South African community perceptions of antibiotic access and use: Qualitative evidence from a health and demographic surveillance system site. *Am J Trop Med Hyg* 2019;100:1378-90.
54. Mokwele RN, Schellack N, Bronkhorst E, Brink AJ, Schweickerdt L, Godman B. Using mystery shoppers to determine practices pertaining to antibiotic dispensing without a prescription among community pharmacies in South Africa-a pilot survey. *JAC Antimicrob Resist* 2022;4:dlab196.
55. Edessa D, Sisay M, Hagos B, Amare F. Antimicrobial use and management of childhood diarrhea at community drug retail outlets in Eastern Ethiopia: A matched questionnaire-based and simulated patient-case study. *Pediatric Health Med Ther* 2022;13:63-79.
56. Darshansinh S, Thorat VM, Akshayraj C, Singh L, Shah A, Singh H. Assessment of self-medication practice among medical students: A cross-sectional study. *Pak Heart J* 2023;56:409-15.
57. Nguyen CT, Nguyen HT, Boyer L, Auquier P, Fond G, Do KN, *et al.* Prevalence and impacts of self-medication in a disadvantaged setting: The importance of multi-dimensional health interventions. *Front Public Health* 2023;11:1176730.
58. Etando A, Amu AA, Haque M, Schellack N, Kurdi A, Alrasheedy AA, *et al.* Challenges and innovations brought about by the COVID-19 pandemic regarding medical and pharmacy education especially in Africa and implications for the future. *Healthcare* 2021;9:1722.
59. Hoxha I, Malaj A, Kraja B, Bino S, Oluka M, Marković-Peković V, *et al.* Are pharmacists' good knowledge and awareness on antibiotics taken for granted? The situation in Albania and future implications across countries. *J Glob Antimicrob Resist* 2018;13:240-5.
60. Babatola AO, Fadare JO, Olatunya OS, Obiako R, Enwere O, Kalungia A, *et al.* Addressing antimicrobial resistance in Nigerian hospitals: Exploring physicians prescribing behavior, knowledge, and perception of antimicrobial resistance and stewardship programs. *Expert Rev Anti Infect Ther* 2021;19:537-46.
61. Edessa D, Assefa N, Dessie Y, Asefa F, Dinsa G, Oljira L. Non-prescribed antibiotic use for children at community levels in low- and middle-income countries: A systematic review and meta-analysis. *J Pharm Policy Pract* 2022;15:57.

Supplementary Table 1: Pilot study version: Patient questionnaire (Part 1)

PATIENT QUESTIONNAIRE PART 1

Date: _____

Participant no: _____

Greet the patient and ask if they can participate in the survey. Give the information participation sheet or read it for them, if they agree let them sign the consent form

1. Age _____ years Prefer not to disclose age
2. Biological sex assigned at birth Male Female Prefer not to answer
3. Home language Xitsonga Tshivenda Sepedi English Other (Specify) _____
4. Educational level No education High school completed Diploma
Master's degree Primary school completed College certificate
Bachelor's Degree Doctorate Honours degree
5. Were you dispensed or sold any medication at the pharmacy today? Yes No
6. Did you hand in a prescription from a doctor? Yes No
7. Does the medication include any antibiotics? Yes No Don't know
8. If no, for what condition did you visit the pharmacy?
How many items were dispensed/sold to you? (Then end the interview and thank them)
9. If antibiotics were dispensed, ask to have a look at the antibiotics dispensed and note them 1. _____
2. _____
3. _____
10. What were the antibiotics indicated for?
URTI (Upper respiratory tract infection) SSTI (Skin and soft tissue infection)
STI (Sexually transmitted disease) UTI (Urinary tract infection)
Other (Please specify) _____
11. Who were the antibiotics for? Adult Child Both
12. If the medication is for a child under 12, are you the parent or guardian? Yes No
13. If the answer above is yes, how old is the child?
14. If the answer above is no, kindly state relationship
15. If any antibiotics were obtained without a prescription, what were the reasons?
Clinic too far Long waiting times
No money for doctor Used the same antibiotics before
Lack of knowledge Don't know
Pharmacist recommended Patient insisted on the Antibiotic them
Other (Please specify) _____
16. Was something else offered before the antibiotic? Yes No

Supplementary Table 2: Pilot study version: Patient questionnaire (Part 2)

PATIENT QUESTIONNAIRE PART 2

Date: _____

Participant no: _____

Greet the patient and ask if they can participate in the survey. Give the information participation sheet or read it for them, if they agree let them sign the consent form

- | | | | | | |
|----------------------|-------------------|----------------------------|----------------------|---------------------|-----------------|
| 1. Age | _____ years | Prefer not to disclose age | | | |
| 2. Gender | Male | Female | Prefer not to answer | | |
| 3. Home language | Xitsonga | Tshivenda | Sepedi | English | Other (Specify) |
| 4. Educational level | No education | High school completed | | Diploma | |
| | Master's degree | Primary school completed | | College certificate | |
| | Bachelor's Degree | Doctorate | | Honours degree | |

Please select the best option below

- | | | | |
|---|------|-------|------------|
| 5. Antibiotic resistance occurs when your body becomes resistant to antibiotics and they no longer work as well | True | False | Don't know |
| 6. When people take too many antibiotics the germs becomes resistant to them | True | False | Don't know |
| 7. Antibiotics can treat colds and coughs | True | False | Don't know |
| 8. Antibiotics are good for treating germs called bacteria | True | False | Don't know |
| 9. Taking antibiotics when not needed can lead to antibiotic resistance | True | False | Don't know |
| 10. Completing the course is important, even when I feel better | True | False | Don't know |
| 11. I can share my antibiotics with someone else who is also ill or who needs them | True | False | Don't know |
| 12. In South Africa, community pharmacists are legally allowed to dispense antibiotics without a prescription. | True | False | Don't know |
| 13. If patient answered 'True' to no 12 above, then ask under which condition? | | | |
| 14. Pharmacists should educate patients on proper antibiotic use | True | False | Don't know |
| 15. I must take antibiotics only when prescribed by a doctor or nurse | True | False | Don't know |
| 16. I can discard leftover antibiotics | True | False | Don't know |
| 17. Antibiotic resistance is something the community is concerned about | True | False | Don't know |
| 18. Healthcare personnel are the only ones responsible for addressing and preventing antibiotic resistance | True | False | Don't know |
| 19. Everyone needs to take responsibility for using antibiotics responsibly | True | False | Don't know |
| 19. Government and regulatory bodies are also responsible for addressing and preventing antibiotic resistance | True | False | Don't know |