

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

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Abstract

Introduction: There are concern with rising rates of antimicrobial resistance (AMR) across countries with the appreciable impact on morbidity, mortality and costs. Among low- and middle-income countries (LMICs), a key driver of AMR is 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 among patients especially in more rural areas of South Africa. A pilot study was undertaken to address this. **Methodology:** A two-step descriptive approach was undertaken. This involved two questionnaires among patients exiting chain and independent community pharmacies followed by cognitive interviews. **Results:** Overall, 21 patients were approached for an interview, 11 for the first questionnaire (Part 1) and 10 for the second (Part 2). 3 patients declined participation in Part 1 and 2 for Part 2, leaving 8 patients completing each questionnaire. On average, it took 2 minutes 13 seconds 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 among the 8 patients interviewed with Part 2. Overall, there was 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 of 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.

1. 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 (WHO) with its Global Action Plan (GAP) alongside National Action Plans (NAPs) to reduce AMR.^[5-8] A key focus 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% to 95% of total human antibiotic consumption in LMICs.^[9-12] Within ambulatory care in LMICs, including among 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 with 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 among 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 antibiotics without a prescription, lack of knowledge regarding antibiotics and AMR among patients as well as prior experience with antibiotics to successfully treat previous infections (Table 1).

Across countries, there are concerns regarding the knowledge and understanding of patients regarding antibiotics and whether they are effective against self-limiting conditions such as ARIs.^[14,21,28-31] This includes South Africa.^[32] Alongside this, concerns with a lack of understanding of terms such as AMR and the implications among patients and their families potentially exacerbating inappropriate prescribing and dispensing of antibiotics.^[33-35] Consequently, it is crucial that patients are a key element of 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.^[36,37] However, there can still be challenges with their knowledge and understanding, along with the implications of AMR.^[38]

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

Country	Author/ Year	Key patient factors
Multiple African countries	Belachew et al., 2021 ^[39]	<ul style="list-style-type: none"> • 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 among personnel in community outlets regarding antibiotics and their use
	Yeika et al., 2021 ^[34]	<ul style="list-style-type: none"> • 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 among patients to really consider key issues surrounding antibiotics and AMR
	Li et al., 2023 ^[40]	<ul style="list-style-type: none"> • Systematic review including 40 papers with 25% from sub-Saharan African countries

		<ul style="list-style-type: none"> • 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	Amin et al., 2019 ^[41]	<ul style="list-style-type: none"> • 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 et al., 2022 ^[42]	<ul style="list-style-type: none"> • 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 et al., 2016 ^[43]	<ul style="list-style-type: none"> • Common reasons for purchasing of antibiotics without a prescription included: <ul style="list-style-type: none"> ○ Limited education among patients ○ Patient pressure on pharmacists to dispense antibiotics without a prescription
Ghana	Afari-Asiedu et al., 2018 ^[44]	<ul style="list-style-type: none"> • 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 et al., 2019 ^[45]	<ul style="list-style-type: none"> • 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	Khakid et al., 2019 ^[46]	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 et al., 2022 ^[28]	Patients frequently request and use antibiotics inappropriately believing that they will be effective in treating coughs and colds in children
Mozambique	Torres et al., 2020 ^[19]	<ul style="list-style-type: none"> • Principal reasons for purchasing antibiotics without a prescription included: <ul style="list-style-type: none"> ○ Patients' demands and expectations 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 et al., 2022 ^[47]	<ul style="list-style-type: none"> • 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 et al., 2023 ^[21]	<ul style="list-style-type: none"> • 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

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.^[48-51] These are summarised in Chigome et al. (2023) and Sono et al. (2023), and centre around the National Antimicrobial Resistance Strategy Framework for 2017-2024.^[48,52,53] Despite specific legislation regard the dispensing of prescription only medicines (POMs) 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.^[22,53-55]

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.^[32] 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 among pharmacists and their assistants.^[53]

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 is 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.^[53] 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.^[14,53]

Our approach was to initially undertake a small-scale preliminary pilot study with a structured questionnaire among patients as they leave community pharmacies as proof of concept. This is seen as important since we were already aware that a questionnaire survey among community pharmacists and their assistants may under-estimate the extent of dispensing of antibiotics without a prescription in LMICs.^[56] 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 minimize implementation challenges brought about by these circumstances prior to 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.

2. Methods

2.1 Study approach and setting

A descriptive approach was employed for the pilot study, which built upon the successful pilot study we conducted recently amongst pharmacists and their assistants in the same province using a self-administered questionnaire.^[53] 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.^[53] 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.^[53] Additionally, community pharmacists and their assistants may underestimate the extent of dispensing antibiotics without a prescription in self-administered questionnaires due to fears of sanctions and beliefs of more appropriate prescribing and dispensing behaviour than observed in reality.^[56] Consequently, for the purpose of this pilot study, 6 community pharmacies in the same province (3 independent and 3 chain pharmacies), all within a 45 km radius from each other, were selected based on convenience and being part of 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 on a Microsoft Excel® spreadsheet and summarised descriptively, using frequencies and percentages.

2.2 Patient questionnaire

The patient questionnaire was developed drawing from existing literature.^[27,33,57,58] In view of concerns regarding the length of the questionnaire, which we observed in our experience with 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 among 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 antimicrobial resistance (AMR) given 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 S1 and S2). We have used this approach before when developing questionnaires where no standard questionnaire was available.^[51,59-61] The questionnaire was exclusively provided in English due to concerns related to the lack of standardized 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.

2.3 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 in order 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 pilot study. Those who indicated their willingness to participate, were given more information about the study and requested to provide written informed consent prior to 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.

2.4 Follow-up cognitive interviews

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

2.6 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 is stored securely in a password protected computer with access to TMS only. Data will be discarded after a period of 5 years, according to institutional policies.

3. Results

3.1 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 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.

Table 2 – Patient characteristics and medicines dispensed

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

The average time taken to administer Part 1 of the questionnaire was 1 minute and 47seconds, and for Part 2 this was 2 minutes and 39 seconds. On average it took 2 minutes 13 seconds to complete both parts of the questionnaire.

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 5 patients being dispensed an antibiotic were dispensed an antibiotic without a prescription. All 3 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.

Table 3 – Key information regarding the nature of antibiotics dispensed and rationale for this among 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 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	Diarrhoea in their child	Co-trimoxazole suspension	No money for a physician; long waiting times to see a HCP in a public clinic	Yes

NB: HCP = healthcare professional; STIs = sexually transmitted infections; *Antibiotics recommended for STIs in the South African Standard Treatment Guidelines

There was mixed knowledge regarding antibiotics and AMR among the 8 patients interviewed with Part 2 of the questionnaire (Table 4)

Table 4 – Responses to the knowledge statements among 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

Note: * Correct or ideal response to knowledge question / statement

3.2 Responses to the cognitive interviews

3.2.1 – 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 didn't 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 emphasized 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 in order 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 S1):

- 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 in order to capture a complete picture of medications dispensed without a prescription. This will enable a more comprehensive understanding of this practice in reality
- 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 not contribute significantly to the study findings especially if Question 12 is rephrased

3.2.2 – Part 2 of the questionnaire

Among the 8 participants, 3 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 paper. Pharmacists could always facilitate obtaining a prescription from a doctor without the patient seeing them 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, utilize 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.

3.3 Updated questionnaire

Table 5 (Part 1) and Table 6 (Part 2) contain the updated questionnaire for inclusion in the principal study following feedback from the patient participants (Part 1 and 2) and experience in administering the questionnaire using an interview.

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.

1. Age		_____ years		Prefer not to disclose age	
2. Biological sex assigned at birth		Male		Female	
3. Home language		Xitsonga	Tshivenda	Sepedi	English
		Other (Specify)			
4. Educational level	No education		Primary school completed	High school completed	ABET certificate
	Diploma		Bachelor's degree	Honours degree	Master's degree
5. Were you dispensed or sold any medication at the pharmacy today?					No
6. Did you have a prescription from a doctor?					No
7. Does the medication include any antibiotics?					Yes
8. For what condition did you visit the pharmacy?					No
How many items were dispensed/sold to you?		Yes	No	<i>Note: If no antibiotics were dispensed, end the interview and thank the patient for their time</i>	
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	
12. If the medication is for a child under 12, are you the parent or guardian?		Parent		Guardian	
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?					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)				

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	Sepedi	English	Other (Specify)
4. Educational level	No education	Primary school completed	High school completed	ABET certificate	
	Diploma	Bachelor's degree	Honours degree	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	Don't know
6. When people take too many antibiotics the germs become 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 Question 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 should be 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

Thank the patient for their time and participation

4. Discussion and next steps

Overall, there was appreciable utilisation of antibiotics among the surveyed patients (62.5% 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. (2019) and Do et al. (2021),^[22,54] but similar to the findings of Mokwele et al. (2022) among independent pharmacies.^[55] However, the findings of this pilot study resonated with the conclusions of Mokwele et al. (2022) in that no antibiotics were dispensed without a prescription in franchised (chain) pharmacies.^[55] Having said this, the number of patients in this pilot study were 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 an 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.^[53] This is similar to the findings when using simulated patients versus questionnaires with pharmacists, justifying our approach.^[56,62] Nevertheless, the sample sizes in both pilot studies are too small to draw definitive conclusions, with further investigation 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). There were more concerns with the second part of the questionnaire in terms of understanding among 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 in order 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 just over 4 minutes to administer both questionnaires, these can potentially be combined for the full study without compromising the findings. This approach would potentially increase the number of participants in this rural setting (Table 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.^[53] 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.

5. Conclusion

Similar to the pilot study among pharmacists and their assistants in rural South Africa, this pilot study raised considerable concerns regarding the extent of purchasing of 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 among 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.

Conflicts of interest

The authors have no conflicts of interest to declare.

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There was no external funding for this pilot study.

Supplementary Material

Table S1 – 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 them		Patient insisted on the Antibiotic		
	Other (Please specify)				

16. Was something else offered before the antibiotic?	Yes	No
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Table S2 – 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

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