




BMJ Open Determinants of dispensing antibiotics without prescription in Eritrea: a mixed-method qualitative study on pharmacy professionals' perspective

Merhawi Bahta ¹, Dawit G Weldemariam ², Sirak Tesfamariam ³,
Eyasu H Tesfamariam,⁴ Mulugeta Russom ¹

To cite: Bahta M, Weldemariam DG, Tesfamariam S, *et al*. Determinants of dispensing antibiotics without prescription in Eritrea: a mixed-method qualitative study on pharmacy professionals' perspective. *BMJ Open* 2021;**11**:e049000. doi:10.1136/bmjopen-2021-049000

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online. (<http://dx.doi.org/10.1136/bmjopen-2021-049000>).

Received 14 January 2021
Accepted 31 July 2021



© Author(s) (or their employer(s)) 2021. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

¹National Medicines and Food Administration, Ministry of Health, Asmara, Eritrea

²Pharmacy, Hazhaz Zonal Referral Hospital, Asmara, Eritrea

³Pharmacy, Nakfa Hospital, Nakfa, Eritrea

⁴Department of Statistics, Eritrean Institute Technology, Asmara, Eritrea

Correspondence to

Sirak Tesfamariam;
sirakino2015@gmail.com

ABSTRACT

Objective Antimicrobial resistance is a global public health challenge. Dispensing of antibiotics without prescription (DAWP), a major contributor to antibiotic resistance, is extensive in Eritrea. This study was, therefore, aimed at deeply understanding, qualitatively, the pharmacy professionals' perspective on the factors that trigger DAWP and how this practice could be mitigated.

Design A qualitative exploratory study design was employed.

Setting Drug retail outlets of Asmara, capital of Eritrea, and pharmaceutical services of Eritrea.

Participants Thirty pharmacy professionals who were owners and employees of the drug retail outlets stationed in Asmara and six key informants from the pharmaceutical services of all administrative regions of Eritrea, selected purposively, were the study participants.

Data collection and analysis The data were collected using focus group discussions and key informant interviews between March and September 2020. The collected data were transcribed verbatim, translated to English and finally thematically analysed using an inductive approach.

Results The main triggering factors were related to the drug retail outlet owners, dispensers, healthcare system and patients. Knowledge and attitude-based motivation, economic interest, inadequate services in health facilities, weak regulatory enforcement, inadequate training, trust and satisfaction of patients, previous successful experience, seriousness of a condition and saving time and money were reported among others as determinants of DAWP.

Conclusions The triggering factors to DAWP were found to be very complex and some of them were important that might require immediate attention from policymakers. Ensuring readily available and accessible healthcare services, empowering medicines regulation and continuing sensitisation of dispensers are highly recommended to minimise DAWP.

INTRODUCTION

Antimicrobial resistance (AMR) is a great challenge to global public health which has enormous clinical and economic burden.^{1–5} It is predicted to be the third leading cause

Strengths and limitations of this study

- This study provides deep understanding of pharmacy professionals' perspectives regarding the triggering factors of dispensing antibiotics without prescription.
- Data saturation was achieved ensuring the richness of the results.
- Conducting both focus group discussions and key informant of different study groups has enabled us to explore the factors from different corners freely.
- Some of the health system and patient-related factors, reported in the study, were the perspectives of the pharmacy professionals, not of the patients, which can affect the trustworthiness of the reasons.

of death by 2050.⁶ Even though the development of AMR is an inevitable natural phenomenon,¹⁷ it is further accelerated mainly due to the overuse and misuse of antimicrobials in humans, animals and agriculture.^{4 6 8–11}

Dispensing of antibiotics without prescription (DAWP), a major contributor to the overuse and misuse of antibiotics,^{9 12} is an irrational practice with the greatest impact on global AMR.⁶ It has been reported that antimicrobial-resistant bacteria are common in communities with frequent non-prescription use.^{12 13} Although this irrational practice is common all around the world,^{11 12 14} it is more prevalent in developing countries.^{15–17}

As community pharmacies and drug stores are the main sources of antimicrobials,^{12 18} healthcare professionals, especially dispensers, play a major role in DAWP impacted by myriad factors. Accessibility of community pharmacies,^{19 20} customer pressure,^{13 15 21} time and financial cost,^{19 20} weak regulatory enforcement mechanisms^{12 15 19} and patients' trust in pharmacists^{19 20 22} are the commonly quoted determinants of DAWP.

The situation in Eritrea is no exception. There is overuse and misuse of antibiotics, including prescribing antibiotics for viral infections,²³ and DAWP is extensive (87.6%).²⁴ With the increasing rate of AMR globally and very few new antibiotics being developed, optimising the use of the existing antibiotics in humans is essential.^{8 9} Thus, understanding the factors that trigger dispensers for such practices, and coming up with effective interventions is a calling act to limit further damage. The aim of this study, therefore, was to deeply understand, qualitatively, the pharmacy professionals' perspective on the factors that trigger them for DAWP and how this practice could be mitigated.

METHODS

Study design and setting

A mixed-method qualitative exploratory study design was employed and the data were collected between March and September 2020. The data collection, using focus group discussions (FGDs) and key informant (KI) interviews, was conducted in a conducive environment and in the absence of non-participants for the successful completion of the process.

Initially, FGDs were conducted on the key players, dispensers of drug retail outlets (DROs), to identify the triggering factors for DAWP. To further ascertain the credibility of the data and understand the factors in a different perspective, KI interviews were also carried out sequentially.

Source and study population

In Eritrea, as per the licensing office of the National Medicines and Food Administration, there were 88 DROs, including pharmacies and drug shops, which were run by 47 pharmacists and 44 pharmacy technicians. Out of which, 48 DROs were located in Asmara. The FGD participants were pharmacy professionals who were owners and employees of the DROs stationed in Asmara. Both owners and employees were included in the study to gather data from different perspectives. Owing to their role in regulating the use of medicines, KIs from the pharmaceutical services of all administrative regions of Eritrea were also deeply interviewed as KIs.

Patient and public involvement

No patient involved.

Sampling design and sample size

A purposive sampling technique was used to locate the study participants. The principle of data saturation was used to determine the sample size of the study and interviews took place until no new themes or subthemes emerged. The saturation point was met after completing three FGDs and five KI interviews. An extra KI was interviewed to ensure further data saturation. The three FGDs consisted of 10 participants each yielding a total of 30 participants.

Research questions

Question 1: What are the triggering factors that would affect the pharmacy professionals to dispense antibiotics without prescription in Eritrea?

Question 2: What can be done to avoid or minimise DAWP in Eritrea?

Data collection tool and approach

A semi-structured interviewer/moderator guide consisting of two main questions and several prompts was used to guide the FGDs and KI interviews. The guide was self-developed based on the research questions and during its development, the authors brainstormed the major potential problems that would drive DAWP in the country's context and organised these points to structure the guide. The employees of the DROs, possibly due to conflict of interests, might hesitate to disclose information related to the topic of the study in front of their owners. Thus, in order to ensure the free flow of ideas, the DRO owners and employees were separated into different groups. Except for this case, no other restrictions like sex, age, working experience, were exercised during the creation of the FGDs.

The three authors, DGW, MB and ST, who have huge experience in collecting qualitative data, run the interview process and moderated the FGDs. The data collectors were oriented in advance of the data collection process to assure the consistency of the collected data. All the interviews were audiotaped and additional field notes were taken to maintain the contextual details and non-verbal expressions which are essential for the data interpretation and analysis. The FGDs and KI interviews were conducted in Tigrigna—a commonly used local language in the country—transcribed verbatim and translated to English by a bilingual pharmacist. Finally, to reassure the accuracy of the translation, it was checked by another bilingual pharmacist. Efforts were made to avoid/minimise all forms of potential biases that could be introduced during the data collection, transcription, translation and analysis processes.

Each session of the FGDs and KI interview ended when the data collectors decided the data saturation had been reached. Data saturation was reached when new information no longer arose and the interview provided the maximum information on the study subject. The average duration of the FGDs was 56 min, ranging from 43 to 65 min. The average time taken for the KI interviews was 34 min. At last, the findings of the study were communicated to the study participants to authenticate the translation and interpretation of their opinions.

Data analysis

Thematic analysis using an inductive approach was done to generate the themes. The inductive approach was followed allowing the subthemes to emerge from the frequent and significant ideas excerpted from the collected data. During the analysis, first, the data were sifted, eliminating irrelevant information, and then coded by all the authors. On a thorough discussion, any disagreement among the codes was

Table 1 Demographic characteristics of the participants

Variables	Frequency	Per cent
Sex		
Male	27	75
Female	9	25
Title/profession		
Pharmacist	25	69.4
Pharmacy technician	11	30.6
Age (in years)	(Mean=45.9, SD=11.6, range=24–69)	
Work experience (in years)	(Median=11.5, IQR=10, range=2–47)	

resolved by consensus. Next, the codes were sorted systematically to facilitate transparent and rigorous data management, and labelled to create subthemes. The similar subthemes aggregated together were then used to create the main themes. As the data collected was easy to manage as well as to be reviewed thoroughly, no qualitative data analysis software was used.

The consolidated criteria for reporting qualitative research checklist (online supplemental file 1) was used to ensure all essential criteria are completed and finally used to prepare the manuscript.²⁵

RESULTS

Thirty participants from DROs equally distributed in three focus groups participated in the study. Besides, six KIs, KIs from the zonal pharmaceutical services, were

interviewed deeply to extract a different perspective. In both approaches, none of the study participants refused to participate. The demographic characteristics of the study participants are shown in [table 1](#).

On the FGDs and KI interviews, three main themes and 12 subthemes emerged regarding the factors that trigger dispensers to provide antibiotics without prescription. The main themes and subthemes are summarised in a thematic analysis framework ([figure 1](#)).

DRO owners and dispensers related factors

Knowledge and attitude-based motivation, economic interest, empathising with patients and dispensing to recognised personnel were the labelled factors related to DRO owners and dispensers that are further detailed below.

Knowledge and attitude-based motivation

Knowledge and attitude of dispensers towards AMR were some of the reported driving factors for DAWP. Some of the respondents disclosed that pharmacists are more knowledgeable than many of the low-level health cadres who are authorised to prescribe medicines in the country. They asserted that they are well-trained to treat bacterial infections with antibiotics. One of the FGD participants stated:

We have taken pathology and therapeutics courses and we are even more knowledgeable than those some prescribers practicing in lower-level health facilities. What is the problem of giving antibiotics to patients? I do not know the reason why we are not allowed to dispense antibiotics because in rural areas

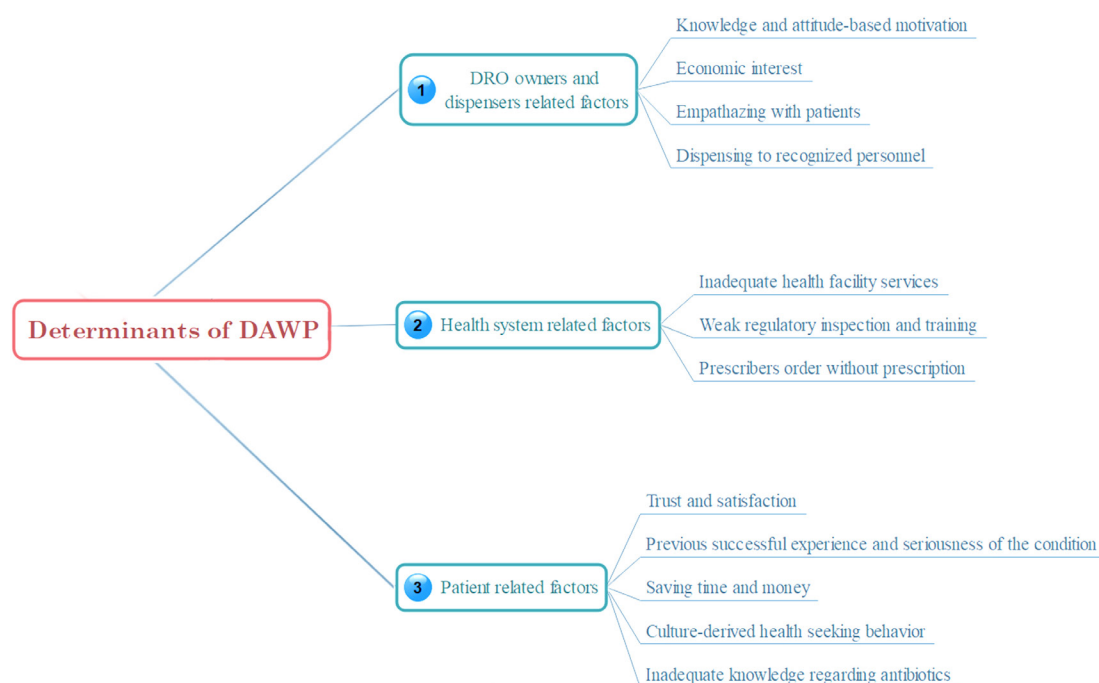


Figure 1 Thematic analysis framework exploring the triggering factors for DAWP. DAWP, dispensing of antibiotics without prescription; DRO, drug retail outlet.

low health cadres are giving antibiotics without proper prescription. (FG 2.2)

Some respondents from the FGDs said that some diagnoses—like visible tonsillitis and dental abscess—requiring antibiotics can be easily detected, and giving antibiotics in such cases is necessary. Their confidence in such diagnoses was reported as a triggering factor to DAWP.

I give antibiotics with great satisfaction for patients who come to me with dental swelling. I do not believe that it is bad to give antibiotics for illnesses you believe antibiotic is really required. But it does not mean that you give antibiotics for whoever asks. (FG 3.1)

On the other side, some of the KIs had the perception that some dispensers are not abreast of new clinical knowledge, and are not equipped with adequate knowledge regarding their contribution to fighting AMR. One KI also mentioned that even though dispensers have enough knowledge on AMR, the knowledge is not accompanied by rational practice. Some of the respondents also disclosed that some dispensers are negligent in preserving antibiotics and one FGD participant supported this as:

If you try to teach the patient about antibiotic resistance and you told them they do not need antibiotics, they leave your pharmacy and get the medicine next door. The pharmacies are not following the same principles. (FG 2.1)

Economic interest

All the KIs stressed that the DRO owners and employees are selling antibiotics without prescription for economic reasons. As per their report, such practices are mainly due to owners' pressure to maximise revenues. If the employees failed to do so, one respondent said that they are likely to be fired. The owners' pressure was explained by one KI as follows:

Economic interest is a critical issue. The pharmacy professionals are constantly under pressure from the owners to sell antibiotics. Since their salary depends on the sales, they have to work for the profit of the business. They mostly work according to the owners' desires. (KI 4)

Empathising with patients

During the FGDs, the participants reported that they know the consequences of AMR and they dispense antibiotics without prescription to help the patients considering the inadequacy and inaccessibility of health facilities, especially during weekends. They also said that they do not provide antibiotics by comparing themselves with authorised lower health prescribers or for economic interests.

A pharmacist knows everything regarding resistance and rational use of antibiotics. He/she gives

antibiotics to help patients rather than for economic interests. (FG 3.2)

Dispensing to recognised personnel

One KI mentioned that dispensers provide antibiotics to family members, friends or relatives without prescription. He explained that some dispensers provide antibiotics to healthcare professionals and their colleagues believing that they possess the knowledge to use antibiotics rationally. On the opposite side, other dispensers could hesitate to dispense antibiotics as their colleagues could criticise them or might report their practice to regulatory authorities.

Health system related factors

Inadequate services in health facilities, weak regulatory enforcement, inadequate training and prescribers ordering patients to take antibiotics without prescription were reported as some of the determinants of DAWP.

Inadequate health facility services

Most of the respondents disclosed that the health facilities could not absorb enough patients, and even the quality of service they provide is not that satisfactory. They said that patients encounter multiple problems during a hospital visit. There is a lack of affability of the personnel, time wastage on numerous queues, patients inability to communicate openly about their conditions and lack of proper advice offered in the hospital pharmacies due to overcrowding of patients. They further reported that patients are not satisfied with their time in the health facilities, and are not motivated to return back again. All the KIs also reported that scarcity of medications in hospitals might discourage patients to visit health facilities and shift the flow to private DROs. Additionally, antibiotics are prescribed without any proper laboratory investigations, and sometimes, even being prescribed by lower-level health cadres were mentioned as triggering factors. One FGD participant explained this as:

We all know the service that is provided in health facilities. The patients need to wait long queues just to get services for simple diseases. The service provided in pharmacies is by far better than in health facilities. They [the prescribers in health facilities] prescribe antibiotics simply by taking history or observing the symptoms without any antimicrobial sensitivity test. Taking this into account, I see no reason why the service in pharmacy is not better than that existing in some health facilities. (FG 2.1)

Weak regulatory inspection and training

All the KIs except one claimed that the weak regulation and training targeted to the DROs is one reason for the high DAWP. Moreover, they reported that the dispensers are very tactful to escape from penalties, and leakage of information through many channels is commonly

hindering the successful execution of the inspection process. One KI explained it as:

Inspection on DROs is periodical, and is conducted strenuously if there are serious reports only. Owing to the predictable inspection schedule, the drug retail owners know every tactic in order to curb through the regulations. Second, the inspection unit does not go to the DROs as often, hence the drug retail owners only think of their own benefit that the system becomes business-oriented. (KI 1)

The KIs also mentioned that the professionals in DROs, usually, are marginalised from the capacity building activities offered by the Ministry of Health (MoH) which might be one reason for the dispensers to sink in irrational practices. One KI said:

I am often confused whether the private DROs are under the umbrella of the Ministry of Health. Continuous in-service training is mostly given to the governmental health facilities, and the private services are not given much attention. They should be allowed to participate in every workshop/seminar and get the chance to communicate with other professionals and stakeholders. Simply, they should not be discriminated. (KI 2)

Prescribers order without prescription

Two respondents claimed even the prescribers themselves order patients to buy antibiotics without giving an official prescription and this recommendation is especially seen in dental prescribers. One KI reported that some prescribers also provide services to patients outside health facilities and advise their clients to buy antibiotics without prescription. His claim is quoted below:

Sometimes the patients come to pharmacies and ask for a certain antibiotic after a physician advises them what medication to take without writing a prescription. There is also a case in which patients get services from physicians in settings outside the hospital like in cafes or at their homes. So the patients are forced to buy the antibiotics from the pharmacies without prescriptions after the unofficial advice they have received. (KI 1)

Patient-related factors (patient pressure)

Trust and satisfaction

The patients' trust and satisfaction were reported as a possible factor that influences seeking antibiotics without prescription. Most of the FGD participants claimed that DROs provide free counselling to the patients, whereas the personal communication of some prescribers with patients is poor and short at the same time. This advantage over health facilities might be luring the patients to flow to the DROs. One KI also reported that:

The patient might not be motivated to return to the hospital due to the inadequate services provided.

Additionally, the personal communications of some physicians with patients is poor. But, there is a sort of air of freedom in pharmacies, patients feel more comfortable sharing their symptoms there. The patients feel more connected to pharmacists. (KI 5)

Some of the KIs had the perception that physicians are more cautious of AMR and thus they usually do not prescribe them when they are not required. On the other hand, patients might not be satisfied if they do not get antibiotics and thus, they prefer to visit DROs where they can easily access it. The accessibility of DROs and the difficulty of obtaining services in health facilities during weekends were also mentioned by the participants as triggering factors to buy antibiotics without prescriptions.

Previous successful experience and seriousness of the condition

The majority of the respondents said that patients usually tend to buy previously prescribed medication if the outcome was positive. On successive exposure to similar ailment, however, as they came to know the antibiotics' name, they see no importance to lose time in hospitals to get the same prescription. This was reported as one reason behind the increased demand for antibiotics in DROs. Moreover, as per the respondents, the perceived seriousness of a condition could force the patients to seek service in DROs.

Some patients come with serious conditions. If you tell them to go to a hospital, they answer, 'How can I go with this illness?' and ask for our help. They exert pressure on us. (FG 3.6)

Saving time and money

The respondents disclosed that many patients flow to DROs to save time and money as the health facilities are overcrowded and they do not have the capability to entertain patients adequately. As per their report, seeking antibiotics in DROs is perceived as cost-effective practice by consumers, and thus they put pressure on dispensers.

Culture-derived health-seeking behaviour

Two of the six KIs claimed that culture of a community influences the antibiotics-seeking behaviour. The behaviour is deeply rooted that results the patients to believe antibiotics are a cure for all. As a result, the patients exert too much pressure on the dispensers to the extent that can desensitise the dispensers' responsibility to protect antibiotics.

The people in this area are mostly from Sudan, in which antibiotics are sold everywhere without any restrictions. Antibiotics are even sold on streets. But they don't know that they are drugs that are only to be prescribed in Eritrea. They think that they can get easy access to antibiotics, like oxytetracycline for their animals. So the patients persistently demand the pharmacists to dispense the antibiotics considering such drugs can be sold without prescription. (KI 4)

Inadequate knowledge regarding antibiotics

Some of the KIs mentioned that patients themselves lack knowledge regarding the rational use of antibiotics. Some patients perceive even minor ailments require antibiotics, and are not able to differentiate between over-the-counter and prescription-only drugs. All these misconceptions impact the patients pressure to get antibiotics.

Possible solutions to avoid or minimise DAWP in Eritrea

The FGD participants and KIs suggested the following interventions to be made to tackle DAWP.

1. Organizing awareness-raising activities to dispensers, prescribers and the general public (including the non-professional owners of DROs) on the rational use of antibiotics and AMR.

2. Improving the accessibility and quality of services of health facilities especially in diagnostics and availability of medications to make it encouraging for patients' visits.

The healthcare system should be improved in the first place. All the queue, time management, all in all, the services should be improved. If service in health facilities is not improved, it is difficult for the pharmacists to recommend patients to visit health facilities. If not, we need to help the society by providing quality service by ourselves. (FG 1.2)

3. Strengthening regulatory capacities and delegating regulatory responsibilities to zonal pharmaceutical services for the successful execution of regulatory tasks.

4. Improving the competency of the prescribers (especially at lower levels) and redefining authorised prescribers.

The prescribers should improve their competency. When a patient came to a pharmacy with a complaint of viral infection, and you tell him there is no benefit of giving an antibiotic. He will go to a clinic and come back with a prescription for an antibiotic, then the patient underestimates you. So the prescribers should be defined and competent. (FG 2.9)

5. Promoting the implementation of medicines schedule guideline for it is an important tool in creating a clear line between over-the-counter and prescription-only drugs.

The implementation of the medicines scheduling guideline will decrease confusions about which drugs are OTC and prescription only. All the professionals including us [dispensers] and the society will know that antibiotics are prescription-only. Because there are many doctors who tell their patients to get antibiotics especially amoxicillin without a written prescription. (FG 3.3)

DISCUSSION

The thematic analysis came up with a framework that grouped the triggering factors for DAWP into three

broad categories. They were factors related to DRO owners, dispensers, patients and the healthcare system. The perceived confidence of the pharmacy professionals on their knowledge to treat some bacterial infections, like tonsillitis and tooth swelling, with antibiotics was the main driving factor for DAWP as previously reported in a systematic review by Servia-Dopazo and Figueiras.¹³ Such practices are irrational, for antibiotics alone could not be sufficient and definitive dental management, whether surgical or endodontic procedures are required as soon as possible to prevent serious complications.²⁶ Whereas in tonsillitis, treating patients with antibiotics in DROs could delay their visit to health facilities at the right time, and possibly lead to further complications if tonsillectomy was the appropriate intervention.

All the KIs disclosed that dispensers sell antibiotics without prescription for economic benefits mainly due to DRO owners' pressure which was also reported in other similar studies.^{13 16 22 27} This was, however, argued by other FGD participants that they provide antibiotics without prescription for the enormous pressure they encounter from consumers and thus, they do it for the benefit of patients as the healthcare system sometimes is not readily accessible. It is quite normal for consumers to provide several reasons to request antibiotics without prescription like reports to save time and money that would be spent in health facilities. Such demand might even be higher when consumers have a good level of trust and satisfaction in dispensers.^{13 16 20 28} It should, however, be noted that regardless of the magnitude of patient pressure and other external factors, DAWP is irrational as it violates rules/regulations, and might provide false reassurance that could lead patients to complications and endangers antimicrobial stewardship. Thus, patient pressure should not be an excuse for DAWP and dispensers should value their professional role in combating AMR. Taking the risks of misdiagnosis, further complications, misuse of antibiotics and AMR into account, dispensers, at all times, should convince consumers of the importance of visiting health facilities for further diagnosis and management.

As reported by the KIs and FGD participants, inadequate quality and availability of services in the health facilities, on the other hand, were among the main triggering factors for DAWP. The government of the State of Eritrea is guided by the 'health for all' policy and to ensure this, the MoH provides health services, through its public health facilities, at a highly subsidised cost.^{29 30} Despite all the efforts, health facilities are still struggling to secure robust diagnostics and ensure efficient as well as accessible health services to the general public,^{23 31} and this might be a reason for consumers to seek antibiotics from DROs. Moreover, to complement the universal health coverage, in Eritrea, lower level health cadres are authorised to prescribe medicines including antibiotics empirically. This might trigger pharmacists to sell antibiotics without prescription as they do not see any difference in referring a patient to a lower health facility having no or inadequate diagnostic capacity.

Similar to findings reported in neighbouring countries,^{15 16} weak regulatory enforcement was also reported by the KIs as one health system related cause for the increased DAWP. This has been acknowledged by the MoH and to overcome this, medicines are scheduled in June 2019 as ‘prescription-only’, ‘pharmacy medicine’ and ‘over-the-counter’ and its implementation has been enforced starting from January 2020. Accordingly, all antibiotics are categorised as prescription-only medicines. The MoH in collaboration with relevant stakeholders has also developed a national action plan (2021–2025) for combating AMR.²³ Besides, it was frequently reported that pharmacy professionals working in DROs have been marginalised from sensitisation/orientation workshops, meetings and/or conferences organised by the MoH which could result in losing professionalism and nurturing business-oriented practice.

The magnitude of the problem²⁴ and the complexity of the factors that trigger DAWP would have serious policy and public health implications. First, the respondents reported that the inadequacy of readily available healthcare services, long queues, weak diagnostic capacity—among others—are triggering consumers to seek antibiotics without prescription which highlights the need for improvements in the quality of services. Second, almost all the KIs reported that with the available transportation and human resource challenges, it was difficult to strictly inspect the DROs. As such, the establishment of regulatory affairs office at zonal levels would foster the enforcement of the regulatory inspection at all levels.

Continuously sensitising dispensers, prescribers and consumers on the appropriate use of antibiotics, improving quality and accessibility of the healthcare services, encouraging private sectors, developing therapeutic guidelines for infectious diseases, taking serious regulatory measures in case of violation of rules/regulations, introducing point-of-care diagnostics for tonsillitis and others related illnesses in health facilities and DROs, enforcing the implementation of the medicines schedule are recommended to minimise or prevent DAWP.^{11 32–36} Sensitising non-professional owners of DROs on code of ethics, responsibilities, professional independence and AMR has also paramount importance in fighting the existing problem.

Strengths and limitations

This study, to our knowledge, is the first to explore the determinants of DAWP qualitatively in Eritrea. Involvement of owners and employees in separate groups of the FGDs and conducting KI interviews from the zonal pharmaceutical services has enabled us to explore the factors from different corners freely. However, this study was not without limitation. Some of the health system and patient-related factors, reported in the study, were the perspectives of the pharmacy professionals which needs to be ascertained with further studies.

CONCLUSION

The factors that trigger dispensers to DAWP were found to be very complex. Several claims related to DRO owners, dispensers, health system and patients’ pressure were identified to influence DAWP and some of them are of high importance that might require immediate attention from policymakers. Ensuring readily available and accessible healthcare services, empowering medicines regulation and continuing sensitisation of dispensers of DROs are highly recommended to minimise DAWP.

Twitter Mulugeta Russom @Mulugeta.Russom

Acknowledgements The authors want to thank all the participants of the study.

Contributors All the authors (DGW, EHT, MB, MR and ST) conceived the idea, contributed to the design of the study protocols, and thematically analyzed the collected data. DGW, MB, and ST moderated the FGDs and KI interviews. The manuscript was drafted by MB and ST, and finally critically reviewed for its intellectual content by the rest of the authors.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not required.

Ethics approval Ethical approval was granted from the Ministry of Health (MoH) of Eritrea. All participants were briefed about the aims of the study and audiotaped verbal consent was taken for the participation and audiotaping of the interviews. The name and other identifiers of the participants were kept anonymous and used for the purpose of the study only.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data sharing not applicable as no data sets generated and/or analysed for this study.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iDs

Merhawi Bahta <http://orcid.org/0000-0002-1690-7876>

Dawit G Weldemariam <http://orcid.org/0000-0001-7179-4993>

Sirak Tesfamariam <http://orcid.org/0000-0003-4348-5952>

Mulugeta Russom <http://orcid.org/0000-0003-1939-5842>

REFERENCES

- 1 World Health Organization. *Worldwide country situation analysis: response to antimicrobial resistance: summary*. World Health Organization, 2015.
- 2 Zhen X, Lundborg CS, Sun X, *et al*. Economic burden of antibiotic resistance in ESKAPE organisms: a systematic review. *Antimicrob Resist Infect Control* 2019;8:1–23.
- 3 Organisation for Economic Co-operation Development Staff. *Stemming the superbug tide: just a few dollars more*. OECD, 2019.
- 4 Dadgostar P. Antimicrobial resistance: implications and costs. *Infect Drug Resist* 2019;12:3903–10.

- 5 Founou RC, Founou LL, Essack SY. Clinical and economic impact of antibiotic resistance in developing countries: a systematic review and meta-analysis. *PLoS One* 2017;12:e0189621.
- 6 Resistance RoA. *Antimicrobial resistance: tackling a crisis for the health and wealth of nations. 2014: review on antimicrobial resistance*, 2014.
- 7 Holmes AH, Moore LSP, Sundsfjord A, et al. Understanding the mechanisms and drivers of antimicrobial resistance. *Lancet* 2016;387:176–87.
- 8 World Health Organization,. *Antimicrobial stewardship programmes in health-care facilities in low-and middle-income countries: a who practical toolkit*, 2019.
- 9 World Health Organization,. *Global action plan on antimicrobial resistance*. World Health Organization, 2015.
- 10 Bell BG, Schellevis F, Stobberingh E, et al. A systematic review and meta-analysis of the effects of antibiotic consumption on antibiotic resistance. *BMC Infect Dis* 2014;14:1–25.
- 11 Llor C, Bjerrum L. Antimicrobial resistance: risk associated with antibiotic overuse and initiatives to reduce the problem. *Ther Adv Drug Saf* 2014;5:229–41.
- 12 Morgan DJ, Okeke IN, Laxminarayan R, et al. Non-Prescription antimicrobial use worldwide: a systematic review. *Lancet Infect Dis* 2011;11:692–701.
- 13 Servia-Dopazo M, Figueiras A. Determinants of antibiotic dispensing without prescription: a systematic review. *J Antimicrob Chemother* 2018;73:3244–53.
- 14 Auta A, Hadi MA, Oga E, et al. Global access to antibiotics without prescription in community pharmacies: a systematic review and meta-analysis. *J Infect* 2019;78:8–18.
- 15 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;5:1–7.
- 16 Salim AMA, Elgizoli B. Exploring the reasons why pharmacists dispense antibiotics without prescriptions in Khartoum state, Sudan. *Int J Pharm Pract* 2017;25:59–65.
- 17 Batista AD, A Rodrigues D, Figueiras A, et al. Antibiotic dispensation without a prescription worldwide: a systematic review. *Antibiotics* 2020;9:786.
- 18 World Health Organization. *Multi-country public awareness survey*. Geneva, Switzerland: World Health Organization, 2015: 59.
- 19 Alhomoud F, Almahasnah R, Alhomoud FK. "You could lose when you misuse" – factors affecting over-the-counter sale of antibiotics in community pharmacies in Saudi Arabia: a qualitative study. *BMC Health Serv Res* 2018;18:1–9.
- 20 Chowdhury M, Stewart Williams J, Wertheim H, et al. Rural community perceptions of antibiotic access and understanding of antimicrobial resistance: qualitative evidence from the health and demographic surveillance system site in Matlab, Bangladesh. *Glob Health Action* 2019;12:1824383.
- 21 Vazquez-Lago J, Gonzalez-Gonzalez C, Zapata-Cachafeiro M, et al. Knowledge, attitudes, perceptions and habits towards antibiotics dispensed without medical prescription: a qualitative study of Spanish pharmacists. *BMJ Open* 2017;7:e015674.
- 22 Bahnassi A. A qualitative analysis of pharmacists' attitudes and practices regarding the sale of antibiotics without prescription in Syria. *J Taibah Univ Med Sci* 2015;10:227–33.
- 23 Ministry of Health, The State of Eritrea. *National action plan on antimicrobial resistance in Eritrea*, 2021: 53.
- 24 Bahta M, Tesfamariam S, Weldemariam DG, 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.
- 25 Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care* 2007;19:349–57.
- 26 Beech N, Goh R, Lynham A. Management of dental infections by medical practitioners. *Aust Fam Physician* 2014;43:289–91.
- 27 Radyowijati A, Haak H. Improving antibiotic use in low-income countries: an overview of evidence on determinants. *Soc Sci Med* 2003;57:733–44.
- 28 Banerjee I, Bhadury T. Self-Medication practice among undergraduate medical students in a tertiary care medical College, West Bengal. *J Postgrad Med* 2012;58:127.
- 29 Ministry of Health, The State of Eritrea. *National health policy*. Asmara, 2010: 32.
- 30 Dawit Tet al. Economic burden of adverse drug reactions among hospitalized patients in Eritrea: a Five-month prospective analysis of 5848 patients. *J Pharmacovigil* 2019;7:274.
- 31 Kirigia JM, Zere E, Akazili J. National health financing policy in Eritrea: a survey of preliminary considerations. *BMC Int Health Hum Rights* 2012;12:16.
- 32 Jacobs TG, Robertson J, van den Ham HA, et al. Assessing the impact of law enforcement to reduce over-the-counter (OTC) sales of antibiotics in low- and middle-income countries; a systematic literature review. *BMC Health Serv Res* 2019;19:1–15.
- 33 Alrasheedy AA, Alsalloum MA, Almuqbil FA, et al. The impact of law enforcement on dispensing antibiotics without prescription: a multi-methods study from Saudi Arabia. *Expert Rev Anti Infect Ther* 2020;18:87–97.
- 34 Godman B, Haque M, McKimm J, et al. Ongoing strategies to improve the management of upper respiratory tract infections and reduce inappropriate antibiotic use particularly among lower and middle-income countries: findings and implications for the future. *Curr Med Res Opin* 2020;36:301–27.
- 35 Saleem Z, Hassali MA, Hashmi FK, et al. Antimicrobial dispensing practices and determinants of antimicrobial resistance: a qualitative study among community pharmacists in Pakistan. *Fam Med Community Health* 2019;7:e000138.
- 36 Marković-Peković V, Grubiša N, Burger J, et al. Initiatives to reduce nonprescription sales and dispensing of antibiotics: findings and implications. *J Res Pharm Pract* 2017;6:120.