


RESEARCH ARTICLE

Healthcare seeking outside healthcare facilities and antibiotic dispensing patterns in rural Burkina Faso: A mixed methods study

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Abstract

Objective: Optimising antibiotic use is important to limit increasing antibiotic resistance. In rural Burkina Faso, over-the-counter dispensing of antibiotics in community pharmacies and non-licensed medicine retail outlets facilitates self-medication. We investigated its extent, reasons and dispensing patterns.

Methods: In an exploratory mixed-method design conducted between October 2020 and December 2021, this study first explored illness perceptions, the range of healthcare providers in communities, antibiotics knowledge and reasons for seeking healthcare outside healthcare facilities. Second, frequencies of illness and healthcare utilisation in the last 3 months were quantitatively measured.

Results: Participants distinguished between natural and magico-religious illnesses, according to origins. For illnesses considered to be 'natural', healthcare was mainly sought at healthcare facilities, private pharmacies and informal drug outlets. For illnesses considered as magico-religious, traditional healers were mainly visited. Antibiotics were perceived in the community as medicines similar to painkillers. Healthcare-seeking outside healthcare facilities was reported by 660/1973 (33.5%) participants reporting symptoms, including 315 (47.7%) to informal vendors. Healthcare seeking outside facilities was less common for 0–4-year-olds (58/534, 10.9% vs. 379/850, 44.1% for ≥5-year-olds) and decreased with improving socio-economic status (108/237, 45.6% in the lowest quintile; 96/418, 23.0% in the highest). Reported reasons included financial limitation, and also proximity to informal drug vendors, long waiting times at healthcare facilities, and health professionals' non-empathetic attitudes towards their patients.

Conclusion: This study highlights the need to facilitate and promote access to healthcare facilities through universal health insurance and patient-centred care including reducing patients' waiting time. Furthermore, community-level antibiotic stewardship programmes should include community pharmacies and informal vendors.

KEYWORDS

antibiotic use, antimicrobial resistance, Burkina Faso, community setting, cross-sectional studies, healthcare utilisation, informal drug outlets, mixed methods, sub-Saharan Africa

Sustainable Development Goal: Good Health and Wellbeing

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INTRODUCTION

Inappropriate use of antimicrobials speeds the pace of antimicrobial resistance (AMR) [1]. Unlike in high-income countries where AMR is largely attributed to healthcare facilities, in low- and middle-income countries (LMICs), AMR is mainly associated with community-acquired infections [2–4]. While prescriptions in healthcare facilities are not always appropriate, inappropriate use is also facilitated by unrestricted access to a wide range of antibiotics in community pharmacies where a prescription is not needed, and the plethora of non-licensed drug retail outlets in communities, promoting uncontrolled antibiotic dispensing [5–8]. Point-of-care tests, which differentiate bacterial from non-bacterial infections in healthcare facilities that do not have microbiology laboratories, have been valuable in reducing unnecessary antibiotic prescriptions, but over-the-counter dispensing escapes such interventions [9]. Therefore, it is crucial to understand the reasons for seeking healthcare outside healthcare facilities and to identify symptoms that trigger antibiotic dispensing in such settings: the already high AMR burden will continue to grow without comprehensive action to optimise antibiotic use [10].

Despite legislation to prohibit medicine dispensing from non-licensed drug retail outlets [11–13] in Burkina Faso, such outlets continue to coexist next to healthcare facilities and community pharmacies. Over-the-counter dispensing of antibiotics in community pharmacies, without prior prescription, also largely escapes official control [13–15].

Previous studies evaluating antibiotic access and use outside facilities in LMICs concluded that long waiting times in healthcare facilities, easy and unrestricted accessibility of drug retail outlets in communities, and a lower cost per treatment course dispensed were the main reasons for accessing antibiotics without prior formal consultation [16–18]. While largely overlooked in antimicrobial stewardship, antimicrobial dispensing and use outside healthcare facilities may contribute towards maintaining a high AMR burden [19–21]. Studying the reasons underlying healthcare seeking outside healthcare facilities is crucial to develop context-specific interventions and to inform policy change. The purpose of this study was to assess the prevalence and the factors influencing healthcare seeking outside healthcare facilities as well as to understand symptoms that trigger antibiotics dispensing without prescription in a rural district of Burkina Faso.

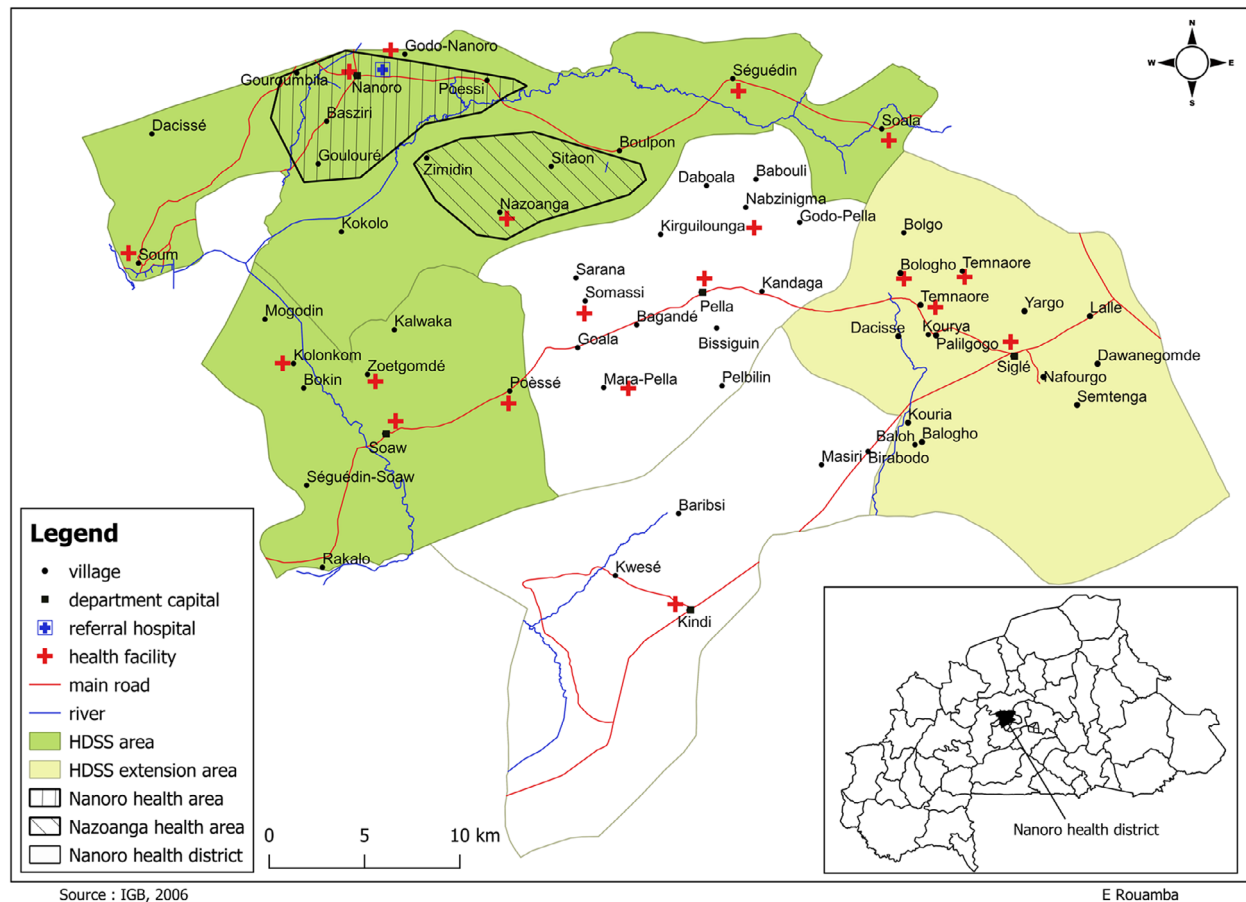


FIGURE 1 Nanoro health district showing the Nanoro and the Nazoanga health areas embedded in the Health and Demographic Surveillance System (HDSS) area.

METHODS

Study area

This study was conducted in the Nanoro health district (Figure 1), which is located in central-west Burkina Faso, about 90 km from Ouagadougou. Nanoro health district has 24 primary healthcare centres (PHCs) and 4 medical centres. Each PHC or medical centre covers a health area made up of villages. Data were collected in two health areas of the district: Nanoro health area which comprises five villages (Nanoro, Poessi, Gouroumbila, Basziri and Goulouré) and covers a population of 17,300 inhabitants, and Nazoanga health area which comprises three villages (Nazoanga, Zimidin and Sitaon) and covers a population of 8800 inhabitants. In Nanoro health area, a medical centre is the patients' first point of contact with the healthcare system; in Nazoanga health area, it is a PHC. PHCs have no medical doctors. Malaria rapid diagnostic tests are available to support febrile disease diagnoses. More complicated cases should be referred from the PHC or the medical centre to the district hospital. Both health areas are embedded in the Clinical Research Unit of Nanoro (CRUN) Health and Demographic Surveillance System (HDSS). The HDSS covers 24 of 57 villages in the area. Four-monthly household visits are planned by the HDSS to update individual participants' and households' data [22].

In Nanoro health district, the most frequently reported diagnosis is malaria [23], which in children is sometimes associated with a community-acquired invasive bacterial co-infection [24, 25]. Malaria is endemic with a high malaria transmission season from July to November. This period overlaps with the rainy season, which extends from June to October. The low malaria transmission season is from December to June.

Study design

We conducted an exploratory mixed-method design from October 2020 to December 2021. Data were collected in three distinct stages. The results of each stage fed into the design and development of subsequent stages. First, using focus group discussions (FGD), in-depth interviews (IDIs) and informal conversations (ICs), we explored illness perceptions, the range of healthcare providers in the community, antibiotics knowledge and reasons to seek healthcare outside healthcare facilities. Based on the results of the initial qualitative study, we refined a quantitative questionnaire to survey household members in the same community on episodes of illness and healthcare utilisation within the last 3 months. Subsequently, we conducted informal interviews with the private drug store vendors and informal drug vendors to capture how they generally manage symptoms that households reported during the survey, with a special focus on antibiotic dispensing.

Illness perception, range of healthcare providers and reasons for the choice of provider

Five FGDs were conducted, four with community members and one with community healthcare workers. All community members were farmers. In the Nanoro health area, three FGDs were conducted, two with community members (a group of 12 women aged 30–40 and a group of 12 men aged 35–55) and one with community healthcare workers (a group of 8 community healthcare workers aged 25–35). In the Nazoanga health area, two FGDs were conducted with community members (a group of 12 women aged 20–35 and a group of 12 men aged 20–35). Participants were selected purposively for their ability to provide in-depth and pertinent information regarding our research question, based on the principles of purposive sampling for qualitative data collection [26]. All community informants from each village from both health areas were involved in this selection. Data were analysed as the fieldwork progressed: in an iterative cyclic process, the topic guide for subsequent FGDs was adjusted based on what had emerged from the previous sessions. Subsequently, using snowball sampling, interview participants were selected. Six IDIs were conducted, four in Nanoro health area (with a nurse, a midwife, and both the private drug store vendor and the public drug store vendor located in the Nanoro's medical centre) and two in Nazoanga health area (with a midwife and the public drug store vendor in Nazoanga's PHC). Four ICs were conducted, with two informal drug vendors in the Nanoro health area and two others in the Nazoanga health area. Interviews with informal drug vendors were an opportunity for direct observations of available medicines at their drug outlets. The findings from the different methods permitted data triangulation. The process of participant selection was ended after theoretical saturation was reached. FGDs, IDIs and IC sessions were conducted in French, the official language in Burkina Faso and in Mooré, the most spoken local language in the research area. Recording and facilitation were undertaken for all sessions by the CRUN anthropologists after verbal informed consent was obtained from the participants and recorded by the interviewers.

Household healthcare utilisation

For the cross-sectional household survey recording healthcare utilisation, we selected a random sample of 802 households in Nanoro and 780 in Nazoanga using each health area households' list (available in the HDSS database) as sample frame. The sample size (number of households) per health area was calculated assuming a proportion of the population having sought healthcare of 0.2, a design effect (adjusting for intra household clustering) of 2, an average household size of 7 (based on the Nanoro HDSS data), 95% confidence intervals, confidence limits of $\pm 4\%$. In an electronic questionnaire, all members of each selected household were asked about symptoms during the 3 months prior to the survey, the frequency and the type of healthcare provider visited. Data

collection in both health areas was combined with the most recent HDSS routine data during which ownership of assets (television/video/radio/telephone/mobile devices, computers, laptops, cars, motorcycles, bicycles and refrigerator) was recorded and used to rank the socio-economic level of each household [22, 27].

Symptoms management at informal drug outlets and private drug stores

Five ICs were conducted, two with informal drug vendors in both health areas and one with a vendor in the Nanoro private drug store to find out how they usually manage patient symptoms as detailed in the household healthcare utilisation survey. We specifically explored how they dispense Watch group antibiotics if seen at their outlets during direct observations. Participants were purposively selected on their ability to provide detailed information based on data collected during first stage.

Qualitative data analysis

Data were analysed using a thematic analytical approach. The audio recordings of the interviews were transcribed into English. Transcripts were reviewed to match audio records before being imported into NVivo software, version 12. After familiarisation with the data, codes were deductively and inductively generated according to the research question being addressed as well as new codes emerging from collected data. Codes were grouped into broader categories and themes were named: first, on the perceptions of illness and the range of healthcare providers in the community for their management; second, the reasons for seeking healthcare outside healthcare facilities; third, on perceptions and knowledge regarding antibiotics; and fourth, on the management of acute illnesses at informal drug outlets and private drug stores (after the household utilisation survey). Triangulation between quantitative and qualitative data allowed for the examination of complementing and contrasting data.

Quantitative data analysis

We reported frequencies of the type of healthcare provider visited in the last 3 months prior to the survey. Combinations of symptoms during the 3 months preceding the survey were grouped into five combinations of symptoms: (i) fever only, (ii) gastroenteritis, indicated by diarrhoea and/or vomiting with or without fever, (iii) respiratory tract symptoms, indicated by cough and/or rhinorrhoea with or without fever, (iv) urinary tract symptoms with or without fever and (v) sore throat and ear pain and/or discharge with or without fever. We then reported frequencies for each combination of symptoms.

Ownership of assets recorded during the routine HDSS round of which the survey was combined, were used to rank

households in quintiles at the corresponding socio-economic level according to the steps outlined to construct the new Demographic and Health Surveys (DHS) wealth index [27].

We used chi-square tests to compare the frequency of healthcare utilisation between age groups, health area (Nanoro vs. Nazoanga), gender (female vs. male), symptom category and socio-economic level quintiles. Variables from the univariate analysis were included in a multivariate analysis to control for potential confounding factors if $p \leq 0.2$. Likelihood-ratio test (LRT) p -values were reported and significance was set at 5%.

Ethics approval and consent to participate

The study protocol was approved by the Ethics Committee for Health Research of Burkina Faso (ref no. 2020-8-171). For the quantitative study, written informed consent was obtained from household heads and each household member aged at least 18 years. For household members aged between 14 and under 18, oral assent was obtained in addition to household heads' written informed consent. For household members under 14 years, written informed consent was obtained from parents or caretakers. For the qualitative study, verbal informed consent was obtained from all participants. This verbal consent was documented in a form signed by the researchers, certifying that verbal informed consent was obtained from each participant. Both qualitative and quantitative data were anonymised to preserve study participants' confidentiality.

RESULTS

Household healthcare utilisation

In 1582 households included in the survey (802 in Nanoro and 780 in Nazoanga) with median household size 6 (IQI 4–9), symptoms and healthcare visits of 10,693 participants were recorded. Acute symptoms were reported by 1973 (18.5%) participants. Of these, 907 (46.0%) were men, 535 (27.1%) were 0–4 years old and 237 (12.0%) were from the lowest socio-economic quintile. Main symptoms reported were fever only (1063, 53.9%), followed by respiratory tract symptoms (669, 33.9%). Healthcare seeking outside healthcare facilities was reported by 660 (33.5%) participants (Table 1).

Among the 660/1969 (33.5%) participants who reported visiting healthcare providers outside healthcare facilities, 315 (47.7%) reported having visited informal drug vendors, 175 (26.5%) self-medicated with left-over medicines kept at home, 89 (13.5%) visited formal private drug stores without prior consultation, 62 (9.4%) visited traditional healers and 19 (2.9%) sought healthcare in public drug stores without prior medical consultation.

Over a quarter (534/1969) of reported healthcare episodes were in 0–4-year-olds, who had the lowest proportion

TABLE 1 Characteristics of household members who reported acute symptoms.

	Health area			
	Nanoro (<i>n</i> = 1132)		Nazoanga (<i>n</i> = 841)	
	<i>n</i>	%	<i>n</i>	%
Sex				
Female	616	54.4	450	53.5
Male	516	45.6	391	46.5
Age (years)				
0–4	256	22.6	279	33.2
5–17	399	35.3	273	32.5
18–49	293	25.9	150	17.8
≥50	184	16.3	139	16.5
Socio-economic level ^a				
Highest quintile	339	30.0	79	9.4
Fourth	244	21.6	181	21.6
Third	254	22.5	259	30.8
Second	183	16.2	194	23.1
Lowest	110	9.7	127	15.1
Self-reported acute symptoms				
Fever only	538	47.5	525	62.4
Respiratory tract symptoms	475	42.0	194	23.1
Gastroenteritis	97	8.6	112	13.3
Urinary tract symptoms	15	1.3	4	0.5
Sore throat and ear pain	7	0.6	6	0.7
Place of healthcare sought ^b				
Formal HC	728	64.5	581	69.1
Outside formal HC	400	35.5	260	30.9

Abbreviation: HC, healthcare centre.

^aSocio-economic level data were missing for two study participants in Nanoro health area and for one study participant in Nazoanga health area.

^bPlace of healthcare sought data were missing for four study participants in Nanoro health area.

of visits outside facilities (58/534, 10.9%), compared to 42.0% (602/1435, $p < 0.001$) of visits among other age groups (Table 2). Respiratory tract symptoms led more frequently to visits outside healthcare facilities (273, 40.9%) than other combinations of symptoms (387, 29.7%, $p = 0.027$). Participants at the lowest socio-economic level (108, 45.6%) more frequently sought healthcare outside healthcare facilities than those at the highest level (96, 23.0%, $p < 0.001$).

Illness perception and the range of healthcare providers in the community for their management

It emerged that communities were facing illnesses of diverse origins: illnesses were divided into two categories by participants; both logical and magico-religious diseases depending

on whether their origins were perceived to be natural or unnatural (witches, genies). Certain disorders – such as mental disorders or any other illness of an origin considered to be unnatural by the community – were considered ‘magico-religious’. Healthcare was therefore generally sought from traditional healers or in churches:

Sometimes, illnesses are due to evil spirits or witches, or you can simply be sick without understanding why and according to your faith, you can seek healthcare from the traditional healers or in churches. (FGD, women, 30–40 years, Poessi)

Some are doubtful about the natural cause of their disease and instead of going to the healthcare facility, they will rather go to the traditional healers because they think that their diseases are of mystical origin. (IDI, public drug store vendor, Nazoanga)

For illnesses considered ‘natural’ by communities such as malaria, urination burn, cough, common cold, diarrhoea, stomach ache, treatment was generally sought at healthcare facilities, at informal drug outlets and at private drug stores:

For these illnesses, we generally seek for healthcare in healthcare facilities or directly from informal drug vendors. (FGD, women 20–35 years, Sitaon)

Illnesses might be perceived as natural at first but reconsidered to be magico-religious if symptoms were not resolved by formal healthcare:

Sometimes, some patients come here to seek for healthcare, we treat them but without health condition improvement. They therefore prefer to go to churches or to traditional healers, rather than coming back here. (IDI, responsible nurse, Nanoro)

You need to know that there are some illnesses that cannot be treated in formal health centers such as some stomach aches, persistent illnesses after many treatments. (FGD, women 20–35 years, Sitaon)

Traditional medicine might also be regarded as complementary to formal healthcare:

Most of the time, we go to consultation in formal health centers, but, between two consultations, we can also seek for healthcare to the traditional healers. (FGD, men 20–35 years, Nazoanga)

TABLE 2 Univariate and multivariable analysis of factors associated with looking for healthcare outside healthcare facilities.

	<i>n</i>	Reported healthcare sought outside healthcare facilities				
		%	OR (95% CI)	LRT <i>p</i> -value	aOR (95% CI)	LRT <i>p</i> -value
Health area				0.035		0.12
Nanoro	1128	35.5	1		1	
Nazoanga	841	30.9	0.81 (0.67–0.99)		0.84 (0.68–1.05)	
Gender				0.63		-
Female	1065	34.0	1		-	
Male	904	33.0	0.95 (0.79–1.15)		-	
Age (years)				<0.001		<0.001
0–4	534	10.9	1		1	
≥5	1435	42.0	5.93 (4.43–7.94)		6.01 (4.46–8.10)	
Socio-economic level				<0.001		<0.001
Highest quintile	418	23.0	1		1	
Fourth quintile	424	32.1	1.58 (1.17–2.15)		1.68 (1.22–2.31)	
Third quintile	511	36.0	1.89 (1.41–2.52)		2.28 (1.67–3.11)	
Second quintile	376	35.9	1.88 (1.38–2.56)		2.17 (1.56–3.03)	
Lowest quintile	237	45.6	2.81 (1.99–3.96)		3.34 (2.30–4.85)	
Fever only				0.13		0.16
No	908	35.2	1		1	
Yes	1061	32.0	0.87 (0.72–1.01)		1.81 (0.79–4.17)	
Respiratory tract symptoms				<0.001		0.003
No	1302	29.7	1		1	
Yes	667	40.9	1.64 (1.35–1.99)		2.57 (1.11–5.94)	
Gastroenteritis				<0.001		0.86
No	1760	35.3	1		1	
Yes	209	18.7	0.42 (0.29–0.60)		1.09 (0.44–2.67)	

Note: aOR, adjusted odds ratio for health area, age, socio-economic level, fever only, respiratory tract symptoms and gastroenteritis. Abbreviations: CI, confidence interval; LRT, likelihood-ratio test; OR, odds ratio.

Knowledge and perceptions regarding antibiotics

In the community, antibiotics were usually perceived as medicines that are similar in nature to painkillers. Even when discussing antibiotics by name, participants continued to confuse their function with pain medication:

Well, I will try! Antibiotics are medicines to fight against pain when wounded. (FGD, women 30–40 years, Poessi)

Amoxicillin can be used for joints pain, as well, when you get wounded you can take it orally as medication. (FGD, men 20–35 years, Nazoanga)

For community healthcare workers, antibiotics were considered to be wound treatments and stated that they could also be used to protect the body from disease:

Antibiotic is used for wounds treatment and can be used to reinforce the body in order to

prevent it from diseases. (FGD, community health workers, Nanoro, 25–35 years)

Among informal vendors, knowledge on antibiotic use and function was very limited. They generally based their vague knowledge of the function of antibiotics on pictures on the packaging even though they could not tell whether medicines were antibiotics or not:

Do you see the picture on this package? ... The manufacturer is clever, as the picture shows, you can see that medicine is for headache. It is how we choose which medicine to dispense according to our patients complaints. (IC, informal drug vendor, Nazoanga)

For formal private drug store vendors, antibiotics could be used to kill microbes and treat infection diseases:

An antibiotic is a substance use to kill microbes. In other words, I can say that it is a

substance used to treat infectious diseases. (IDI, private drug store vendor, Nanoro)

Only a formal healthcare worker (nurse) was able to give an answer including antibiotics' ability to combat bacterial infections:

Antibiotic is used against pathogens, we can talk about bacteria, pneumococcus, meningococcus, typhoid fever germs. (IDI, nurse, Nazoanga)

Reasons for seeking healthcare outside healthcare facilities

When asking the reasons for seeking healthcare outside healthcare facilities, interviewees raised many factors of which, financial limitations were prominent:

It is always the lack of money that makes us look for healthcare to the informal drug vendors in markets, and all categories of people, young and old go there. (FGD, women 20–35 years, Sitaon)

In the market, medicine prices can be negotiated and we can buy them for only 100 or 150 CFA (€0.15 or 0.23). In addition, from informal drug vendors, payment can be delayed, meaning that one can have the medicine when he needs it and come back to pay later when he gets money, which is not possible in formal drug stores. (FGD, men 35–55 years, Nanoro)

Some customers take the medicines here without paying immediately, they come back later to pay when they get money, which is not possible in healthcare facilities. There, they will give you a prescription. (Informal interview with an informal drug vendor in Nanoro)

It must be recognized that some are afraid to go to the public drug stores at the risk of being refused to be given medicines without prior consultation which is additional cost. (Informal interview with an informal drug vendor in Nazoanga)

Some patients find our medicines of high cost and cannot afford them. (IDI, formal public drug store vendor)

Geographical access limitations were also underlined. Informal drug vendors lived in the community, and were therefore closer to people and easier to reach than healthcare

facilities. Furthermore, in the rainy season healthcare facilities were frequently inaccessible:

During the rainy season, it is difficult to reach the healthcare facility because the bridge to get there is flooded, so informal drug vendors are mostly solicited. (FGD, women 20–35 years, Sitaon)

Sometimes it is the remoteness of healthcare facilities that lead people to the informal drug vendors. (FGD, men 20–35 years, Nazoanga)

Health system factors were also raised: long waiting times and unprofessional attitudes of formal healthcare workers towards patients were remarked upon:

Sometimes, you get to the healthcare facility and there is no healthcare worker to listen to you and readily take care of you and that leads people to informal drug vendors. (FGD, men 20–35 years, Nazoanga)

It also emerged that medicines from markets were used as first-line treatment before looking to formal healthcare if symptoms still persist:

We treat our children having diarrhea with medicine from the market before we look for formal healthcare, because healthcare workers will not immediately take care of them. (FGD, women 30–40 years, Poessi)

Finally, medicines sold in the market were considered to be stronger than those in formal drug stores, as illustrated in the following quotes:

I remember when I was sick and under observation in the primary healthcare center, the nurse was about to refer me to the Nanoro district hospital. I just ordered a child to buy me a medicine from the market; when I took it my health condition improved and I was not referred anymore. (FGD, men 20–35 years, Nazoanga)

Our medicines quickly heal them. (Informal interview with an informal drug vendor in Nanoro)

Symptom management at informal drug outlets and the private drug store

Fever without any additional symptoms was managed differently in the private drug store than in informal drug outlets. While these patients were referred to the healthcare facility by the private drug store vendor, all informal drug vendors

reported treating them as malaria cases with paracetamol and an anti-malaria monotherapy (amodiaquine hydrochloride) or an artemisinin-based combination therapy (artemether–lumefantrine). Respiratory tract symptoms were managed with oral-route amoxicillin by the private drug store vendor while informal drug vendors reported treating them with drugs only available in their outlets. When reading the components, the latter did not contain antibiotics. But both informal drug vendors and the private drug store vendor reported dispensing amoxicillin (and oral route ampicillin, only available at informal drug outlets) for treatment of wounds. Gastroenteritis was managed with metronidazole by both the private drug store vendor and the informal drugs vendors regardless of the type of diarrhoea. Urinary tract symptoms were referred to the healthcare facility by the private drug store vendor while informal drug vendors reported treating all illnesses that manifest by burns, meaning urination burns, stomach burns, with ciprofloxacin and erythromycin. For them, both antibiotics played the same role and were only different in colour. When asking the private drug store vendor how he dispensed ciprofloxacin, erythromycin and azithromycin, he reported dispensing ciprofloxacin for typhoid fever or stomach burns and erythromycin for dermatosis like pimples all over the body. He declared not to sell azithromycin without medical prescription because he did not know this medicine very well.

Regarding dosage and length of treatment, informal drug vendors stated that ciprofloxacin and erythromycin dosed at 500 mg should be given as half a tablet twice a day for adults and a quarter of a tablet twice a day for children; they furthermore stated that the course of antibiotic should be stopped when symptoms ended. The private drug store vendor reported that he mainly sold these medicines to adults at a dosage of one tablet of 500 mg twice a day for 7 days, regardless duration of symptom.

DISCUSSION

This article aimed to examine factors influencing healthcare seeking outside healthcare facilities and antibiotic dispensing patterns in a rural district of Burkina Faso. Nearly 34% of people who went through acute illnesses in the last 3 months prior to the survey reported that they had sought healthcare outside of healthcare facilities and almost 50% among them went to informal drug vendors. Low income and high costs related to formal healthcare seeking as well as lack of patient-centred care and difficult geographical access were mentioned as reasons for seeking healthcare outside healthcare facilities. People from the highest socio-economic quintile and with children aged 0–4 years were more likely to attend official healthcare facilities.

Communities' high demand of care from informal vendors is worrisome. Indeed, the latter's poor antibiotics knowledge – such as questionable antibiotics indications – may lead to excessive and inappropriate dispensing.

Additionally, ciprofloxacin and erythromycin dispensing even for non-infectious diseases at poor dosage and at treatment length according to symptoms duration is striking and may be fuelling the growing resistance level to these high resistance potential antibiotics [20, 28, 29]. The high financial incentive yield might be a reason for not looking for alternative activities even though informal drug selling is prohibited by the authorities. Additionally, their proximity to the population, the ease of payment methods, meaning possibility of delaying payment and only buying the number of tablets one can afford, make them the healthcare providers of choice in the community. Sometimes, they are even the first contact with patients before they look for formal healthcare. The availability of Access and Watch antibiotics in these informal stores, dispensed over-the-counter without any rule, suggests that interventions to optimise antibiotics use should not only target healthcare facilities, but all antibiotics providers including formal and informal drug stores. Developing and implementing a context-specific behavioural intervention may help optimise antibiotic dispensing. Such interventions should involve a component targeting community as well, in order to raise health literacy and reduce unnecessary antibiotics demand and overuse.

In Burkina Faso, healthcare is free at healthcare facilities for children aged 0–4 years but out-of-pocket payment prevails for those older than this age group. As healthcare-seeking outside healthcare facilities and out-of-pocket payments have been found to be associated with uncontrolled antibiotic dispensing in other LMICs [5, 30, 31], reflecting on how to set up universal health insurance could be crucial. In addition, promoting patient-centred care in healthcare facilities is vital, including reducing patients' waiting times when possible, empathetic attitude of healthcare workers towards patients, taking patient's needs into account to the extent that they are rational and sensitisation about the dangers of self-medication both at individual and at community-level, may help reduce healthcare seeking outside healthcare facilities [32–35]. However, while promoting healthcare seeking at healthcare facilities, febrile illnesses management should be improved and unnecessary antibiotics prescription reduced at this level, for example, by using C-reactive protein (CRP) or procalcitonin tests to differentiate bacterial from non-bacterial infection where microbiology labs are lacking [9, 36, 37].

Our findings largely align with findings from other studies in sub-Saharan Africa [32, 38, 39], and will be used to tailor community-based antibiotic stewardship interventions to tackle uncontrolled and likely inappropriate dispensing and (over) use. We found a strong association between financial limitations and healthcare seeking outside healthcare facilities sustained by both qualitative and quantitative data. Of note, the few study participants who sought healthcare outside healthcare facilities by going to traditional healers were not further investigated. Indeed, based on what emerged from qualitative data, such patients when presenting likely 'natural' illnesses might have unsuccessfully tried other options before going to the traditional healers, rather

than being triggered by financial reasons. Likewise, due to low levels of knowledge of antibiotics in the community reported in the first part of this study, it was difficult to measure the amount and type of antibiotics used the last 3 months prior to the household survey. Although the third part of this study reported how healthcare providers outside healthcare facilities managed symptoms presented in the community, exit interviews from each provider will be more suitable to measure in real time the quantity of antibiotics per provider type, prescription dosages, treatment length and symptoms or illnesses for which each type of antibiotic is dispensed. This will better inform antibiotic dispensing inappropriateness per provider type and therefore highlight where to stress interventions to reduce antibiotics (over) prescription.

CONCLUSION

Frequent healthcare seeking outside healthcare facilities and antibiotics dispensing with unclear indications, dosage and duration, as well as community members' low levels of knowledge around antibiotics are concerning in the context of increasing AMR. This suggests that while facilitating formal healthcare access by universal health insurance and patient-centred care, interventions to reduce the uncontrolled or inappropriate dispensing and (over) use of antibiotics should target all antibiotic providers (formal and informal) as well as the entire community.

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