Assessment of factors associated with self-medication practices during the COVID-19 pandemic in southwestern Ethiopia: a community-based cross-sectional survey

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Abstract

Background Self-medication practices involve the use of medications without healthcare professional requests. The threat of coronavirus disease 2019 (COVID-19) caused the practice of a fittest to survive action, with the assumption that something is better than nothing. Moreover, owing to the lack of effective treatment for COVID-19, the general public has shifted toward self-medication and symptomatic treatment, with approximately 80% of people stockpiling medication for use during the pandemic. Thus, this study aimed to assess the factors associated with self-medication practices during the COVID-19 pandemic crisis in southwestern Ethiopia.

Methods A community-based cross-sectional study design was employed at selected drug retail outlets in southwestern Ethiopia for 415 community pharmacy clients from July 1, 2021, to September 1, 2021. Purposive sampling techniques were employed to select five drug retail outlets on the basis of high patient flows, and we took the study participants until the required quota allotted to each selected drug retail outlet had been filled. Bivariable and multivariable logistic regression analyses were employed to identify factors associated with self-medication. AORs with 95% CIs were used to report associations, and the level of significance was set at $P < 0.05$. Results: Self-medication was significantly associated with being female (AOR 3.51, 95% CI 1.04–12.41), having a college education or above (AOR 47, 95% CI 4.32–55.21), time wastage at public health facilities (AOR 2.71, 95% CI 3.47–5.21), being afraid of contracting COVID-19 (AOR 0.006, 95% CI 0.004–0.185), and having high fees at public health facility (AOR 0.006, 95% CI 0.004–0.185). The most frequently used medications to treat or prevent the COVID-19 pandemic were analgesics (42.4%) and cold medicines (29.5%). Headache (22.2%), fever (13.2%), respiratory infection (14.3%), and cold (21.4%) were the most frequently reported symptoms of the COVID-19 pandemic.

Conclusion This study revealed high self-medication practices among study area residents during the COVID-19 pandemic. The primary reasons for self-medication in the context of COVID-19 are fear of the pandemic and time wastage at public health facilities. Therefore, special attention should be given to educating public and health care providers on the types of illnesses that can be self-diagnosed and self-treated and the types of drugs to be used for self-medication.

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Introduction

The World Health Organization (WHO) defines self-medication as the use of pharmaceuticals, including over-the-counter (OTC) or nonprescription drugs, prescription-only medicines, and medicinal products to treat symptoms or illnesses that have been independently diagnosed without consulting a doctor, pharmacist, or other healthcare provider [1]. It also includes taking medicine as directed by a doctor to treat persistent or reoccurring conditions or symptoms [2].

Since the first coronavirus outbreak in Wuhan, China, the COVID-19 pandemic has drastically affected people's way of life in the developed and developing world [3]. Ethiopia has performed 1,706,321 tests since the start of the pandemic, according to the Federal Ministry of Health of Ethiopia (FMOH), which was announced on December 13, 2020 [3]. Since the early outbreak of the pandemic, international lockdowns have been implemented in countries worldwide to manage the pandemic [4, 5]. Several factors, such as international lockdowns, a low supply of drugs, and the fear of contracting an infection from healthcare professionals or patients at a healthcare facility, have encouraged almost 80% of the population to opt for self-care at home [6].

Research reports indicate that the pandemic crisis has led to an increase in self-medication with various over-the-counter (OTC) and prescription-only medications, increasing from 36.2% in 2019 to 60.4% in 2020 [7]. Although self-medication practices during the COVID-19 pandemic crisis have not been reported in Ethiopia, there have been reports from both developing and developed countries. For example, self-medication is practiced by 83% of medical students in Pakistan [8], 36.3% of healthcare workers in Nigeria [9], and 34.2% of interdisciplinary participants in Togo [10].

In many African countries, access to qualified medical professionals who can provide proper prescriptions is limited. As a result, self-medication is a common practice, as indicated in the report [8]. Moreover, in Africa, self-medication has become more common during the COVID-19 pandemic because the African population considers self-medication the first line of defense against any sickness; more than 80% of the population relies on traditional medicines and the false belief that traditional African medicines can treat/prevent all illnesses [9–11].

Numerous investigations worldwide have established shortages of essential medications throughout the pandemic [12]. Similar reports from Ethiopia revealed issues with a low supply of drugs and a shortage of personal protective equipment. Since there is no approved treatment for COVID-19, the observed lack of necessary medications is very serious [12]. This shortage has been attributed to rising demand. The fear associated with this shortage may encourage people to self-medicate and stockpile drugs [12, 13].

The literature reports that drugs such as analgesics, antipyretics, antitussives, antidiarrheal, calcium and vitamin supplements, anabolic steroids, sedatives, certain antibiotics, and many herbal and homeopathic remedies are the most frequently self-prescribed medications for COVID-19 treatment [13]. Some global health practices lack control over self-treatment with prescription medicines [14–17]. Moreover, even though analgesics and cold medications are OTC medications, the WHO does not recommend self-medication with any medicines as a form of prevention or treatment for the COVID-19 pandemic [8]. Analgesic drugs such as acetaminophen can cause serious liver damage when used for an extended period, even at therapeutic doses, in people with alcoholic liver disease or viral infections [18]. Additionally, long-term acetaminophen use may increase the risk of chronic renal failure, cardiovascular disease, gastrointestinal problems, and even death [19]. Therefore, acetaminophen should be taken with caution, especially because its sales have dramatically increased during the COVID-19 pandemic [20]. Only limited data have addressed drug retailers [21]. Community pharmacies, private pharmacies, and drug stores are frequently the first points of care for minor illnesses in many low- and middle-income countries (LMICs), as they are conveniently located, open for 24 h, and offer quick access to necessary medications such as antibiotics without a prescription [22]. Current evidence shows inappropriate dispensing of antibiotics at drug retail outlets [23] for several reasons, including profit-making incentives, inadequate training, weak regulation, lack of monitoring, and enforcement of rules on antibiotic dispensing [24, 25]. In addition, there is poor regulation of pharmacy practice where drugs are even sold in shops by individuals who have no medical training or education [26]. Therefore, there is an urgent need to identify factors and assess solutions to address inappropriate medication dispensing practices by this major group of providers to increase the standard of treatment and lessen the burden of self-medication, such as multidrug resistance [22].

Given these factors, self-medication has become a significant research topic, particularly during the COVID-19 pandemic [10, 11, 27–29]. Although previous studies have been conducted in other countries, in Ethiopia, the factors associated with self-medication practices during the era of the COVID-19 pandemic are not yet known.

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Therefore, we hypothesized that the prevalence of self-medication in southwestern Ethiopia has increased during the COVID-19 pandemic because of factors such as international lockdowns, a low supply of drugs, fear of infection, and limited access to healthcare professionals. Consequently, the purpose of this study was to assess the factors associated with self-medication among clients visiting drug retail outlets in Southwest, Ethiopia, during the COVID-19 pandemic. The secondary objective is to evaluate the most commonly self-medicated class of drugs, identify the sources from which these drugs were obtained, and determine the source of information during the COVID-19 pandemic.

Therefore, the findings of this study will be particularly useful for policymakers, including the Ethiopian Minister of Health, in developing appropriate national guidelines that distinguish between prescription-only and non-prescription medicines used for treating or preventing COVID-19 in Ethiopia. Additionally, this study can be used as a baseline for healthcare professionals, such as pharmacists and pharmacy technicians, with a particular focus on the problem of dispensing medication without a prescription for treatment or preventive purposes during the COVID-19 pandemic because they play a pivotal role in this regard.

Methods and materials
Study area and period
The study was conducted in Bedelle town, which is located in the Buno-Bedelle zone of the Oromia regional state in southwestern Ethiopia and is 480 km away from Addis Ababa, the capital city of Ethiopia. This location was chosen because of the low supply of essential medicine at the public hospital and poor patient services from the public hospital found in the zone, which may have forced the client to visit drug retail outlets found in the town during the pandemic crisis [12]. According to the most recent census data available, the total population of Bedelle town is 40,483 people, and the town covers 5,856.5 square kilometers, with 1,126.6 square kilometers covered by forests. The study specifically focuses on the community of Bedelle city and its surroundings, particularly those clients who visited the drug retail outlets during self-medication requests during the data collection period. The town has a longitude and latitude of 8027'N 36,021'E and an elevation between 2,012 and 2,162 m above sea level. There are 16 drug stores, 2 private pharmacies, and 2 community pharmacies in the town, along with 1 healthcare center and 1 general hospital. The study was conducted from July 1, 2021, to September 1, 2021.

Study design and study population
A cross-sectional study was conducted among clients who visited drug retail outlets in Bedelle town and its surrounding areas during the study period. The study population comprised all residents of Bedelle town and its surroundings who visited selected drug retail outlets for self-medication within the study period. The study included participants aged 18 years and older who purchased medication without a prescription, in accordance with the Ethiopian minimum age for study consent [30]. Informed consent was obtained from all study participants before the research was conducted.

Sample size determination and sampling technique
Sample size determination
The sample size was determined via the single population proportion formula.

$$n = \frac{\left(z^{a}\big/_{2}\right)^{2} * p\,(1-p)}{D^{2}}$$

For a single population proportion assuming a 5% marginal error, 95% confidence interval, ∂ (alpha)$=0.05$, we considered a 50% prevalence rate of self-medication practice during the COVID-19 pandemic (since no prior research was available in the country). The estimated minimum sample size was 384 participants. After that, we added a 10% nonresponse rate, and the final sample size used was $n=384+38=422$.

Sampling techniques
A total of 20 drug retail outlets were found in Bedelle town. These outlets were first stratified into community pharmacies, private pharmacies, and drug stores, with two community pharmacies, two private pharmacies, and 16 drug stores in the town. These specific outlets were chosen because of high patient flows. We assessed the average patient flow of all drug retail outlets in the town before selection and actual data collection [20]. We then employed purposive sampling techniques, a nonrandom method of sampling that allows researchers to select participants on the basis of their knowledge and judgment, to select five drug retail outlets on the basis of high patient flows. This technique was chosen because it enabled us to collect data from the participants to obtain the proposed sample size within the limited time of the survey (three-month duration) due to the crisis time and the observational nature of the study. Moreover, the participants may have refused to participate because of the stigma associated with the COVID-19 pandemic [31]. The selected drug retail outlets were Community Pharmacy One (CP1), Community Pharmacy Two (CP2), Private Pharmacy One (PP1), Private Pharmacy Two (PP2), and Drug Store One (DS1). The sample was distributed among the five selected drug retail outlets on the basis of the proportion of the average number of patients per

month for each drug retail outlet. We surveyed more than 4 drug retail outlets to achieve a 15% dropout rate. The past three-monthly reports (April 2021 to June 2021) of each selected drug retail outlet indicated that the average numbers of patients at community pharmacy one (CP1), community pharmacy two (CP2), private pharmacy one (PP1), private pharmacy two (PP2), and drug store one (DS1) were 5400, 4500, 6300, 5200 and 3900, respectively. A study performed in Ethiopia, particularly in the study area, revealed that the COVID-19 pandemic significantly affected the quality of healthcare services, decreased patient satisfaction with healthcare services given by public hospitals found in the study area, and out-of-stock essential medicine forced patients to use alternatives from private or community pharmacies and drug stores in the study area [12]. This might be the possible reason that enforces the shift of study participants to self-medication practices in drug retail outlets, and it may also be the reason for high patient flows at those drug retail outlets. Proportional allocation was used to distribute the calculated sample size considering the three-month average patient flow in each drug retail. As a result, 80, 75, 105, 87 and 65 study participants were included from CP1, CP2, PP1, PP2, and DS1, respectively. Drug consumers were asked or observed about the types of drugs they requested for self-medication. Before receiving information on the drugs they sought, the respondents were interviewed after they made their requests. We took the study participants until the required quota allotted to each selected drug retail outlet had been filled. Figure 1 below shows a schematic representation of the sampling procedure used to select study participants from Bedelle town-selected drug retail outlets in 2021.

Data collection tool development and data quality assurance

The data collection questionnaire was developed by reviewing the relevant literature on similar topics [13, 32–34]. A language expert developed the questionnaire in English and then translated it into Afan Oromo, the
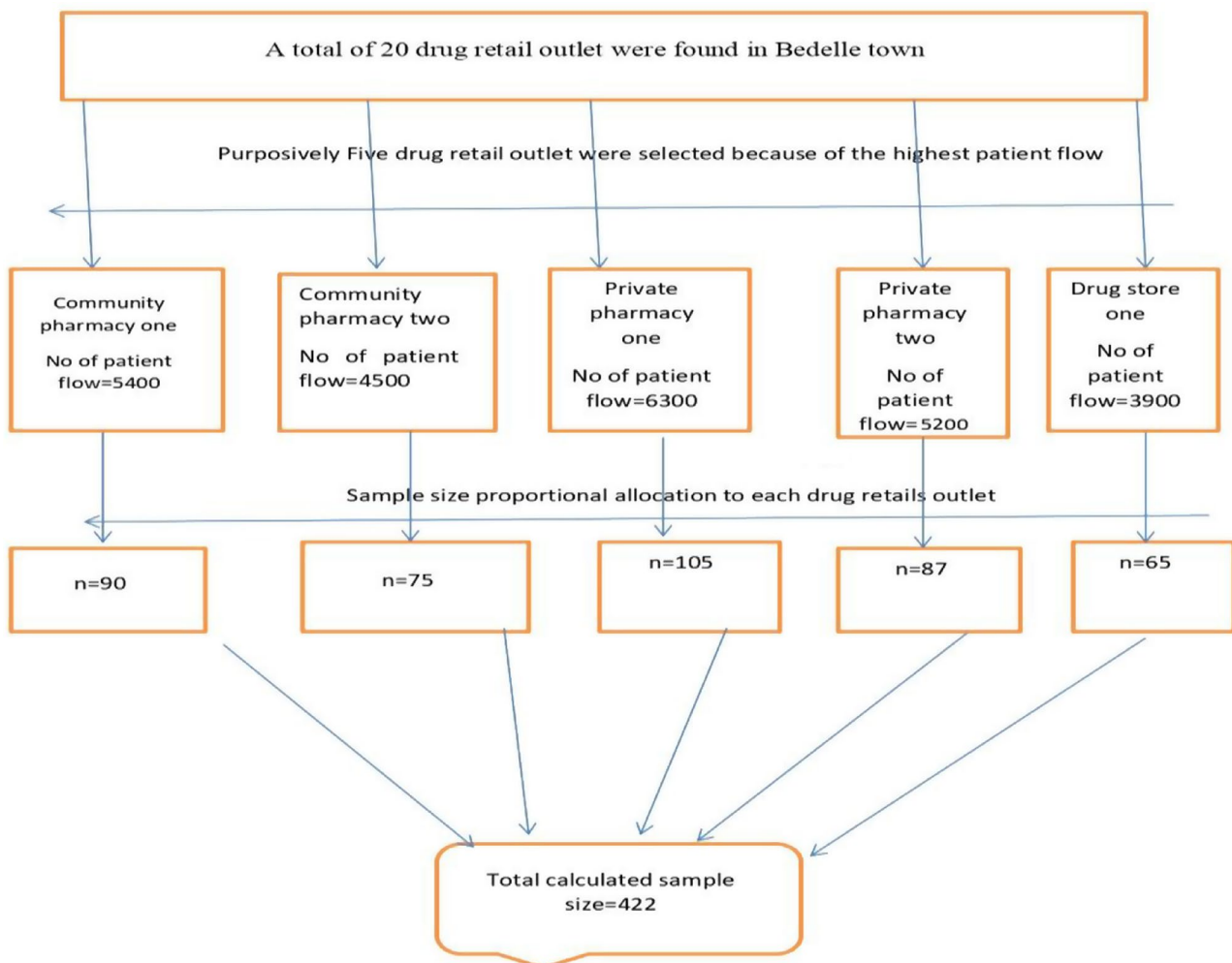

Fig. 1 Schematic representation of the sampling procedure used to select study participants from Bedelle town-selected drug retail outlets, 2021

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resident's mother tongue. The participants were interviewed via a questionnaire during the data collection time. Drugs identified in the survey included those used to treat or prevent COVID-19 symptoms, such as analgesics (paracetamol, ibuprofen), cold remedies, antibiotics (azithromycin), and antiviral and antimalarial agents (hydroxychloroquine). These medications were selected on the basis of media reports and existing studies as effective treatments for the COVID-19 pandemic crisis [35]. A list of all included drugs from each therapeutic class was provided to the patients to help them recall the drugs used. Symptoms of COVID-19 can present in different ranges. This study used the Centers for Disease Control and Prevention (CDC) recommendations to gather information on frequently reported symptoms [36]. Fever, fatigue, coughing, muscle aches, sore throats, headaches, nasal congestion, breathing problems, and additional symptoms (open questions) were included. The participants could choose from seven options to identify the reason of self-medication practice, with the following primary areas of focus: [1] minor symptoms of COVID-19 [2], international lockdown [3], the busy schedule of health care professionals [4], fear of contracting COVID-19 [5], previous knowledge regarding COVID-19 pandemic problems [6], high fees and [7] time wasted at public hospitals. These are the predictor variables or factors chosen because the previous literature review identified them as relevant [37–39]. The participants were asked whether they had ever taken any medication without a prescription paper to treat suspected symptoms, as preventive measures against COVID-19, or even after receiving a positive COVID-19 diagnosis. Another approach to assess the extent of self-medication was to ask how frequently the respondents visited a drug retailer to purchase drugs during the last three months after the pandemic (April 2021–June 2021).

The questionnaire was pretested on 22 people before the actual data collection period to check its validity, and adjustments were made on the basis of the pretest results. Those who pretested were not included in the actual study. The data collectors received training on the contents of the data-gathering tools and methods for approaching the study participants.

Data processing and analysis

The collected data were checked for completeness, accuracy, and clarity before analysis. The data were entered into Epi-data 4.6 and transferred to SPSS version 24 for analysis. Frequencies and percentages were computed for categorical variables, and means and standard deviations were computed for continuous variables. Bivariable binary logistic regression analysis was employed to identify factors that were candidates for multivariable analysis at a P value of less than 0.2. A multivariable binary logistic regression analysis was fitted to identify factors associated with self-medication. Model fitness was checked with the Hosmer–Lemeshow goodness-of-fit test. Furthermore, multicollinearity between the explanatory factors was assessed with the variance inflation factor (VIF) to identify and avoid redundant variables that may affect our estimate. The VIF was within the acceptable range. An adjusted odds ratio (AOR) at a 95% confidence interval with a P value < 0.05 was considered to indicate statistical significance.

Operational definition

Self-medication Use of medication or traditional medicine without the advice of a health care professional for the treatment or prevention of COVID-19.

The rational use of drugs is a process involving appropriate prescribing, dispensing, and patient use of drugs.

Leftover drugs Medicines left from past treatment that were prescribed or purchased (OTC).

Drug retail outlets include drug stores, private pharmacies, and community pharmacies found in the study area.

Community pharmacy In this study, the community pharmacy is a drug retail outlet that is overseen by licensed pharmacists who sell registered prescription-based medicines and over-the-counter medications. In addition, it is near public hospitals, and the owner is the government body. Moreover, private pharmacies are drug retail outlets that are overseen by licensed pharmacists who sell registered prescription-based medicines and over-the-counter medications; however, the owner is the individual business person.

Medications used for the treatment or prevention of COVID-19 analgesics (acetaminophen, ibuprofen), cold medicines (dextrometrephones), traditional medicines, antibiotics (azithromycin, penicillin), antivirals, and antimalaria (hydroxychloroquine), which are used by study participants for preventive or treatment purposes during the COVID-19 pandemic. These medications were selected on the basis of media reports and existing studies as effective treatments for the COVID-19 pandemic crisis [35].

Cold medicine This phrase refers to a wide variety of medications. This class of drugs includes antihistamines, decongestants, cough suppressants, and antitussives that are used alone or in combination to treat or prevent COVID-19 symptoms such as the common cold and other illnesses of the upper respiratory tract.

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Table 1 Sociodemographic characteristics of the participants in Bedelle city and its surroundings, Buno Bedelle Zone, Ethiopia, July 2021 (N = 415)

Variable		Frequency	Percentage (%)
Age (in years)	18–25	104	25.1
	26–33	115	27.7
	34 and above	196	47.2
Sex	Female	221	53.3
	Male	194	46.7
Ethnicity	Oromo	284	68.4
	Amhara	80	19.3
	Gurage	51	12.3
Religions	Orthodox	191	46.0
	Muslim	120	28.9
	Protestant	104	25.1
Educational	Illiterate	132	31.8
	Primary school (1–8)	141	34.0
	Secondary school (9–12)	86	20.7
	College and above	56	13.5
Marital status	Married	272	65.5
	Single	127	30.6
	Divorced	6	3.9
Occupations	Merchant	226	54.5
	Employee	64	15.4
	Daily labor	109	26.3
	Unemployed	14	3.4
	Housewife	2	0.5

Results

Sociodemographic characteristics of the study participants

Of the 422 participants initially approached for the interview, 415 (98.34%) responded to the survey. The study participants presented diverse sociodemographic characteristics. A majority of the respondents were female (53.3%), and a significant portion fell within the 18–25 age range (25.1%). In terms of religious affiliation, Orthodox Christians constituted the largest group (46.0%). With respect to marital status, 65.5% of the participants were married. Ethnically, Oromo respondents were the most prevalent (68.4%). Educational backgrounds varied, with 31.8% of participants being illiterate and 40% having completed primary school [1–8] (Table 1).

Communication between the respondent and healthcare providers about self-medication in the context of the COVID-19 pandemic

Figure 2 provides insights into the communication between respondents and healthcare professionals concerning self-medication in the context of the COVID-19 pandemic. Among the participants, 62.89% reported that they did not consult prescribers or dispensers about the medicines they were already using when visiting drug retail outlets for the treatment or prevention of COVID-19. Moreover, a significant majority (75.19%) indicated that they would not inquire about the potential side effects of the medication, whereas 18.1% stated that they would not seek guidance on how to take drugs for the treatment or prevention of COVID-19. Remarkably, as shown in Figs. 2 and 92.5% of the respondents did not seek information on how to deal with leftover medications.

Availability of medicines in households for COVID-19 treatment and prevention

Table 2 provides detailed insights into the availability and sources of medicines for COVID-19 treatment and prevention among the 415 participants in the study. Notably, more than one-third (36.6%) of the respondents reported having medicines at their homes for this purpose.
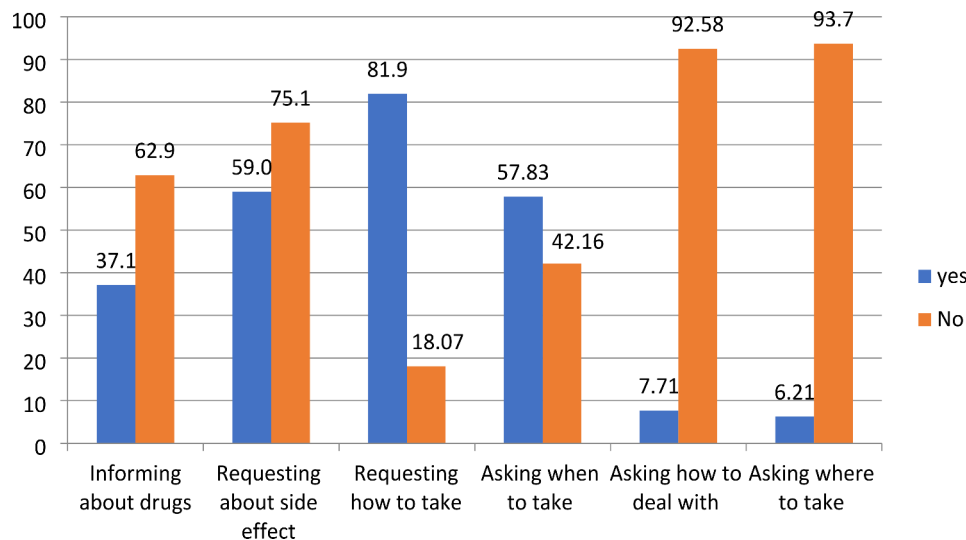

Fig. 2 Percentage of respondents who communicated with health providers about medication used for the treatment of COVID-19 pandemic diseases, Buno Bedelle Zone, Ethiopia, by July 2021

Table 2 Information on medicines available in households for the treatment or prevention of COVID-19, Buno Bedelle Zone, Ethiopia, by July 2021 (*n* = 415)

Variable	Variables	Frequency	Percentage (%)
Do you have any medicines used for treatment or preventive purposes of the COVID-19 pandemic?	No	263	63.4
	Yes	152	36.6
Types of medicine used for treatment or prevention of COVID-19 pandemic disease?	Analgesics	38	34.5
	Cold medicine	22	20.0
	Antibiotics	16	14.5
	Antiretroviral	14	12
	Traditional medicine	12	11
	Anti- malaria (Hydroxychloroquine)	5	4
	Other if any	4	3.6
From where did you get the medicine for COVID-19 pandemic diseases?	Community pharmacy	72	65.5
	Private pharmacy	29	26.4
	Families	7	6.4
	Friends	2	1.8
If you have medicine at home, for what reason you have stored it at home?	Fear to get COVID-19(as preventive)	74	67.3
	Current treatment for COVID-19 (for COVID-19 symptom's)	29	26.4
	Left from past treatment of COVID-19(tested and confirmed as positive)	7	6.4
Do you have Knowledge of drugs used for COVID-19?	Yes	90	81.8
	No	20	18.2
Do you know the frequency of administration of drugs?	Yes	83	75.5
	No	27	24.5
Do you have knowledge of the duration of treatment for COVID-19?	No	66	60.0
	Yes	44	40.0
Do you know the side effect of drugs?	No	95	86.4
	Yes	15	13.6
Do you know the current situation of the expiry date?	Not expired	79	71.8
	Expired	15	13.6
	Not known	16	14.6

Among these medications, the analgesic class of drugs was the most commonly reported, accounting for 34.5% of the total. When seeking such medicines, 65.2% of the respondents relied on community pharmacies, whereas 26.4% turned to private pharmacies. Additionally, 26.4% of the participants acknowledged using leftover medications from prior treatments for COVID-19 management. Strikingly, the majority of participants (86.4%) did not possess knowledge about the potential side effects of the medicines they consumed, as detailed in Table 2.

Self-medication practices during the COVID-19 pandemic among participants

Table 3 provides insights into the self-medication practices of the participants in the context of COVID-19 treatment and prevention. Notably, more than half of the respondents (50.6%) reported engaging in self-medication for COVID-19. Among these participants, 49% sought self-medication information from the internet or social media. A significant portion (49.0%) had visited drug retail outlets at least twice in the past three months to practice self-medication. The most frequently used class of medications for COVID-19 treatment or prevention was analgesics (42.4%), followed by cold medicine (29.5%). Tablet formulations were the preferred choice for more than half of the participants (52.4%) when practicing self-medication. Notably, 16.9% of the study participants reported sharing or exchanging medicines with others for COVID-19 treatment or prevention purposes.

Common self-medication practices for COVID-19 pandemic-related symptoms

Table 4 presents the prevalent self-medication practices among the study participants in response to various COVID-19 pandemic-related symptoms. Notably, the majority (22.2%) resorted to over-the-counter (OTC) medicines to address symptoms such as headaches, seasonal cough and cold. Additionally, a notable

Table 3 Respondents who practice self-medication during the COVID-19 pandemic, Buno Bedelle Zone, Ethiopia, by July 2021 (*N* = 415)

Variable	Category	Frequency	Percentage (%)
Self-medication for treatment or preventive purposes of Covid-19	Yes	210	50.6
	No	205	49.4
Source of information for self-medication for treatment or prevention of COVID-19 Pandemic disease	Advice from the internet or social media	103	49.0
	Experience from previous prescription or experience	52	24.8
	From healthcare professionals	37	17.6
	Promotions	18	8.6
Frequency of drug retail outlet visits for self-medication in the last three months after the COVID-19 outbreak	1	54	25.7
	2	103	49.0
	3	30	14.3
	> 3	23	11.0
Medication utilized as self-medication for COVID-19 treatment or preventive purposes	Analgesic	89	42.4
	Cold medicine	62	29.5
	Antibiotics	56	26.7
	Antimalarial (Hydroxychloroquine)	3	1.4
Formulation	Tablets	110	52.4
	Capsule	86	41.0
	Syrup	12	5.7
	Suppository	2	1.0
Drug sharing with others for treatment or preventive purposes of the COVID-19 pandemic	No	345	83.1
	Yes	70	16.9

Table 4 Common symptoms for self-medication during the COVID-19 pandemic, Buno Bedelle Zone, Ethiopia, by July 2021 (*n* = 415)

Self-medicated drugs	Symptoms	Frequency	Percentage (%)
Over-the-counter medication for common illness	Headache	160	22.2
	Cold	138	21.4
	Fever	102	13.2
	Allergy	30	5.7
Use of antibiotics for infective symptoms	Respiratory infective	95	14.3
	Cough	43	5.8
	Sore throat	40	5.5
Other medication if any	Muscle pain	66	9.4
	Sleeping problems	20	3.3

subset reported using antibiotics for respiratory tract infections (14.3%), cough (5.8%), and sore throat (5.5%). Furthermore, a smaller proportion (3.3%) turned to self-medication with sedatives to alleviate insomnia, whereas 9.4% did so to manage muscle pain. This information provides insights into the diverse self-medication strategies employed by respondents to address their symptoms related to the COVID-19 pandemic.

Reasons for self-medication practices during the COVID-19 pandemic

Inquiring into the underlying reasons for self-medication practices without a prescription during the COVID-19 pandemic, the respondents provided valuable insights. The majority (31.5%) cited fear of contracting the virus as a significant motivator for self-medication, as they were hesitant to venture outside and seek medical attention. Additionally, approximately 21.5% of the participants attributed their self-medication practices to international lockdown measures, which confined people to their homes for extended periods. A smaller percentage (5.4%) mentioned extended waiting times at public health facilities as a reason for opting for self-medication. Notably, 11.4% of the respondents practiced self-medication on the basis of their prior knowledge and experience with the disease, as detailed in Table 5.

Table 5 Reasons for self-medication practices in the context of COVID-19, the Buno Bedelle Zone, Ethiopia, by July 2021

Reason	Frequency	Percentage (%)
Fear to get Covid-19	215	31.5
International lockdown	147	21.5
Due to minor symptoms of COVID-19	86	11.7
Previous knowledge regarding the problems	84	11.4
The busy schedule of healthcare professionals	66	9.6
High fees	62	9.3
Time wastage at the public health facility	37	5.4

Factors associated with self-medication practices in the context of COVID-19

Variables that were significantly associated with self-medication practices in the bivariate analysis were further examined via multivariate logistic regression. Therefore, the results from the multiple logistic regression analysis indicated that self-medication practices were significantly associated with being female (AOR 3.51, 95% CI 1.04 −12.41), having a college education or above (AOR 47, 95% CI 4.32–55.21), time wastage at public health facilities (AOR 2.71, 95% CI 3.47–5.21), having a fear of contracting COVID-19 (AOR 0.006, 95% CI 0.004–0.185), and having high fees at public health facilities (AOR 0.006, 95% CI 0.004–0.185), as shown in Table 6.

Discussion

Self-medication is a serious problem that exacerbates health-related problems, and it is more prevalent in low- and middle-income countries, in which healthcare systems are less effective because of long wait times at

Table 6 Factors associated with self-medication practices

Variable	Categories	Self-medication use		Bivariate analysis			Multivariate analysis		
		Yes	No	P value	COR	CI	P value	AOR	CI
Age (in years)	18–25	65	39	0.58	0.87	0.53–1.54			
	26–33	54	61	0.47	0.78	0.44–1.30			
	34 and above	110	86	0.61	0.77	0.41–1.41			
Sex	Female	131	90	**0.00***	1.78	1.05–2.93	**0.00***	3.51	1.04–12.41
	Male	102	92		1			1	
Ethnicity	Oromo	170	114	0.56	1.24	0.47–3.32			
	Amhara	28	52	0.64	1.63	0.41–6.46			
	Gurage	15	36		1				
Religions	Orthodox	85	106	0.86	1.09	0.48–2.50			
	Muslim	55	65	0.57	0.77	0.31–1.83			
	Protestant	64	40	0.71	0.79	0.43–2.30			
Educational	Illiterate	77	55		1			1	
	Primary school (1–8)	81	60	0.81	0.09	0.04–0.52	0.65	0.047	
	Secondary school (9–12)	38	48	0.061	2.67	1.17–5.2	0.91	0.81	0.003–0.510 0.231–3.51
	College and above	25	31	**0.00***	90.14	118.90-430.41	**0.001***	47	4.32–55.21
Marital status	Married	151	121	0.86	0.88	0.13–4.04			
	Single	72	55	0.44	2.06	0.32–13.25			
	Divorced	2	4	0.67	0.73	0.12–4.71			
Occupations	Merchant	134	92	0.78	1.19	0.42–3.67			
	Employee	27	37	0.28	1.77	0.65–4.11			
	Daily labor	61	48	0.35	1.69	0.62–4.31			
	Unemployed	9	5	0.57	1.49	0.44–4.4			
	Housewife	0	2		1				
Reason for self-medication practice	Previous knowledge regarding the problems	84	338		1			1	
	Fear to get COVID-19	215	207	**0.00***	0.07	0.006-0140	**0.001***	0.006	0.004–0.185
	International lockdown	147	275	0.54	0.406	0.075–1.824	0.071	0.16	0.01–2.14
	Due to minor symptoms of COVID-19	86	336	0.64	0.72	1.80–2.72	0.63	0.69	0.25–2.83
	The busy schedule of healthcare professionals	66	356	0.86	1.33	0.26–4.37	0.88	0.83	0.17–3.43
	High fees at public health facility	62	360	**0.00***	4.91	2.46–6.77	**0.00***	3.63	2.64–4.91
	Time wastage at the public health facility	37	385	**0.00***	4.21	2.33–5.11	**0.00***	2.71	3.47–5.21

(AOR, adjusted odds ratio), (COR, crude odds ratio), *(statistically significant)

facilities, difficulty obtaining doctor appointments, a lack of essential medicines in stock, delays in care, and a lack of beds or space in facilities [3, 13, 40]. In addition, healthcare professionals are now experiencing more anxiety, discomfort, and general psychological burdens as a result of the long hours they have been working under challenging and stressful conditions during the COVID-19 pandemic [41]. To cope with the stress, pressure, discomfort, and anxiety associated with employment, it has been claimed that these circumstances have led to self-medication practices [42, 43]. A previous study reported that not only healthcare professionals but also the community is experiencing stress, anxiety, and sadness as a result of the high number of healthcare professionals' deaths caused by the COVID-19 pandemic crisis [41]. Furthermore, many nations in the world have experienced the greatest rates of death due to the COVID-19 outbreak [13]. Moreover, the threat of coronavirus disease 2019 (COVID-19) caused the practice of a fittest to survive action with the assumption that something is better than nothing and, when done correctly, that self-medication provides significant benefits to consumers, such as self-reliance and cost savings [32].

To the best of the authors' knowledge, no reports have assessed the factors associated with self-medication practices during the COVID-19 pandemic in southwestern Ethiopia. Therefore, the current study is designed to assess the factors associated with self-medication practices in southwestern Ethiopia during COVID-19 pandemic, which will serve as the basis for further research.

Self-medication practice with any medication, including antibiotics, is not recommended by the WHO as a method of COVID-19 pandemic disease treatment or prevention [44]. Despite this, 50.6% of the respondents in our study used medicine to treat or prevent the COVID-19 pandemic without a prescription or seeking advice from a healthcare provider. Various studies have reported different results concerning the prevalence of self-medication during the pandemic. For example, a study reported self-medication in 41% of Nigerians [45]. In contrast, a study conducted in Togo with a different set of participants yielded varying results. Healthcare professionals presented the highest self-medication rate of 51.9%, whereas individuals from other sectors, including the air transport, police, road transport, and informal sectors, reported a lower rate of 34.1% [46, 47]. The discrepancy in the results may be explained by differences in participant characteristics, changes in the study period, insufficient access to COVID-19 data, and various data collection methods employed by the researchers. This finding might also explain the finding that 50.6% of the participants responded that self-medication would be their immediate action if they got sick. This might be further attributed to the wide practice of uncontrolled and nonselective dispensing of drugs without prescription in developing countries such as Ethiopia. Additionally, as previous observations have indicated, there is a lack of adherence to regulations in the dispensing of medications by most community drug outlets, which enables and tolerates people to access medications without any prescription [13].

The most common class of medication used in our study was analgesics, and those who reported symptoms of COVID-19, such as headache, fever, and cold, significantly employed self-medication practices, as the findings indicated. This finding is in line with the results from Saudi Arabia, which revealed that nursing undergraduate students consistently highly use analgesic medicines such as paracetamol [17] and from the Peru adult population, where it was also the most commonly consumed drug for the treatment of the COVID-19 pandemic [16]. From a pharmacological perspective, paracetamol is a known analgesic medication with a very weak anti-inflammatory effect [27], and it can be used to treat minor COVID-19 symptoms when treating patients at home, according to guidelines given during the early months of the pandemic [28], or to treat themselves, particularly for fever or headache [29]. However, some reports claim that medications such as paracetamol can worsen COVID-19 symptoms, possibly because they activate prothrombotic mechanisms, which are among the main pathogenic causes of the COVID-19 pandemic [28]. Therefore, patients should be counseled about the use of medicines for minor ailments, even though paracetamol is a well-known over-the-counter medicine [8].

Moreover, hydroxychloroquine is a less common medication used for preventive or treatment of COVID-19 [48]. In contrast, in addition to analgesic drugs, both antibiotics and cold medications were also some of the most common self-medications for the treatment or prevention of COVID-19 symptoms in the study area. In Pakistan, the use of azithromycin drugs from the antibiotics group was highly based on self-medication for treatment or preventive purposes during the COVID-19 pandemic [49], with a similar report from a study performed in Saudi Arabia [50] and Peru [13]. By law, all antibiotics must be dispensed only by licensed pharmacists after prescription, while drug stores are prohibited from selling any type of antibiotic under any circumstances [51, 52]. Despite this, the community under study was shown to often utilize antibiotics without consultation from healthcare professionals or from drug stores. Currently, the use of antibiotics without consultation with healthcare providers is the main concern because of multidrug resistance [53]. These findings also indicate that there is a need of avoiding self-medication with antibiotics to minimize the risk of antimicrobial resistance in the study area. Moreover, the high prevalence of nonprescription sales

and access to antibiotics in our study could be partially attributable to the absence of sufficient national legislation and clear guidelines for antimicrobial sales in community drug retail outlets. Therefore, these findings will help healthcare policy take measures to enhance pharmaceutical care while working to save lives.

In line with findings from both Iranian and Brazilian medical students, "headache" was the most frequently cited symptom for practicing self-medication [54–56]. Another study also revealed that the use of analgesics for both headache and muscular pain symptoms was very prevalent among Indian undergraduate medical and paramedical students [57]. Similarly, headache was one of the most common COVID-19 symptoms associated with self-medication in the current study. Although those symptoms (headache and muscular pain) seem less severe and manageable, healthcare professionals and patients need to be aware of the alarming COVID-19 pandemic signs and symptoms that necessitate doctor visits before taking any medications because there are other diseases that have symptoms similar to those of COVID-19. Additionally, while some of these medications in Ethiopia (such as acetaminophen and ibuprofen) may not require a prescription, others (such as azithromycin, hydroxychloroquine, and antiretrovirals) are not dispensed without prescription. Since not all illnesses require medicine, pharmacy professionals should reassure customers without recommending specific medications.

In this study, the participants asked about sources of advice/information for self-medication practices. Most participants (49.0%) reported obtaining advice or information from the internet or social media. The probable reason may be that most countries in the world were under lockdown during the pandemic, with the declaration of stays-at-home rules by the government so that people could rely only on social media or the internet for updates and information related to the pandemic [40]. Another factor could be the extensive coverage of COVID-19 in both private and public media, which could provide participants with good information. Furthermore, the participants may receive short voice messages or text messages from national telecom.

Regarding the source of self–medication, in the current study, 65.2% of the respondents received their medicine from community pharmacies for the purpose of treating or preventing the disease caused by the COVID-19 pandemic, which was consistent with findings in Sudan (68.8%) [44], Palestine [20], and Egypt [32, 45]. This might be because community pharmacies are the most easily accessible and more time-saving. The other possible reason might be low healthcare utilization from public hospitals in the study area, which can cause the study participants to shift to self-medication practices from community pharmacies [12].

Communication between patients and healthcare practitioners is crucial for the proper use and storage of medications as well as for the delivery of good healthcare, particularly during the critical time of the COVID-19 pandemic crisis [58]. According to this study, most participants (62.9%) did not communicate with healthcare professionals about what medications they were taking at the time of their visit to drug retail outlets for self-medication. In contrast, a study conducted in Kuwait revealed that 49.3% of participants communicated with healthcare providers about their current medication [27]. This might be due to the participants' lack of information about drug–drug interactions, which can seriously affect a community's health and economic situation.

Before taking any medication, the expiration date of any drug should be checked [47]. However, approximately 70.9% of the participants in this study did not know the expiration date of the medication they are utilizing to treat or prevent COVID-19. This calls for prompt and adequate dissemination of health service information to the general population during pandemics and emergencies.

Data on the relationship between sex and self-medication practice are inconclusive [59]. In the present study, female participants tended to self-medicate more than male participants did (AOR 3.51, 95% CI 1.04–12.41). Although the cause of the link between being female and self-medication is unknown, the COVID-19 outbreak has been linked to increased female anxiety or fear, as reported in Iran and Italy [60, 61]. This might also explain why females self-medicate more than males do.

The logistic regression also revealed that clients whose educational level was greater than the college education level or above were 47 times more likely to practice self-medication (AOR 47, 95% CI 4.32–55.21, $p < 0.05$) than those who were unable to read and write. This finding is in agreement with a similar study conducted in Eretria [62].

A possible explanation could be that those who have a college education or above may have some awareness of drugs and diseases and, as a result, may encourage themselves to practice self-medication rather than seeking healthcare institutions. However, a previous study in Serbia reported that a high level of parental education was independently associated with self-medication practices [63]. Furthermore, reasons such as fears of contracting the virus and delayed treatment received at public healthcare facilities were similarly documented in studies conducted in Lahore, Pakistan, and Dhaka, Bangladesh [64].

Similarly, studies in developing countries have indicated that factors such as long waiting times in public healthcare facilities, shortages of essential medicine, lack of available beds, and frequent closure of healthcare facilities are among the factors that lead to a higher

prevalence of self-medication [65]. The respondents were asked about the basic reasons for the practice of self-medication during the COVID-19 pandemic. The factors associated with self-medication practices during the COVID-19 pandemic were fear of contracting the virus, college and above educational level participants, female participants, high fees, and extended waiting times at public health facilities. Notably, all of these factors served as predictor variables for self-medication in a study conducted in Pakistan [37]. The current finding is also supported by the inability to afford healthcare fees noted as the means for self-medication practice.

Strengths and limitations of the study
Finally, readers need to be aware of the strengths and weaknesses of this study. This study provides a comprehensive analysis of the prevalence of self-medication practices, the types of medications and traditional medicine used, and the factors associated with self-medication during the COVID-19 pandemic. Previously conducted research in other nations concentrated only on one type of medication, such as antibiotics or OTC drugs, to measure the incidence of self-medication during the COVID-19 pandemic and no longer placed any emphasis on customers visiting drug retail outlets. However, the current study included a broad class of medications, such as antibiotics, traditional medicine, OTC, cold medicine, antiviral and antimalarial drugs. Similarly, this study included different study participants (illiterate, adult, literate, pregnant, breastfeeding mothers, and those with chronic illnesses) who required special precautions while prescribing medications. Additionally, this study focused on people who visited drug retail stores because they might already be familiar with the medication, as opposed to people who went to a hospital for healthcare services and might not have used self-medication. However, this study has certain limitations that should be acknowledged. First, the data used in this study were self-reported, which may introduce recall bias or social desirability bias. Second, the cross-sectional design employed here enables us to capture a snapshot of self-medication practices during the study period but does not allow us to establish causality or monitor changes over time. Third, it is important to note that the study is geographically confined to southwestern Ethiopia, which may limit the generalizability of the findings to other regions or countries.

Conclusion
Fear of COVID-19 might made the practice or malpractice a survival of the fittest choice, leaving a lesson on how to handle health emergencies. This study revealed high self-medication practices among study area residents during the COVID-19 pandemic. The factors associated with self-medication practices in the context of

COVID-19 were fear of contracting COVID-19, high fees, being female respondent, educational level and delayed treatment at public health facilities. While analgesics were the most widely consumed drug group, notable usage of antibiotics (such as azithromycin), hydroxychloroquine, and antiretrovirals was also observed in Ethiopia during the era of the COVID-19 pandemic. The most common COVID-19 symptom associated with self-medication in the current study was headache, followed by cold symptoms. The majority of the participants reported that they had obtained advice or information from the internet or social media, and community pharmacies were the major source of self-medication, as reported by the majority of respondents. Therefore, the community needs medical help and consultation before consuming any drugs.

Recommendations
The responsibility for promoting proper drug use in the health-care setting cannot be left only to government authorities. Therefore, every country or individual should participate in existing laws on over-the-counter drug use and sales during the pandemic crisis like COVID-19 outbreak.

National guidelines should be defined to specify the availability of prescriptions and over-the-counter medications for the treatment of COVID-19. It is necessary to raise public awareness of the dangers of self-medication constantly.

Future research on factors related to healthcare providers working in drug retail outlets dispensing medication without a prescription is advised. They are more responsible for following proper dispensing procedures because they are more accessible to the general public. Special attention should be given to educating the public and health care providers on the types of illnesses that can be self-diagnosed and self-treated and the types of drugs to be used for self-medication during pandemic disease outbreaks.

The regulatory authority and drug dispensers should take strong measures in the utilization of drugs for self-medication.

Abbreviations

COVID-19	Coronavirus Disease 2019
CI	Confidence interval
SPSS	Statistical Package for the Social Sciences
CDC	Center for Disease Control and Prevention
CP1	Community Pharmacy one
CP2	Community Pharmacy two
PP1	Private Pharmacy one
PP2	Private Pharmacy two
DS1	Drug Store one
LMIC	Low-income and middle-income countries
FMOH	Federal Ministry of Health of Ethiopia
NA	Not applicable
OTC	Over the counter
WHO	World Health Organization

Declarations

Ethics approval and consent to participate
Ethical clearance was obtained from the Institutional Review Board (IRB) of Mattu University, College of Health Sciences, Department of Pharmacy. The participation of study participants in this study was entirely voluntary and confidential. Informed consent was obtained from all the participants. The right of participants to withdraw from the interview or not to participate was respected. All methods were performed according to the relevant guidelines and regulations (Declaration of Helsinki). COVID-19 prevention was maximized through social distancing and the provision of protective items such as facemasks and sanitizing inputs.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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