



The response to COVID-19 among drug retail outlets in Indonesia: A cross-sectional survey of knowledge, attitudes, and practices

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Summary

Background Pharmacists have been at the frontline of the COVID-19 response in Indonesia, providing medicines, advice, and referral services often in areas with limited healthcare access. This study aimed to explore their knowledge, attitudes, and practices during the pandemic, so that we can be better prepared for future emergencies.

Methods A cross-sectional online survey of community pharmacists and pharmacy technicians in Indonesia was conducted between July and August 2020. The dataset was analysed descriptively, and logistic regression was used to explore willingness to participate in COVID-19 interventions.

Findings 4716 respondents participated in the survey. Two-thirds (66.7%) reported knowing only “a little” about COVID-19 and around a quarter (26.6%) said they had not received any COVID-19 guidelines. Almost all were concerned about being infected (97.2%) and regularly took steps to protect themselves and their clients (87.2%). Stock-outs of Personal Protective Equipment (PPE) and other products (32.3%) was the main reason for not taking any precautions. Around a third (37.7%) mentioned having dispensed antibiotics to clients suspected of having COVID-19. To support COVID-19 response efforts, most respondents were willing to provide verbal advice to clients (97.8%), distribute leaflets to clients (97.7%), and participate in surveillance activities (88.8%). Older respondents, those identifying as male, and those working in smaller outlets were more willing to provide information leaflets. Those working in smaller outlets were also more willing to engage in outbreak surveillance.

Interpretation Drug retail outlets continue to operate at the frontline of disease outbreaks and pandemics around the world. These providers have an important role to play by helping to reduce the burden on facilities and providing advice and treatment. To fulfil this role, drug retail outlets require regular access to accurate guidelines and steady supplies of PPE. Calls for drug retail outlet staff to play in response efforts including the provision of information to clients and surveillance could ease escalating pressures on the health system during future outbreaks.

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Research in context

Evidence before this study

Pharmacies and drug stores play an important role in serving the community as they are often the first point of contact within the health system. Calls for drug retail outlet staff to play a more active role in COVID-19 response efforts are increasing. However, these providers face major challenges, including increased risk of transmission inside outlets and a lack of training in pandemic preparedness. Our study investigated the response of community pharmacies in Indonesia to consumer needs during the pandemic. To the best of our knowledge, this is the largest survey of pharmacists and pharmacy technicians working at drug retail outlets in a Southeast Asian country during the COVID-19 crisis.

Added value of this study

We analysed attitudes and self-reported knowledge, and practice of pharmacists and pharmacy technicians across Indonesia's 34 provinces. The majority of respondents expressed concern about being infected and were willing to participate in COVID-19 response efforts. Our study supports previous research on the potential risks faced by pharmacists during pandemics, while providing new evidence on issues such as the common use of antibiotics among suspected COVID-19 patients.

Implications of all the available evidence

This study provides evidence on the importance of drug retail outlets during the current COVID-19 crisis in Indonesia. Access to guidelines and protocols related to the pandemic as well as uninterrupted supplies of personal protective equipment (PPE), is essential for these frontline health workers. Pharmacists and pharmacy technicians have considerable potential to help combat COVID-19 and any future pandemics. The Indonesian government should increase efforts to engage with them.

Introduction

In the midst of the COVID-19 pandemic, there are increasing calls for pharmacists to play a more active role in the public health response, beyond dispensing of

medicines and other supplies. In particular, it has been suggested that in the context of pandemics, pharmacists could be involved in outbreak surveillance,^{1–6} health education,⁷ drug trials,⁸ vaccine delivery,⁹ testing,¹⁰ and programs to support patient medication adherence.¹¹ These roles become critical when clinical services are heavily committed, especially in countries where health systems are under-resourced.² However, the operation of pharmacies and drug stores during COVID-19 poses significant challenges. A small but growing number of studies have pointed to major gaps in measures to control disease transmission inside pharmacies^{12–14} as well as inappropriate behaviour by clients that can undermine staff safety.¹⁵ Studies have also raised concerns about the lack of appropriate training in pandemic preparedness available to pharmacy staff.^{6,16}

In Indonesia, community pharmacies and drug stores often serve as the first point of contact with the health system for many patients. Community pharmacies must always be attended by a qualified pharmacist and drug stores by a pharmacy technician, who oversee the dispensing of medicines. Only community pharmacies can sell prescribed medicines including antibiotics. Hereon we refer to them both as 'drug retail outlets'. According to official data from the Indonesian Ministry of Health (MOH), the country's population of around 270 million is served by approximately 135,000 licensed drug retail outlets.^{17,18} Around 10% of these outlets serve the provider network for Indonesia's national health insurance scheme, the Jaminan Kesehatan Nasional or simply the 'JKN', which is designed to make health services accessible to all citizens by the end of 2024.¹⁹

There have been increasing calls for greater involvement of pharmacists and pharmacy technicians (who typically work under the supervision of pharmacists) in the response to COVID-19,^{8,20,21} which is taking a huge toll on the population and health system of Indonesia. As of early February 2022, more than 4.3 million cases and 144,000 deaths were reported in the country, including thousands of frontline health workers.^{22,23}

In this paper, we report findings from a survey of the attitudes, self-reported knowledge and practice of pharmacists and pharmacy technicians in Indonesia during the COVID-19 pandemic. After presenting the findings, we discuss recommendations to strengthen their contribution to future response activities in Indonesia and

other Low- and Middle-Income Countries (LMIC). To our knowledge, this is the largest empirical study of health professionals working in drug retail outlets during the COVID-19 pandemic in Indonesia.

Methods

Participants

Participants were registered pharmacists and pharmacy technicians working in drug retail outlets in Indonesia. These private practitioners may be part of major retail chains or small pharmacies owned by individuals or groups. A pharmacist will have a bachelor's degree in pharmacy and a pharmacist registration training certificate. In contrast, a pharmacy technician will have graduated from a pharmacy technician school, obtained a three-year diploma in pharmacy, or received a bachelor's degree in pharmacy without holding a pharmacist registration training certificate. Pharmacists have primary responsibility for the dispensing of medicines, narcotics, and psychotropic substances to the public on presentation of a prescription from a doctor, while pharmacy technicians may assist pharmacists with dispensing.²⁴ Typically, the pharmacy owner and pharmacists-in-charge will enter into a cooperation agreement covering salary and profit sharing. By regulation, pharmacists are entitled to monthly professional fees for managing the pharmacy, consultation fees, benefits including health insurance as well as revenue sharing. While a minimum salary has been determined by some branches of the Indonesian Pharmacists Association (IAI), the actual salary is at the discretion of the pharmacy owner.²⁵

Study design

A cross-sectional online survey of registered pharmacists and pharmacy technicians was conducted between July and August 2020. The Checklist for Reporting Results of Internet E-Surveys (CHERRIES)²⁶ was used to guide development of the study design.

Data collection

An invitation to participate in the study was circulated through the IAI and the Indonesian Pharmacy Technicians Association (PAFI). The invitation, containing a link to an online survey, was sent via email and WhatsApp to a contact person in all 34 provincial branches of these two professional organisations. These persons then forwarded the invitation to more than 500 representatives at the district level using their contact lists. All members of the associations who were currently working in a pharmacy or drug store were eligible to take part in the study. Random sampling was not possible due to the lack of an up-to-date register of all active pharmacists and pharmacy technicians. At the beginning of the survey, a screening question was asked to

ensure respondents were eligible to participate. A large target the sample of 2000 respondents was based on resource constraints and our existing networks with pharmacy and pharmacy technician associations established under the PINTAR (Protecting Indonesia from the Threat of Antibiotic Resistance) study.²⁷

The questionnaire was designed to collect data on demographic characteristics, knowledge and understanding of COVID-19, hygiene and safety measures, experience of serving clients with suspected COVID-19, and willingness to be involved in specific pandemic response activities, including providing verbal advice to clients, distributing information leaflets on COVID-19, and participating in disease surveillance (e.g., reporting the number of clients presenting with symptoms). Questions on hygiene and safety measures were developed using the COVID-19 pandemic emergency guidelines published by the International Pharmaceutical Federation (FIP) and other pharmacy professional bodies^{28,29} as well as the Indonesian national guidelines for pharmacists.³⁰

The original questionnaire was developed in English, translated into Indonesian, and then back-translated to confirm accuracy of the translation.³¹ The questionnaire was refined after being piloted among 46 pharmacy students at the Universitas Islam Indonesia in Yogyakarta and public health researchers in the Center for Tropical Medicine, at the Universitas Gadjah Mada (UGM) for improved accuracy and ease of comprehension.

Respondents could access a mobile or desktop version of the questionnaire, developed using the REDCap electronic data collection tool.^{32,33} The survey was available online for eight weeks between July and August 2020. Fortnightly follow-up reminders were sent via the WhatsApp app. At the end of the survey, all respondents were provided with written guidance from UGM on how to strengthen pandemic response efforts in the community.

Data analysis

Data cleaning, validation, coding, and analysis were undertaken by YM and LPLW using STATA version 13, with oversight from a senior statistician (ML). Descriptive statistics were used to report means, frequencies, and percentages, by pharmacy and pharmacy technician subgroups. We used the total number of complete responses to each question as the denominator. Bivariate and multivariable analyses were used to explore associations between participant characteristics and their willingness to participate in COVID-19 response efforts, using simple and multivariable logistic regression, respectively. The outcome of interest was a respondent's willingness to participate in specific COVID-19 related activities. Answers to these questions were re-categorised as binary variables "very willing" versus "moderately willing" and "unwilling". Bivariate analysis was conducted using age,

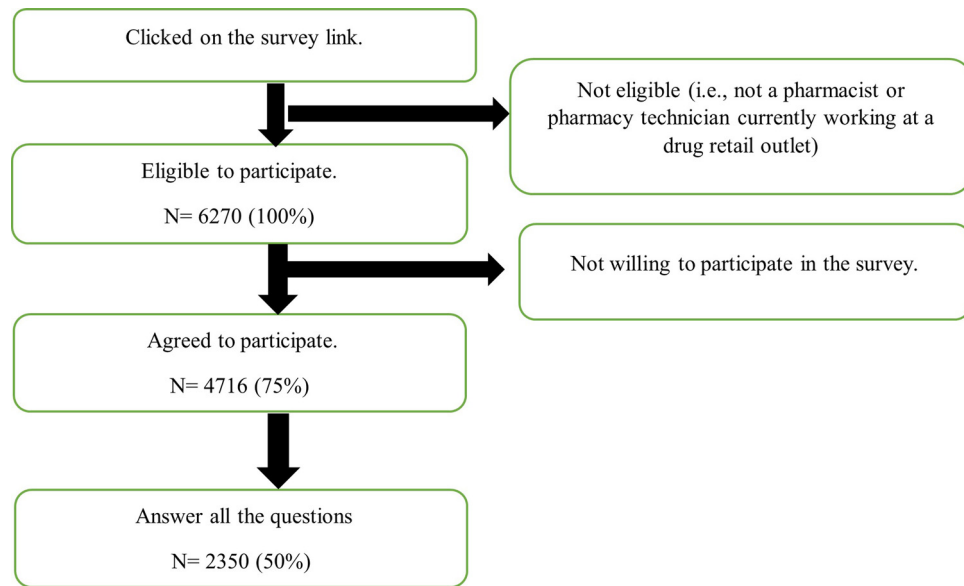


Figure 1. Respondent flowchart.

gender, type of workplace, level of concern about acquiring COVID-19, and number of suspected COVID-19 clients seen in the last week. Only variables that demonstrated a statistically significant association in the bivariate analysis ($p < 0.05$) were included in the multivariable analysis with no adjustment of p-values for multiple comparisons.

Ethics

All research activities were conducted in compliance with a protocol approved by the medical research ethics committees of the Universitas Gadjah Mada (KE/FK/0464/EC/2020) and the University of New South Wales (HC191012). The questionnaire was entirely anonymous and no personal identifiers (including name, location, IP address) were collected. Informed consent was obtained electronically on the first page of the survey and respondents could only proceed if consent was provided.

Role of the funding sources

The study sponsor had no role in the study design, data collection, data analysis and interpretation, writing the report, or the decision to submit the paper for publication.

Results

Characteristics of respondents and their place of work

Of the 7096 staff who clicked on the link to the survey, 6270 were eligible to participate. Of these, three-quarters (4716/6270) gave their consent to participate in the

study (Figure 1). Due to the recruitment methods used in this study, it was not possible to calculate a response rate.

Participants came from all 34 provinces of Indonesia, with a third located in Java: East Java (454/4716; 11.5%); Central Java (438/4716; 11.1%); and West Java (433/4716; 10.9%) (Figure 2). The mean age of respondents was 32 years with the majority (3356/3985; 84.3%) aged between 21 and 40 years. Over three-quarters of respondents were female (1847/4043; 78.6%), and two-thirds had a bachelor's degree or higher (2659/3982; 66.8%). The majority worked at an independent drug retail outlet (3378/3911; 86.4%), defined as an individual business that was not affiliated with any chain, and more than half (2029/4000; 50.8%) had worked as a pharmacist or pharmacy technician for 6 years or more. Around 12% of respondents were also owners of the facilities where they worked (Table 1).

Table 2 shows that almost all respondents reported having some knowledge of COVID-19 (3453/3461; 99.8%) and having received some information on COVID-19 (3384/3461; 97.8%). However, two-thirds (2308/3461; 66.7%) felt that they still knew only a little about COVID-19 at the time of this survey. The information received about COVID-19 was most commonly around disease transmission (3134/3384; 92.6%), while updates on screening and testing practices were the least common (1903/3384; 56.2%). Two-thirds of respondents (2339/3376; 69.3%) stated they had read pharmacy guidelines on COVID-19 that had been produced by groups such as the World Health Organization (WHO), FIP, IAI, or the Indonesian MOH. The majority of respondents correctly identified the main ways that COVID-19 is spread [i.e., through touching infected

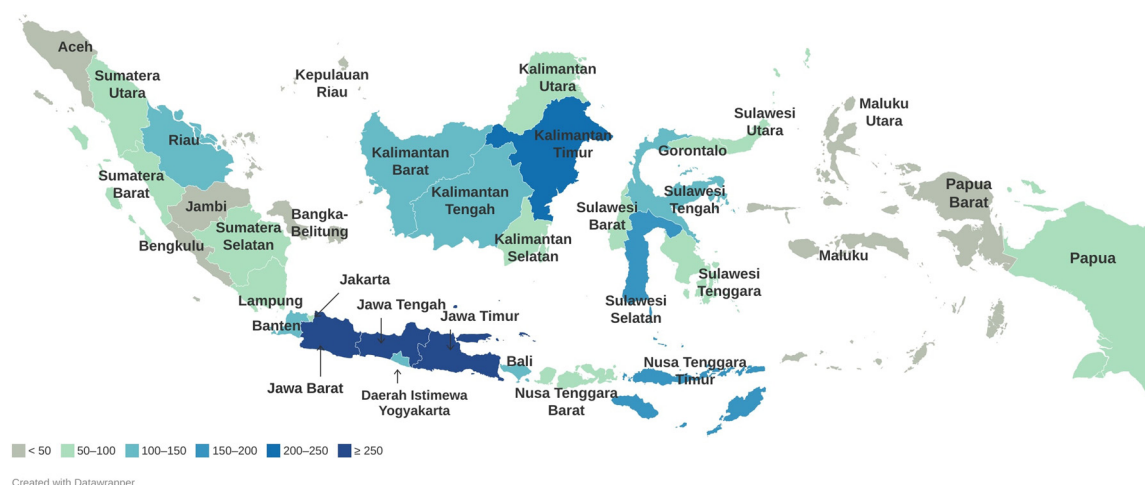


Figure 2. The number of survey respondents by province.

objects and then the face (93.4%) and through inhaling droplets (79.1%). The vast majority also knew that drinking dirty water, the faecal-oral route, and mosquito bites were not main modes of transmission. Pharmacists were more likely to have received COVID-19 related information, and were often correct in their understanding about transmission, compared to pharmacy technicians.

Figure 3 summarises practices reportedly undertaken by pharmacists and pharmacy technicians to protect themselves, other staff, and clients against COVID-19. The three most common practices were wearing a face mask (1725/1736; 99.4% and 1284/1291; 99.5%), instructing clients to wear a face mask (1680/1739; 96.6% and 1255/1291; 97.2%), and putting hand sanitiser at the entrance or cash counter of an outlet (1658/1741; 95.2% and 1257/1291; 97.4%). More than one-third of the respondents (613/1738; 35.2% and 641/1291; 49.6%) reported that a disinfection chamber had recently been installed in a store where they currently worked. The three most common pieces of advice given to clients by pharmacists and pharmacy technicians (Figure 4) were to wear a face mask (1436/1516; 94.7% and 975/1080; 90.3%), to wash hands carefully and regularly (1368/1516; 90.2% and 924/1080; 85.6%), and to self-isolate at home if displaying COVID-19 symptoms (1246/1516; 82.2% and 860/1080; 79.6%).

Client visits during the pandemic

Around a fifth of respondents (532/3034; 17.5%) stated that they had been visited by clients whom they suspected of having COVID-19 in the last week. This varied by province from 0% to 40.9% (Figure 5). Reasons for suspecting a client was infected included: presence of common symptoms (268/532; 50.4%); travelled to a high-risk COVID-19 region (233/532; 43.8%); reported contact with a close friend or relative with COVID-19

(114/532; 21.4%); or the client said they thought they had the virus (25/532; 4.7%) (Figure 6).

Among those respondents who suspected they had been visited by a client with COVID-19, the most commonly perceived symptoms were a cough (235/268; 87.7%) and fever (211/268; 78.7%), but many other symptoms such as sore throat, sneezing, and difficulty breathing were also reported (Figure 7). Items commonly purchased by these clients included: vitamins, immune boosters (e.g., Imunos®), cough medicines, influenza and cold medicines, hand sanitisers, antipyretics, antiseptics, and PPE such as surgical masks, and fabric masks. It was more common for pharmacy technicians to dispense dexamethasone (120/242; 49.6% vs. 80/244; 32.8%), azithromycin (89/240; 37.1% vs. 39/242; 16.1%) and other antibiotics (124/244; 50.8% vs. 63/246; 25.6%), to clients suspected of having COVID-19 compared to pharmacists (Figure 8).

Concerns with COVID-19 and safety precautions

Almost all (2505/2576; 97.2%) respondents expressed concern about contracting COVID-19, ranging from “a little worried” to “very worried”. Many respondents reported taking regular safety precautions with 69.4%, 54.3%, and 45.2% reporting that they wore face masks, washed their hands, and used hand sanitiser regularly throughout the day, respectively. An additional 28.4%, 39.1%, and 46.4% of respondents reported taking these precautions every time they served a client. Among those who had not taken any safety precautions (12.8%), the most common reasons cited were that they were unable to access PPE and other products such as hand sanitiser due to stock-outs (32.3%); found it uncomfortable to wear PPE (37.3%); could not afford PPE and other products (29.1%); or were concerned that items such as face shields might frighten clients (23.2%).

Variables	N (%; 95%CI)
Age group (years) (N= 3985)	
≤ 30	1779 (44.6; 43.1-46.2)
31-40	1584 (39.8; 38.2-41.3)
41-50	461 (11.6; 10.6-12.6)
>50	161 (4.0; 3.5-4.7)
Missing	731 (15.5)
Gender (N= 4043)	
Male	750 (18.6; 17.4-19.8)
Female	3213 (79.5; 78.2-80.7)
Rather not say	80 (2.0; 1.5-2.4)
Missing	673 (14.3)
Highest education level (N= 3982)	
Diploma	1323 (33.2; 31.8-34.7)
Bachelor's degree and above	2659 (66.8; 65.3-68.2)
Missing	734 (15.6)
Occupation (N= 4009)	
Pharmacist (not owner)	1809 (45.1; 43.6-46.6)
Pharmacy technician (not owner)	1711 (42.7; 41.2-44.2)
Pharmacy technician and owner	83 (2.1; 1.6-2.5)
Pharmacist and owner	406 (10.1; 9.2-11.1)
Missing	707 (15.0)
Type of drug retail outlet (N= 3911)	
Independent pharmacy	3135 (80.2; 78.9-81.3)
Chain pharmacy	481 (12.3; 11.3-13.4)
Independent drug store	243 (6.2; 5.5-7.0)
Chain drug store	52 (1.3; 1.0-1.7)
Missing	805 (17.1)
Work experience (years) (N= 4000)	
<1	398 (10.0; 9.0-10.9)
1-5	1573 (39.3; 37.8-40.8)
6-10	1015 (25.4; 24.0-26.7)
>10	1014 (25.4; 24.0-26.7)
Missing	716 (15.2)
Number of outlets currently working at (N= 3986)	
1	2975 (74.6; 73.3-75.9)
2	750 (18.8; 17.6-20.0)
3*	261 (6.6; 5.8-7.4)
Missing	730 (15.5)
Number of staff in main outlet where respondent works (N= 3912)	
>3 staff members	1893 (48.4; 46.8-49.9)
≤3 staff members	2019 (51.6; 50.0-53.2)
Missing	804 (17.0)
Location of main outlet where respondent works (N= 3953)	
Java	2255 (57.0; 55.5-58.6)
Outside Java	1698 (43.0; 41.4-44.5)
Missing	763 (16.2)

Table 1: Respondent characteristics.

* According to the Indonesian Ministry of Health, pharmacists and pharmacy technicians are prohibited from working at more than three outlets.³⁴

COVID-19 rapid antibody test kit

Almost half of the respondents (1052/2445; 43.0%) said that they believed COVID-19 rapid antibody test kits were sold by some drug retail outlets. A quarter (691/

2445; 28.3%) of respondents felt that they should be made available through drug retail outlets, with another third (842/2445; 34.4%) reporting they were not sure. When asked about the likely price and sources of rapid antibody test kit, 88.6% (249/1051) estimated them to be under Rp.500000 (36 USD) and most commonly obtained from licensed wholesalers (874/1049; 83.3%), only 10.1% (106/1049) suspected they were obtained from online sellers.

Willingness to be involved in COVID-19 response efforts

Respondents were asked about their willingness to participate in public health responses to COVID-19 by providing verbal advice to clients (e.g., social distancing and when/where to seek medical advice); distributing information leaflets about COVID-19 prevention to clients (e.g., good hygiene practices and how to wear a face mask); and participating in surveillance activities (e.g., reporting the number of clients with key symptoms). The vast majority of respondents indicated a willingness (i.e., “moderately or very willing”) to be involved in all activities [i.e., provide verbal advice (97.8%), distribute information leaflets on COVID-19 (97.7%), and participate in surveillance activities (88.8%) (Table 3)].

Table 4 shows results of the multivariable analysis of factors associated with respondents reporting to be “very willing” to participate in the interventions described above. Older respondents [age group 34-40 years old (AOR 1.26 (1.04 - 1.52)) and age group 41-50 years old (AOR 1.82 (1.34 - 2.48))], those identifying as male [AOR 1.31 (1.04 - 1.66)], and those working in smaller drug retail outlets with 3 or fewer staff [AOR 1.31 (1.10 - 1.56)] were more willing to provide COVID-19 information leaflets to clients. Respondents who worked in drug retail outlets with fewer staff were more willing to engage in COVID-19 surveillance activities [AOR 1.36 (1.15 - 1.61)]. No correlates of willingness to provide verbal advice on COVID-19 to clients were found to be statistically significant (Supplementary Table 4).

Discussion

Many studies have explored the actions and experiences of public sector health workers during the COVID-19 crisis but far fewer have focussed on pharmacists and pharmacy technicians working in private drug retail outlets. Our study highlights the important roles these providers perform during the current pandemic in Indonesia as well as the challenges they face. It was revealed that reliable information including guidelines for those working in drug retail outlets has not been readily available. While standard operating procedures were issued by key professional organisations including the IAI and the FIP in early March 2020,^{28,30} these had

Variables	Pharmacist N (%; 95%CI)	Pharmacy technician N (%; 95%CI)	Total N (%; 95%CI)
Self-reported level of knowledge about COVID-19** (N=3461)			
Know nothing	1 (0.05; 0.0-0.4)	7 (0.5; 0.0-0.9)	8 (0.2; 0.1-0.4)
Know a little	1187 (60.9; 58.7-63.1)	1120 (74.0; 71.7-76.2)	2308 (66.7; 65.1-68.2)
Know a lot	759 (38.9; 36.8-41.2)	386 (25.5; 23.4-27.8)	1145 (33.1; 31.5-34.7)
Missing			1245 (26.4)
Received any information on COVID-19 (N=3462)			
Yes	1913 (98.2; 97.5-98.7)	1471 (97.2; 96.2-97.9)	3384 (97.8; 0.97-2-98.2)
No	35 (1.8; 1.3-2.5)	42 (2.8; 2.1-3.7)	78 (2.2; 0.18-0.28.0)
Missing			1254 (26.4)
Source of information (N=3384)*			
Online (e.g., social media, website)**	1793 (93.7; 92.5-94.7)	1295 (88.0; 86.2-89.6)	3088 (91.3; 90.2-92.2)
Offline (e.g., newspaper, professional organisation, conversation with friends)**	1790 (93.6; 92.3-94.5)	1314 (89.3; 87.6-90.8)	3104 (91.7; 90.7-92.6)
Both online and offline**	1730 (90.4; 89.0-91.7)	1175 (79.9; 77.8-81.8)	2905 (85.6; 84.6-86.9)
Missing			1332 (28.2)
What topics related to COVID-19 have you received information on? (N=3384)*			
How COVID-19 is transmitted**	1825 (95.4; 94.3-96.2)	1309 (88.9; 87.2-90.5)	3134 (92.6; 91.7-93.4)
Who is most at risk for COVID-19**	1751 (91.5; 90.2-92.7)	1170 (79.5; 77.4-81.5)	2921 (86.3; 85.1-87.4)
Symptoms of COVID-19**	1728 (90.3; 88.9-91.6)	1125 (76.5; 74.2-78.6)	2853 (84.3; 83.0-85.5)
Causes of COVID-19**	1686 (88.1; 86.6-89.5)	1120 (76.1; 73.9-78.2)	2806 (82.9; 81.6-84.2)
Prevention of COVID-19	1604 (83.8; 82.1-85.4)	1041 (70.7; 68.4-73.0)	2645 (78.2; 76.7-79.5)
Latest number of COVID-19 cases**	1450 (75.8; 73.8-77.6)	942 (64.0; 61.5-66.4)	2392 (70.7; 69.1-72.2)
Latest number of COVID-19 related deaths**	1435 (75.0; 73.0-76.9)	926 (62.9; 60.4-65.4)	2361 (69.8; 68.2-71.2)
Latest number of recovered cases**	1428 (74.6; 72.6-76.5)	913 (62.1; 59.6-64.5)	2341 (69.2; 67.6-70.7)
Treatment for COVID-19**	1303 (68.1; 65.9-70.2)	623 (42.3; 39.8-44.8)	1926 (56.9; 55.2-58.6)
Screening and testing for COVID-19**	1233 (64.4; 62.3-66.5)	670 (45.5; 43.0-48.1)	1903 (56.2; 54.6-57.9)
Missing			1332 (28.2)
Have you been given any guidelines on COVID-19 that relate to drug retail outlets? (N=3376)			
Yes	1423 (74.4; 72.4-76.3)	916 (62.5; 60.0-65.0)	2339 (69.3; 67.7-70.8)
No	435 (22.7; 20.9-24.7)	464 (31.7; 29.3-34.1)	899 (26.6; 25.1-28.1)
Don't know	54 (2.8; 2.1-3.7)	84 (5.7; 4.6-7.1)	138 (4.1; 3.4-4.8)
Missing			1340 (28.4)
In your understanding, what are the main ways COVID-19 is spread? (N= 3457)*			
Touching an infected surface, then face**	1855 (95.3; 94.2-96.1)	1374 (91.1; 89.5-92.3)	3229 (93.4; 92.5-94.1)
Inhaling droplets**	1683 (86.4; 84.8-87.8)	1052 (69.7; 67.3-71.9)	2736 (79.1; 77.7-80.5)
Touching an infected person	1003 (51.5; 49.2-53.7)	798 (52.9; 50.3-55.3)	1801 (52.1; 50.4-53.7)
Contact with the blood of an infected person	822 (42.2; 40.0-44.4)	588 (38.9; 36.5-41.4)	1410 (40.7; 39.2-42.4)
Breathing in the air	238 (12.2; 10.8-13.7)	155 (10.3; 8.8-11.9)	393 (11.4; 10.4-12.5)
Faecal-oral route**	138 (7.1; 6.0-8.3)	75 (4.9; 3.9-6.2)	213 (6.2; 5.4-7.0)
Drinking dirty water**	52 (2.7; 2.0-3.5)	25 (1.6; 1.1-2.4)	77 (2.2; 1.7-2.7)
Mosquito bites	11 (0.6; 0.3-1.0)	10 (0.6; 0.3-1.2)	21 (0.6; 0.4-0.9)
Missing			1259 (26.7)

Table 2: Self-reported knowledge and access to information on COVID-19 among pharmacists and pharmacy technicians.

* Respondents could tick more than one answer.

** $p < 0.05$.

not reached all providers by the time of the survey. Easy access to accurate and timely information is crucial, especially given the proliferation of “infodemic” around COVID-19, much of which is driven by social media.³⁵ Compared to pharmacists, fewer pharmacy technicians reported having received information about COVID-19.

Increased steps should be taken to ensure guidelines and training are available to all pharmacists and pharmacy technicians.

Actions to protect staff and clients from COVID-19 including the wearing of face masks, instructing clients to wear a face mask, and providing hand sanitiser to

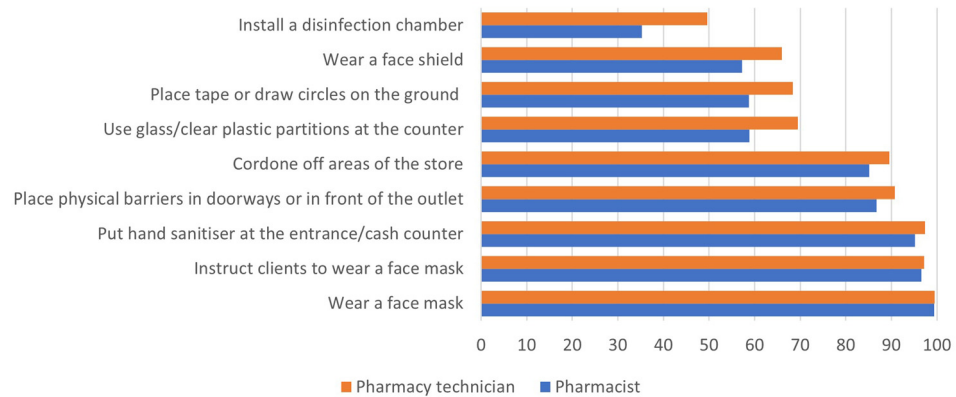


Figure 3. Practices of pharmacists and pharmacy technicians related to COVID-19.

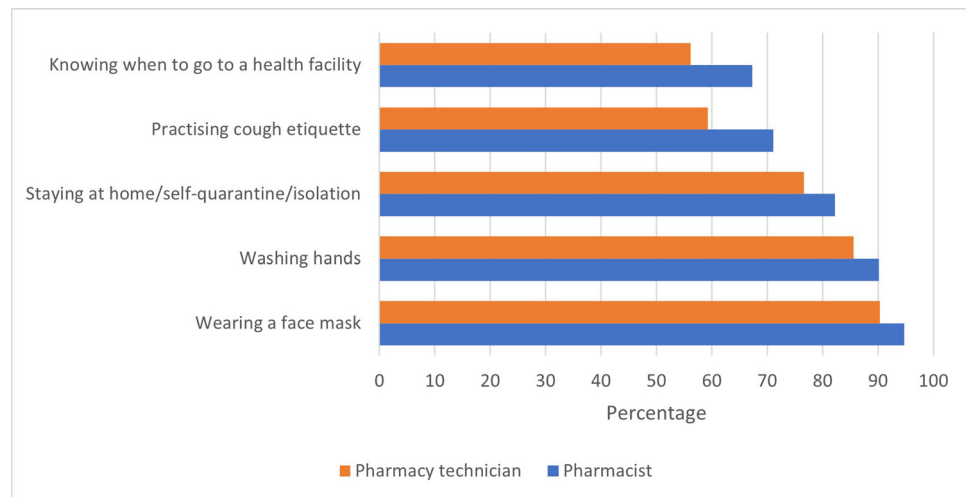


Figure 4. Advice provided to clients by pharmacists and pharmacy technicians on COVID-19.

clients were commonly practised. Most respondents also provided COVID-19 related information to clients including advice on wearing a face mask and washing their hands properly. While these safety measures have been widely implemented by staff working in community pharmacies in many countries,^{13,14,16} there have been reports that they have sparked patient anxiety and even aggression,⁵ fuelled by longer waiting times⁵ and increased out-of-pocket costs.¹⁶ Similarly, our study showed that some respondents were worried about frightening clients by using PPE, particularly face shields. They also reported barriers to accessing PPE and infection control products such as hand sanitiser, a challenge experienced in many other LMIC.^{36,37} This highlights the need for further strategies to assist pharmacists and pharmacy technicians in implementing safety and security measures during pandemics.

Around a third of respondents mentioned that they had provided antibiotics to clients suspected of having COVID-19. Over-the-counter dispensing of antibiotics

without prescription is common in Indonesia, driving another impending pandemic, antimicrobial resistance.⁴² Prior to the COVID-19 pandemic in Indonesia, we documented the frequent dispensing of Fradiomycin/Gramicidin lozenges by staff at community pharmacies and drug stores.²⁷ In this current study, we confirmed reports of the increase in demand for the antibiotic Azithromycin. This is likely because it is specifically mentioned in guidelines for management of patients with COVID-19.³⁸ Although most patients with COVID-19 do not also have a bacterial infection and therefore do not require any antibiotics, in the face of the pandemic, avoiding the use of antibiotics has been challenging. Other studies have also reported increased use of antibiotics in the community in both LMICs^{43,44} and high income countries.⁴⁵ Pharmacy technicians were more likely than pharmacists, to report selling antibiotics and other prescription-only medicines. This finding is consistent with a study (pre-COVID19) from Abu Dhabi showing that pharmacy technicians are



Figure 5. Proportion of respondents who suspected seeing clients with COVID-19 in the last week, by province.

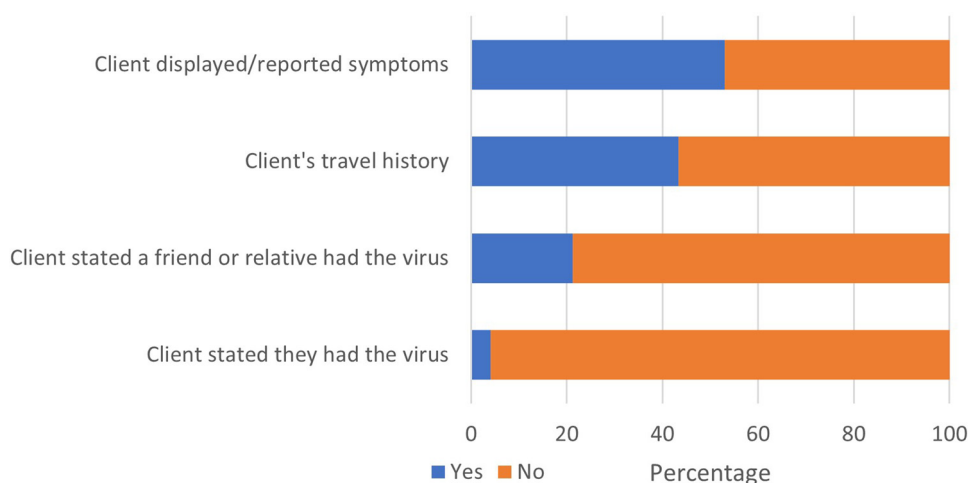


Figure 6. Reasons for suspecting a client had COVID-19.

more likely to sell antibiotics to their clients compared to pharmacists.³⁹ Countries should be closely tracking the use of antibiotics amid the COVID-19 pandemic and training health workers on antimicrobial stewardship.^{40,41}

Most respondents in this study were willing to support COVID-19 response efforts by providing verbal advice to clients, distributing information leaflets, and/or participating in early warning systems in the event of a disease outbreak. Given that pharmacists and pharmacy technicians are often the only point of contact with the health system for rural and/or remote communities, there is potential to expand their role as sources of reliable information both for COVID-19 and future pandemics. Smaller outlets were more willing to engage in outbreak surveillance activities. This might have been

due to the less complex administrative issues that the smaller outlets would have needed to complete compared to the larger outlets, particularly those working in chain pharmacies.

At the time of the survey, drug retail outlets were not authorised to sell COVID-19 rapid antibody test kits or any type of test kits for COVID-19, yet it had been reported that some were selling these test kits at highly variable prices.⁴⁶ In our study we asked participants about whether they suspected test kits were being sold despite the prohibition, and whether they felt retail drug outlets had a future role to play in their distribution. Around half of the respondents in our study believed these tests (sourced from online sellers or wholesale sellers) were being sold and conducted at drug retail outlets and a quarter were in support of this.

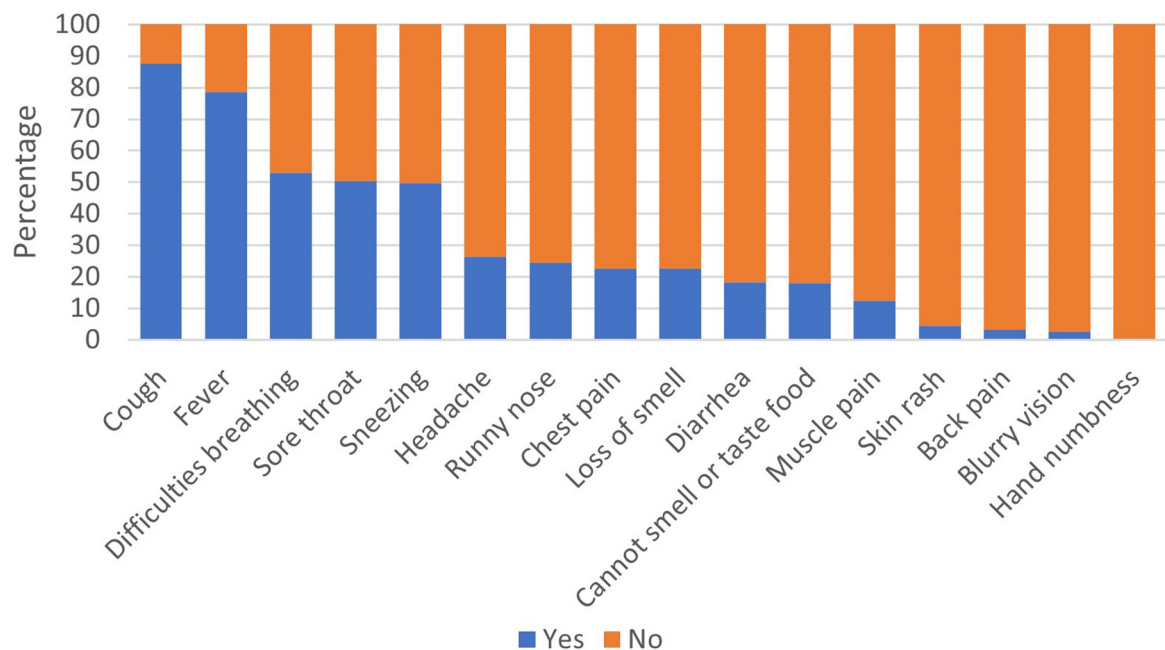


Figure 7. Symptoms of clients suspected of having COVID-19.

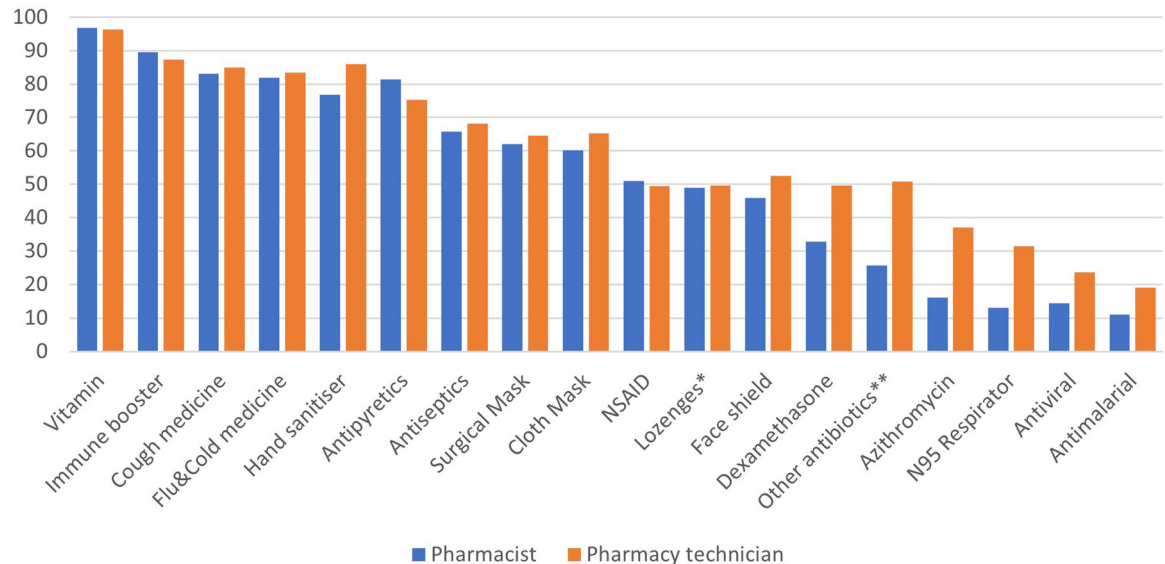


Figure 8. Medicines and other products sold to clients suspected of having COVID-19.

*including those containing an antibiotic.

**excluding azithromycin and lozenges.

A recent qualitative study from Jordan suggested a high level of willingness among community pharmacies to be involved in testing but expressed concerns about their lack of preparedness and training.¹⁰ In order to explore the possibility of extending the role of pharmacists or pharmacy technicians in providing COVID-19 testing in Indonesia, it will be important for the government to engage with drug retail outlets proactively.^{47,48}

One of the main limitations of this online survey is that it is difficult to ascertain the non-response rate and whether there were systematic differences between those who chose to participate compared to those who did not, which might have in turn influenced our findings.⁴⁹ For example, the under-representation of staff above 50 years of age, which may have been due to higher levels of internet illiteracy among older age

Willingness to provide verbal advice on COVID-19 to the client (N=2353)

Predictors	Unwilling (55/2353; 2.3%) N (%; 95%CI)	Moderately willing (688/2353; 29.4%) N (%; 95%CI)	Very willing (1610/2353; 68.4%) N (%; 95%CI)
Age (years)			
<30	27 (2.5; 1.7-3.7)	314 (29.6; 26.9-32.7)	718 (67.8; 64.9-70.5)
31-40	21 (2.2; 0.1-3.4)	278 (29.3; 26.5-32.3)	649 (68.5; 65.4-71.3)
41-50	5 (1.8; 0.1-4.3)	81 (29.6; 24.5-35.4)	188 (68.6; 62.7-73.7)
>50	2 (3.0; 0.0-1.2)	12 (18.2; 10.9-30.3)	52 (78.8; 66.2-86.6)
Gender			
Male	6 (1.3; 0.5-3.4)	127 (27.2; 23.4-31.4)	333 (71.5; 67.2-75.3)
Female	49 (2.7; 0.2-2.8)	544 (29.4; 27.4-31.6)	1252 (67.9; 65.7-70.0)
Rather not say	0 (0.0; 0.0-0.0)	17 (45.9; 30.6-62.1)	20 (54.1; 37.9-69.4)
Main workplace			
Pharmacy	53 (2.4; 1.8-3.1)	643 (29.4; 2.7-3.1)	1484 (68.2; 66.1-70.0)
Drug store	2 (1.2; 0.3-4.6)	45 (26.8; 20.6-34.0)	121 (72.0; 64.7-78.3)
Size of workplace			
>3 staff members	27 (2.4; 1.6-3.4)	338 (29.4; 26.8-32.1)	782 (68.2; 65.5-70.8)
≤ 3 staff members	28 (2.3; 1.6-3.4)	350 (29.1; 26.7-31.7)	823 (68.5; 65.8-71.1)
Concerned about getting COVID-19			
Not worried	3 (4.8; 1.5-13.8)	18 (28.6; 18.7-40.9)	42 (66.6; 54.1-77.2)
A little	22 (2.2; 1.4-3.8)	315 (32.0; 29.3-35.1)	643 (65.8; 52.6-68.5)
Very worried	30 (2.3; 1.6-3.2)	35 (27.2; 24.7-29.7)	920 (70.5; 68.0-72.9)
Number of suspected COVID-19 clients			
None	46 (2.3; 0.2-3.1)	582 (29.7; 27.7-31.8)	1329 (68; 65.8-69.9)
≤10 clients	9 (2.9; 0.2-5.5)	82 (26.5; 21.9-31.8)	218 (70.6; 65.2-75.3)
>10 clients	0 (0.0; 0.0-0.0)	688 (29.3; 20.4-40.0)	58 (70.7; 59.9-79.5)

Willingness to distribute information leaflets on COVID-19 (N=2350)

Predictors	Unwilling (54/2350; 2.3%)	Moderately willing (681/2350; 28.9%)	Very willing (1615/2350; 68.7%)
Age (years)			
<30	26 (2.5; 1.6-3.6)	349 (32.9; 30.1-35.8)	684 (64.6; 61.6-67.4)
31-40	22 (2.3; 1.5-3.5)	257 (27.1; 24.3-30.0)	669 (70.6; 67.6-73.4)
41-50	6 (2.2; 0.9-4.8)	57 (20.9; 16.4-26.1)	210 (76.9; 71.5-81.6)
>50	0 (0.0; 0.0-0.0)	16 (24.2; 15.8-37.1)	50 (75.8; 62.9-84.1)
Gender			
Male	5 (1.1; 0.4-2.5)	115 (24.7; 21.0-28.9)	346 (74.2; 70.0-78.0)
Female	49 (2.7; 2.0-3.5)	547 (29.6; 27.6-31.8)	1251 (67.7; 65.5-69.7)
Rather not say	0 (0.0; 0.0-0.0)	19 (51.3; 35.4-66.9)	18 (48.7; 33.0-64.6)
Main workplace			
Pharmacy	51 (2.3; 1.8-3.1)	638 (29.3; 27.4-31.2)	1492 (68.4; 66.4-70.3)
Drug store	3 (1.8; 0.6-5.3)	43 (25.4; 19.4-32.5)	123 (72.8; 65.6-78.9)
Size of workplace			
>3 staff members	33 (2.9; 2.0-4.0)	360 (31.4; 28.8-34.2)	754 (65.7; 62.9-68.4)
≤ 3 staff members	21 (1.7; 1.1-2.7)	321 (26.7; 24.3-29.3)	861 (71.6; 68.9-74.0)
Concern of getting COVID-19			
Not worried	5 (7.9; 3.3-17.8)	19 (30.2; 20.0-42.6)	39 (61.9; 49.3-73.1)
A little	25 (2.5; 1.7-3.7)	285 (29.0; 26.3-31.9)	673 (68.5; 65.4-71.2)
Very worried	24 (1.8; 1.2-2.7)	377 (28.9; 26.5-31.4)	903 (69.3; 66.7-71.7)

Table 3 (Continued)

Willingness to distribute information leaflets on COVID-19 (N=2350)			
Predictors	Unwilling (54/2350; 2.3%)	Moderately willing (681/2350; 28.9%)	Very willing (1615/2350; 68.7%)
Number of suspected COVID-19 clients			
None	44 (2.3; 1.7-3.0)	568 (29.0; 27.1-31.1)	1346 (68.7; 66.6-70.7)
≤10 clients	8 (2.6; 1.3-5.1)	94 (30.3; 25.4-35.7)	208 (67.1; 61.6-72.1)
>10 clients	2 (2.4; 0.6-9.3)	19 (23.2; 15.3-33.6)	61 (74.4; 63.8-82.7)
Willingness to participate in surveillance activities (N=2350)			
Predictors	Unwilling (264/2350; 11.2%)	Moderately willing (1074/2350; 45.7%)	Very willing (1012/2350; 43.1%)
Age (years)			
<30	111 (10.5; 8.7-12.4)	516 (48.6; 45.6-51.6)	434 (40.9; 37.9-43.9)
31-40	116 (12.2; 10.3-14.5)	411 (43.4; 40.2-46.5)	421 (44.4; 41.3-47.6)
41-50	32 (11.7; 8.3-16.1)	117 (42.7; 36.9-48.6)	125 (45.6; 39.8-51.6)
>50	5 (7.8; 3.2-17.5)	28 (43.8; 32.1-56.1)	31 (48.4; 36.4-60.6)
Gender			
Male	50 (10.7; 8.2-13.9)	206 (44.2; 39.7-48.8)	210 (45.1; 40.6-49.6)
Female	209 (11.3; 9.9-12.8)	849 (46.0; 43.7-48.2)	789 (42.7; 40.5-44.9)
Rather not say	5 (13.5; 5.7-28.9)	19 (51.4; 35.4-66.9)	13 (35.1; 21.5-51.8)
Main workplace			
Pharmacy	242 (11.1; 9.8-12.5)	1012 (46.4; 44.3-48.5)	927 (42.5; 40.4-44.6)
Drug store	22 (13.0; 8.7-19.0)	927 (42.5; 29.7-44.2)	85 (50.3; 42.8-57.8)
Size of workplace			
>3 staff members	149 (13.0; 11.2-15.1)	551 (48.0; 45.2-50.9)	447 (39.0; 36.2-41.8)
≤3 staff members	115 (9.6; 8.0-11.4)	523 (43.5; 40.7-46.2)	565 (46.9; 44.2-49.8)
Concerned about getting COVID-19			
Not worried	8 (12.5; 6.3-23.1)	29 (45.3; 33.5-57.6)	27 (42.2; 30.7-54.6)
A little	107 (10.9; 9.1-13.0)	475 (48.4; 45.2-51.6)	399 (40.7; 37.6-43.7)
Very worried	14 (11.4; 9.8-13.3)	570 (43.7; 41.0-46.4)	586 (44.9; 42.2-47.6)
Number of suspected COVID-19 clients			
None	218 (11.1; 9.8-12.6)	892 (45.6; 43.4-47.8)	848 (43.3; 41.1-45.5)
≤10 clients	41 (13.2; 9.9-17.5)	142 (45.8; 40.3-51.4)	127 (40.9; 35.6-46.5)
>10 clients	5 (6.1; 2.5-13.9)	40 (48.8; 38.1-59.6)	37 (45.1; 34.7-56.0)

Table 3: Respondents' willingness to engage in the COVID-19 response, by respondent and workplace characteristics.

groups, could have biased our results. We also could not determine if a respondent completed the survey more than once. It is also important to note that this study was conducted in the initial months of the COVID-19 pandemic. Given how quickly the pandemic is evolving in Indonesia, it could be that some of the issues identified have changed or been addressed. Caution should also be taken when interpreting the result on number of clients visiting the outlets, as this was based on estimates provided by drug outlet staff.

Our research has identified several key lessons for future response efforts. First, it has exposed the fragility of medical supply chains for infection control products including PPE and the need to strengthen local sourcing and production to help prevent the risk of stock-outs during any future health crises. Second, our results point to frequent antibiotic use among COVID-19 patients attending drug retail outlets in Indonesia. The

potential knock-on effects this can have on the containment of antimicrobial resistance are significant.⁵⁰ Third, it is likely that COVID-19 rapid antibody test kits were available among drug retail outlets (especially via online pharmacies) despite not being approved for purchase. Future response efforts must involve the early monitoring and regulation of these tests to ensure their safe use in the community. Fourth, provided they have access to accurate guidance and information, many pharmacies are willing to actively participate in response efforts including through surveillance and communication. Thus, our study supports recent calls for expanding the role of private drug outlets during future outbreaks.⁶

Finally, what COVID-19 has shown globally is that effective whole-of-health system responses are needed to effectively deal with major public health threats. In countries like Indonesia where there is a dominant

Predictors	Willingness to distribute leaflets on COVID-19 to clients		Willingness to participate in COVID-19 related surveillance activities	
	AOR [@] * (95%CI)	p-value	AOR [@] * (95%CI)	p-value
Age (years)				
≤30	1			
31-40	1.26 (1.04 - 1.52)	0.018		
41-50	1.82 (1.34 - 2.48)	<0.001		
>50	1.58 (0.88 - 2.82)	0.125		
Gender				
Female	1			
Male	1.31 (1.04 - 1.66)	0.020		
Rather not say	0.46 (0.24 - 0.89)	0.021		
Type of drug retail outlet				
Pharmacy			1	
Drug store			1.23 (0.90 - 1.70)	0.187
Size of drug retail outlet				
> 3 staff members	1		1	
≤3 staff members	1.31 (1.10 - 1.56)	0.003	1.36 (1.15 - 1.61)	<0.001
Level of concern about getting COVID-19				
Not worried				
A little				
Very worried				
Number of suspected COVID-19 client				
None				
≤10 clients				
>10 clients				

Table 4: Correlates of willingness to participate in COVID-19 response.

[@] AOR: Adjusted Odds Ratio.

* 'very willing' compared to 'moderately willing' and 'unwilling' combined.

private sector, the ability to rapidly mobilise these actors is critical. What we have observed in this study is that while pharmacists have taken on many different roles to protect the community and their staff during the COVID-19 pandemic, these actions on the most part have been ad hoc and not well-integrated into national pandemic management. This is an ideal time for countries such as Indonesia to begin strengthening and updating existing regulatory and community health frameworks to accommodate the changing roles of drug retail outlets during public health crises.

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Data sharing statement

The data that underpin these findings may be released following a written request to the last author.

Declaration of interests

All authors declare no competing interests.

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Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.lanwpc.2022.100420.

References

- Al-Quteimat OM, Amer AM. SARS-CoV-2 outbreak: how can pharmacists help? *Res Soc Adm Pharm*. 2021;17(2):480–482. Feb.
- Cadogan CA, Hughes CM. On the frontline against COVID-19: community pharmacists' contribution during a public health crisis. *Res Soc Adm Pharm*. 2021;17(1):2032–2035.
- Ung COL. Community pharmacist in public health emergencies: quick to action against the coronavirus 2019-nCoV outbreak. *Res Soc Adm Pharm*. 2020;16(4):583–586.
- Zheng SQ, Yang L, Zhou PX, Li HB, Liu F, Zhao RS. Recommendations and guidance for providing pharmaceutical care services during COVID-19 pandemic: a China perspective. *Res Soc Adm Pharm*. 2021;17(1):1819–1824.
- Hayden JC, Parkin R. The challenges of COVID-19 for community pharmacists and opportunities for the future. *Ir J Psychol Med*. 2020;37(3):198–203.
- Aruru M, Truong HA, Clark S. Pharmacy Emergency Preparedness and Response (PEPR): a proposed framework for expanding pharmacy professionals' roles and contributions to emergency preparedness and response during the COVID-19 pandemic and beyond. *Res Soc Adm Pharm*. 2021;17(1):1967–1977.
- Miller S, Patel N, Vadala T, Abrons J, Cerulli J. Defining the pharmacist role in the pandemic outbreak of novel H1N1 influenza. *J Am Pharm Assoc*. 2012;52(6):763–767.
- Goff DA, Ashiru-Oredope D, Cairns KA, et al. Global contributions of pharmacists during the COVID-19 pandemic. *J Am Coll Clin Pharm JACCP*. 2020;(September):1–13.
- Schwerzmann J, Graitcer SB, Jester B, et al. Evaluating the impact of pharmacies on pandemic influenza vaccine administration. *Disaster Med Public Health Prep*. 2017;11(5):587–593.
- Mukattash TL, Jarab AS, Abu-Farha RK, et al. Willingness and readiness to test for COVID-19: a qualitative exploration of community pharmacists. *Int J Clin Pract*. 2020;74(12).
- Kretchy IA, Asiedu-Danso M, Kretchy JP. Medication management and adherence during the COVID-19 pandemic: perspectives and experiences from low-and middle-income countries. *Res Soc Adm Pharm*. 2021;17(1):2023–2026. Jan.
- Khojah HMJ. Community pharmacy services and preparedness during COVID-19 outbreak in Madinah, Saudi Arabia. *Saudi Pharm J*. 2020;28(11):1402–1407.
- Itani R, Karout S, Khojah HMJ, et al. Community pharmacists' preparedness and responses to COVID-19 pandemic: a multinational study. *Int J Clin Pract*. 2021;(May):1–10.
- Alshahrani A. Readiness of community pharmacists to play a supportive and advocacy role in the fight against corona virus disease. *Risk Manag Healthc Policy*. 2020;13:3121–3133.
- Zaidi STR, Hasan SS. Personal protective practices and pharmacy services delivery by community pharmacists during COVID-19 pandemic: results from a national survey. *Res Soc Adm Pharm*. 2021;17(1):1832–1837.
- Hoti K, Jakupi A, Hetemi D, Raka D, Hughes J, Desselle S. Provision of community pharmacy services during COVID-19 pandemic: a cross sectional study of community pharmacists' experiences with preventative measures and sources of information. *Int J Clin Pharm*. 2020;42(4):1197–1206.
- World Bank. Indonesia health sector review. Pharmaceuticals: Why reform is needed [Internet]. 2009. Available from: <http://documents.worldbank.org/curated/en/299321468284127594/pdf/594710BRIOPharBox358283BotPUBLIC1.pdf>.
- The Indonesian Ministry of Health. Mapping of Pharmaceutical Facilities 2013 - 2018 (Aplikasi Pemetaan Sarana Kefarmasian 2013-2018) [Internet]. [cited 2021 Aug 5]. Available from: https://www.farmalkes.kemkes.go.id/index.php?req=view_services&p=rekapitulasilkot.
- Hermansyah A, Wulandari L, Kristina SA, Meilianti S. Primary health care policy and vision for community pharmacy and pharmacists in Indonesia. *Pharm Pract (Granada)*. 2020;18(3):2085.. Jul 22.
- Kristina SA, Herliana N, Hanifah S. The perception of role and responsibilities during covid-19 pandemic: a survey from Indonesian pharmacists. *Int J Pharm Res*. 2020;12(November):3034–3039.
- Hess K, Bach A, Won K, Seed SM. Community pharmacists roles during the COVID-19 pandemic. *J Pharm Pract*. 2020.
- Lapor COVID-19. Terima Kasih Pahlawan Kesehatan Indonesia [Internet]. 2020 [cited 2021 Aug 5]. Available from: <https://nakes.laporcovid19.org/>.
- WHO. WHO Coronavirus Disease (COVID-19) Dashboard With Vaccination Data [Internet]. World Health Organization. 2021 [cited 2022 Feb 2]. Available from: <https://covid19.who.int/region/searo/country/id>.
- Pemerintah Republik Indonesia. Peraturan Pemerintah Republik Indonesia No 51 Tahun 2009. 2009.
- Ikatan Apoteker Indonesia. Peraturan Organisasi tentang Standar Minimal Jasa Profesi Apoteker di Apotek dan Klinik. Indonesia; 2019 p. 1–6.
- Eysenbach G. Improving the quality of Web surveys: the Checklist for Reporting Results of Internet E-Surveys (CHERRIES). *J Med Internet Res*. 2004;6(3):e34.. Sep 29–e34.
- Wulandari LPL, Khan M, Liverani M, et al. Prevalence and determinants of inappropriate antibiotic dispensing at private drug retail outlets in urban and rural areas of Indonesia: a mixed methods study. *BMJ Glob Heal*. 2021;6(8):e004993.
- International Pharmaceutical Federation. FIP Covid-19 Information Hub [Internet]. 2020 [cited 2021 Aug 5]. Available from: <https://www.fip.org/coronavirus>.
- The Pharmacy Guild of Australia. Pandemic Planning and Guidelines - Pharmacy Guild of Australia [Internet]. 2020 [cited 2021 Aug 5]. p. 11. Available from: <https://www.guild.org.au/resources/business-operations/covid-19/covid-19-guide-for-community-pharmacy>.
- Indonesian Pharmacist Association. Standard operational procedures on provision of services to clients during COVID-19 pandemic [Standar Prosedur Operasi Pelayanan Pelanggan Selama Masa KLB COVID-19]. 2020.
- Brislin RW. Back-translation for cross-cultural research. *J Cross Cult Psychol*. 1970;1(3):185–216.
- Harris PA, Taylor R, Minor BL, et al. The REDCap consortium: building an international community of software platform partners. *J Biomed Inform*. 2019;95:103208. Jul.
- Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)-a metadata-driven

- methodology and workflow process for providing translational research informatics support. *J Biomed Inform.* 2009;42(2):377–381. Apr.
- 34 Kemenkes RI. Peraturan Menteri Kesehatan Republik Indonesia No 889 Tahun 2011 tentang Registrasi, Ijin Praktek dan Izin Kerja Tenaga Kefarmasian. Kementerian Kesehatan Republik Indonesia; 2011:4.
 - 35 Dzingirai B, Matyanga CMJ, Mudzviti T, Siyawamwaya M, Tagwireyi D. Risks to the community pharmacists and pharmacy personnel during COVID-19 pandemic: perspectives from a low-income country. *J Pharm Policy Pract.* 2020;13(1):1–6.
 - 36 Haque M, Kumar S, Charan J, Bhatt R, Islam S, Dutta S, et al. Utilisation, availability and price changes of medicines and protection equipment for COVID-19 among selected regions in India: findings and implications. *Front Pharmacol.* 2021;11(January):1–17. Jan 14.
 - 37 Godman B, Haque M, Islam S, et al. Rapid assessment of price instability and paucity of medicines and protection for COVID-19 across Asia: findings and public health implications for the future. *Front Public Heal.* 2020;8(December):1–19. Dec 14.
 - 38 Burhan E, Susanto AD, Nasution SA, et al. Protokol Tatalaksana Pasien Terkonfirmasi Covid-19. 2020;4.
 - 39 Dameh M, Green J, Norris P. Over-the-counter sales of antibiotics from community pharmacies in Abu Dhabi. *Pharm World Sci.* 2010;32(5):643–650.
 - 40 Adebiyi YA, Jimoh ND, Ogunkola IO, et al. The use of antibiotics in COVID-19 management: a rapid review of national treatment guidelines in 10 African countries. *Tropical Medicine and Health.* 2021;49(1):51.
 - 41 Chitungo I, Dzinamarira T, Nyazika TK, Herrera H, Musuka G, Murewanhema G. Inappropriate antibiotic use in Zimbabwe in the COVID-19 Era: a perfect recipe for antimicrobial resistance. *Antibiotics.* 2022;11(2).
 - 42 Rawson TM, Ming D, Ahmad R, Moore LSP, Holmes AH. Antimicrobial use, drug-resistant infections and COVID-19. *Nat Rev Microbiol.* 2020;18(8):409–410.
 - 43 Elsayed AA, Darwish SF, Zewail MB, Mohammed M, Saeed H, Rabea H. Antibiotic misuse and compliance with infection control measures during COVID-19 pandemic in community pharmacies in Egypt. *Int J Clin Pract.* 2021;75(6):1–11.
 - 44 Sulis G, Batomen B, Kotwani A, Pai M, Gandra S. Sales of antibiotics and hydroxychloroquine in India during the COVID-19 epidemic: an interrupted time series analysis. Knight GM, editor *PLOS Med.* 2021;18(7):e1003682. Jul 1.
 - 45 Mian M, Sreedharan S, Giles S. Increased dispensing of prescription medications in Australia early in the COVID-19 pandemic. *Med J Aust.* 2021;214(9):428–429.
 - 46 PatKlin PDS. Revisi Panduan Tatalaksana Pemeriksaan Rapid Test Antibody SARS-CoV-2 Metode Imunokromatografi. 2020 p. 1–15.
 - 47 Hendarwan H, Syachroni S, Aryastami NK, et al. Assessing the COVID-19 diagnostic laboratory capacity in Indonesia in the early phase of the pandemic. *WHO South-East Asia J public Heal.* 2020;9(2):134–140.
 - 48 Djalante R, Lassa J, Setiamarga D, et al. Review and analysis of current responses to COVID-19 in Indonesia: period of January to March 2020. *Prog Disaster Sci.* 2020;6:100091.
 - 49 Andrews D, Nonnecke B, Preece J. Electronic survey methodology: a case study in reaching hard-to-involve internet users. *Int J Hum Comput Interact.* 2003;16(2):185–210.
 - 50 Lucien MAB, Canarie MF, Kilgore PE, et al. Antibiotics and antimicrobial resistance in the COVID-19 era: perspective from resource-limited settings. *Int J Infect Dis.* 2021;104(52):250–254.