2nd UPhIC
UNISSULA PHARMACY INTERNATIONAL CONFERENCE

WORLD CLASS ISLAMIC CYBER UNIVERSITY
UNISSULA
SULTAN AGUNG ISLAMIC UNIVERSITY

Article

Profile of Household Drug Management in Indonesia

Fildza Huwaina Fathnin[1,2]*, Satibi[3], Dwi Endarti[3] and Lutfan Lazuardi[4]

[1] Doctoral Program, Faculty of Pharmacy, Universitas Gadjah Mada; fildzahuwainafathin@mail.ugm.ac.id
[2] Faculty of Pharmacy, Universitas Islam Sultan Agung; fildzahuwainafathnin@unissula.ac.id
[3] Faculty of Pharmacy, Universitas Gadjah Mada; satibi@ugm.ac.id
[4] Faculty of Medicine, Universitas Gadjah Mada; lutfan.lazuardi@ugm.ac.id

* Correspondence: fildzahuwainafathnin@unissula.ac.id; Tel.: +62 8564 2648 894

Abstract: (1) Background: Poor drug management in households is one of the causes of irrational drug use in self-medication. The high rate of self-medication and drug storage in households in Indonesian society is the basis for this study to determine the profile of drug management at home; (2) Method: The study employs an observational analytical approach by questionnaires. The study used a cross-sectional design by online survey and was carried out in Indonesia; (3) Results: The study obtained 1265 respondents. Selection, a majority of respondents (37.2%) choose drug based on advice from family. Purchasing, a majority said they were confused on purchasing the same drug by different brand (50.2%) dan price(50.8%). A majority of respondents said they were confused about how to take the drug (43.9%), how to change the drug if the condition does not improve (48.1%), how to determine the frequency (42%), duration(50.9%), forgetting to take the drug(50.7%). The main reason for storing medicine is as a supply if needed (34.9%), 1-3 types of medicine stored (51.1%) with a total of 6-10 packs/bottles of medicine (34.5%), with overall estimated value of IDR 46,516. Majority of respondents put away in the trash (27.5%), they felt knew how to dispose drug(88.1%), never take-back program(88.1%); (4) Conclusions: All sub-practices of drug management needed improvement, especially of drug management in Indonesian households, allowing this study to highlight risks for targeting treatments based on goals

Keywords: Selection; Purchasing; use; storage; disposal; household; Take back program.

1. Introduction

Household drug management is an activity carried out by consumers or the community that involves 5 sub-practices of drug management, namely selection, purchase, use, storage, and disposal [1]. Drug management that is not carried out properly will have an impact on clinical, environmental, social, and economic conditions [2][3][4][5]. The Indonesian population who use drugs for self-medication is 84.34% [6]. [7] in basic health research noted that 50.7% of households in Indonesia store drugs for self-medication.

Leftover drugs that are not consumed because they have expired or are damaged at the household level will become drug waste which is included in B3 waste [8][9]. Other impacts such as the social impact of illegal drug sales can occur. There is a possibility that the drug will be re-circulated for sale, this emerged in the research of [3] in China, that 0.6% of respondents resold their remaining drugs. Research by [10] tated that the rationality of drug use in the self-medication process was only 59.4%. The impact of this irrationality can give rise to adverse drug events [5]. Recent research by [11] stated that there are still many leftover and expired drugs, which is caused by the community's insufficient knowledge of the proper way to manage drugs. In addition, research by [12] also stated that the low level of knowledge regarding the management of damaged and

expired drugs is due to inadequate information. This makes people unaware of the practice of proper drug disposal.

In determining and developing appropriate interventions, a detailed description of practices and ethnography in the social environment is needed [13]. Household drug management practices can be described in the form of a profile. Therefore, the main objective of this study is to determine the profile of household drug management in Indonesia. It is hoped that the results of this study can be the basis for developing improvement interventions afterwards.

2. Materials and Methods

This type of research is quantitative descriptive with a cross-sectional design. Respondents in the study were selected based on inclusion and exclusion criteria, according to the technique used, namely purposive sampling. The subjects of this study were people in Indonesia who could access this research information with inclusion and exclusion criteria.

Inclusion Criteria:

- Aged > 18 years
- Managing medicine at home
- Having an Android smartphone
- Being able to read and answer research questions
- Willing to participate in the study by agreeing to informed consent

Exclusion Criteria:

- Incomplete data filled in
- Health workers
- Having a health education background

The study began with the submitting of ethical clearance. The instrument used in the research process was a questionnaire. The survey question items consisted of 17 items regarding drug management in the household with details of selection (1 item), purchase (4 items), use (7 items), storage (9), disposal (4). The questionnaire was distributed via *google form* (online) with the first sheet containing informed consent.

The data analyzed descriptively to see the frequency and percentage. Data with a Likert scale of 1-5 will be collected for its tendency to be positive (merge the frequency of agree and strongly agree) and negative (merge the frequency of strongly disagree and disagree).

3. Results

The respondents obtained in this study were 1265. This study has obtained ethical approval from the Bioethics Commission of the Faculty of Medicine, Sultan Agung Islamic University with Number 136/IV/2024/Bioethics Commission.

3.1. The characteristics of respondents

The characteristics of respondents in this study were dominated by women (54.5%), aged 26-35 years (54.9%), higher education (60.2%), marital status unmarried/notmarried (53.7%), employment status private employees (48.5%), with an income of IDR 4,000,000 - 5,000,000 (32.8%), number of family members 4 (38%), no history of disease (52.2%) and treatment (51.9%). The respondent provinces were spread across 32 locations out of 38 provinces in Indonesia, with the largest respondents in Central Java (26.88%). The highest disease that was most often treated was allergies (138 cases) in line with the type of drug most often consumed was antihistamines (160 cases) (Table1).

Table 1. The characteristics of respondents

Characteristic	N	(%)
Gender		
Male	575	45,5
Female	690	54,5
Age		
18-25 years	354	28,0
26-35 years	695	54,9
36-65 years	216	17,1
Education		
Low (Elementary, Middle, High School)	503	39,8
High (Undergraduate, Postgraduate)	762	60,2
Marital Status		
Unmarried	679	53,7
Married	586	46,3
Employment Status		
Not/Not Working	284	22,5
Entrepreneur	196	15,5
Government Employee	172	13,6
Private Employee	613	48,5
Income		
<1000000	86	6,8
1000000-2000000	126	10,0
2000000-3000000	198	15,7
3000000-4000000	341	27,0
4000000-5000000	415	32,8
5000000-6000000	90	7,1
>6000000	9	0,7
Number of Family Members		
1	4	0,3
2	65	5,1
3	411	32,5
4	481	38,0
5	203	16,0
>5	101	8,0
Medical History		
Yes	609	47,3
No	656	52,2
Type of Disease (10 highest)		
Allergy	138	
Hypertension	111	
Diabetes	101	
Pain to	74	
Stroke	65	
Sinusitis	64	
Gastrointestinal	59	
Cholesterol	56	
Migraine	41	
Heart Disease	39	

Sore Throat	33	
Treatment History		
Yes	609	48,1
No	656	51,9
Type of Medication (10 highest)		
Antihistamines	160	
Antidiabetics	92	
Antibiotics	84	
Analgesics	72	
Decongestants	61	
Antihypertensives	58	
Anticholesterol	56	
Stroke medication	54	
Antipyretics	48	
Gastrointestinal Medication	44	
Province of Origin		
Aceh	11	0,87
Bali	7	0,55
Banten	54	4,27
Bengkulu	1	0,08
DIY	31	2,45
DKI Jakarta	152	12,02
Jambi	7	0,55
West Java	215	17,00
Central Java	341	26,88
East Java	245	19,37
West Kalimantan	11	0,87
South Kalimantan	6	0,47
Central Kalimantan	8	0,63
East Kalimantan	22	1,74
North Kalimantan	4	0,32
Bangka Belitung Islands	2	0,16
Riau Islands	11	0,87
Lampung	13	1,03
Maluku	7	0,55
North Maluku	7	0,55
NTB	7	0,55
NTT	7	0,55
Papua	5	0,40
West Papua	4	0,32
Southwest Papua	1	0,08
South Sulawesi	9	0,71
Sulawesi Central	5	0,40
Southeast Sulawesi	3	0,24
North Sulawesi	16	1,26
West Sumatra	16	1,26
South Sumatra	16	1,26
North Sumatra	21	1,66

3.2. Profile of Household Drug Management

In selection practices, most respondents get their information sources from recommendations from family or friends in determining drugs (37,2%) (Image 1).

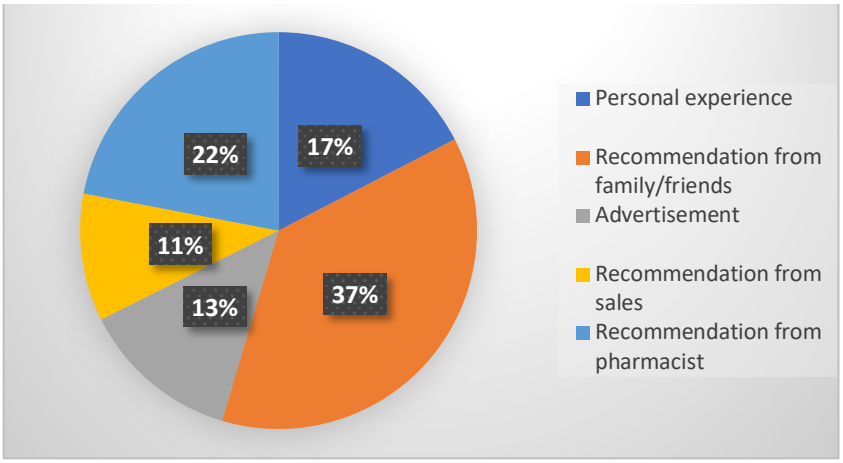

Figure 1. Consideration in drug selection

Purchasing practices, most respondents were not confused about where to buy medicine (49.6%), but agreed that they did not know affordable drugs (48.4%), were confused about buying the same drug but a different brand (50.2%), and determining the amount to be purchased (50.8%) (Table 2).

Table 2. Purchase and Use Sub Practice

Item	SD		D		N		A		SA	
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Purchase										
Confused in determining where to buy medicine	369	29,2	258	20,4	107	8,5	366	28,9	165	13,0
Not knowing which medicine is more affordable	201	15,9	288	22,8	164	13,0	298	23,6	314	24,8
Confused in buying the same medicine but different brands	278	22,0	229	18,1	124	9,8	432	34,2	202	16,0
Confused in determining the amount of medicine purchased	174	13,8	328	25,9	120	9,5	300	23,7	343	27,1
Use										
Confused in determining the frequency of taking medication	357	28,2	248	19,6	128	10,1	362	28,6	170	13,4
Confused in determining the duration of taking medication	222	17,5	289	22,8	110	8,7	297	23,5	347	27,4
Difficulty understanding how to take medication	256	20,2	341	27,0	112	8,9	356	28,1	200	15,8
Not knowing the follow-up when the illness improves	247	19,5	264	20,9	119	9,4	321	25,4	314	24,8
Changing medication or increasing the dose when the illness does not improve	272	21,5	283	22,4	102	8,1	340	26,9	268	21,2
Stopping medication when side effects occur*	70	5,5	353	27,9	91	7,2	531	42,0	220	17,4
Forget to take medication on time	149	11,8	292	23,1	183	14,5	345	27,3	296	23,4

abbreviation: SD (Strongly disagree); D (Disagree), N (Neutral), A (Agree), SA (Strongly agree)

Usage, most agreed to feel confused about determining the frequency (42%), duration (50.9%), how to take the medicine (43.9%), determining follow-up if it improves (50.2%),

how to change the medicine if the condition does not improve (48.1%), immediately stopping due to side effects (59.4%), and forgetting to take the medicine (50.7%). Storage, the biggest reason for storing medicine is as a supply if needed (34.9%), 1-3 types of medicine stored (51.1%) with a total of 6-10 packs/bottles of medicine (34.5%), using medicine box (40.6%), arranging according to expiration date (84.2%), and having damaged/ED medicine (71.1%). Average estimated value of stored drugs IDR 98.040, damage drugs IDR 19.946, and expired drugs IDR 26.570. The disposal stage, most immediately threw it into the household trash (27.5%), felt they knew how to dispose of medicine (88.1%), did not know the take-back program (88.1%), and never returned the medicine to the pharmacy (69.6%) (Table 3).

Table 3. Storage and Disposal Subpractice

Item	N	(%)
Storage		
(1) Reasons for storing medicine		
As a supply in case it is needed later	441	34,9
Feel a shame if it is thrown away	420	33,2
Doctors prescribe routine medicine	318	25,1
Medicines are sold in large packages	83	6,6
Others	3	0,2
(2) Number of types of medicine stored		
1 – 3 types	646	51,1
4 – 6 types	521	41,2
> 6 types	98	7,7
(3) Number of medicines stored		
Not sure	136	10,8
1 – 5 packs/bottles	425	33,6
6 – 10 packs/bottles	436	34,5
11 – 15 packs/bottles	212	16,8
> 20 packs/bottles	56	4,4
(4) Places to store medicine		
In the medicine box	514	40,6
On the refrigerator door	422	33,4
In the refrigerator freezer	241	19,1
Not sure	88	7,0
(5) Arranging medicines according to expiration date		
Yes	1065	84,2
No	200	15,8
(6) Having expired, damaged, or leftover medicines at home		
Yes	900	71,1
No	365	28,9
(7) Average estimated value of stored drugs	IDR 98.040 ± 177.945 (0 – 1.500.000)*	
(8) Average estimated value of damaged drugs	IDR 19.946 ± 50.328 (0 – 500.000)*	
(9) Average estimated value of expired drugs	IDR 26.570 ± 147.406 (0 – 2.000.000)*	
Disposal		
(1) How to dispose of leftover, damaged, or expired drugs		
Throw directly into household trash	348	27,5
Throw directly into the toilet	322	25,5
Crush/dilute the drug and then throw it away	337	26,6
Return to the nearest pharmacy	188	14,9
Give to family/friends	70	5,5
(2) Knowledge of how to dispose of drugs		
Know	1115	88,1

Don't Know	150	11,9
(3) Knowledge of take back program		
Know	331	26,2
Don't Know	934	73,8
(4) Ever returned drugs to the pharmacy (implementation of take back program)		
Ever	385	30,4
Never	880	69,6

*Amount + SD (min-max)

4. Discussion

Based on the characteristic's of 1265 respondents, allergies are the most treated disease which is in line with the type of drug was antihistamines. It can happen because of non-specific external environmental exposure to weather, which is in line with research [14] that 58% of respondents in their study suffered from allergies due to weather. Cold, humid, hot conditions and sudden changes in temperature can trigger the formation of autoantigens de novo and induce an IgE response [15]. This possibility is strong because Indonesia has a large tropical archipelago with a complex and dynamic climate. The use of antihistamines has increased in addition to allergic conditions, antihistamines are included in the group of limited over-the-counter drugs that can be obtained without a doctor's prescription with a limited amount that has been regulated in the regulations of the Minister of Health [16]. This study provides an overview of 5 subpractices of household drug management. The drug selection process tends to consider family recommendations. This can happen because consumer decisions and behavior are heavily influenced by family and friends [17]. In line with the research of [18] that there is family involvement in each stage of treatment, which can be an opportunity for knowledge-based improvement in the family.

Purchasing practices show that respondents are not confused about where to buy medicine, this can be because the number of pharmacies in Indonesia reaches 26,658. Other components such as determining drugs with various brands, cheaper drugs to buy and the amount are still confusing. This result is influenced by several factors, one of which is the diverse brand names where based on [19] here is a strong relationship between confusion about the number of drug names and a person's cognitive condition. In addition, purchasing behavior patterns are influenced by the presence of brands on drugs [20]. According to [21], the role of pharmacists is a major factor in determining drug purchases when considering brands and prices, so it makes sense that this community-based study that focuses on self-medication shows such results. In the practice of using drugs, people still do not understand how to determine the frequency, duration, how to take them, and follow-up treatment.

The use of drugs has been echoed by the Indonesian Ministry of Health together with the Indonesian Pharmacists Association (IAI) in the DAGUSIBU program (Get, use, store, dispose of drugs) and has been implemented in several educational activities [22][23]. However, this still happens because knowledge about managing damaged and expired drugs is caused by uneven information [12]. There are positive results in the practice of stopping drugs if side effects occur (59.4%), which is in line with the cross-sectional study of [24] that 57.7% of respondents to the study stop the drug when they know that the condition they are experiencing is a side effect of the drug. Awareness does not only occur in synthetic drugs, but half of all respondents in [25] study in Ethiopia also showed awareness in 40.79% of respondents who understood the possibility of side effects in traditional medicine in the form of diarrhea.

Storage practice, the biggest reason for storing medicine is as a supply if needed. In line with [26] that household drug stockpiling is caused by several factors, one of which is a decrease in capacity to make direct purchases due to restrictions on movement during the pandemic and lack of knowledge about rational drug use. In addition, research by [27]

also stated that the behavior of storing drugs tends to be done as stock for future conditions. However, this study shows positive results on the use of medicine boxes as drug storage, because most respondents only have 1-3 types of drugs with a total of 6-10 packs. bottles so that the capacity of the medicine box is still adequate.

The disposal sub-practice of this study has contradictory results between the statement of feeling they know how to dispose of drugs and the actual practice of disposal chosen. Almost all of them feel they know how to dispose of drugs (88.1%), but it turns out that the disposal method they have practiced is throwing into the household trash (27.5%), which is wrong. This may be related to the Dunning-Kruger Effect which allows someone to feel they know but actually do not know, which can be influenced by overclaiming their own knowledge [28]. Akande-Sholabi et al (2023) also provided similar results that the respondents' knowledge did not always correspond to the correct method of disposal [29]. Most of the respondents did not know about the take back program and had never practiced it by not returning unused to the pharmacy. This is in line with the research by [29] that awareness of disposal of medicine through take-back programs is still low, even though they know that there is such a program. The conclusion of this study is that all sub-practices of household drug management in Indonesia still have many things to improve, so that this study can show opportunities for determining interventions according to objectives.

5. Conclusions

All sub-practices of drug management in Indonesian household still have many things to improve, so that this study can show opportunities for determining interventions according to objectives. Pharmacist become pivotal role ensuring that public know how to manage medicines at home

Author Contributions: The authors confirm contribution to the paper as follows: conceptualization, FHF, S, ED, and LL.; methodology, S and ED; software, LL.; validation, FHF and ED; formal analysis, FHF and ED; investigation, FHF.; resources, ED and LL.; data curation, ED and S.; writing—original draft preparation, FHF; writing—review and editing, ED, S, LL.; visualization, LL; supervision, S and ED.; project administration, S.; funding acquisition, S. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by Gadjah Mada University Research Directorate and Final Project Recognition Program 2025, grant number 4161/UN1.P1/Dit-Lit/PT.01.01/2025.

Institutional Review Board Statement: The study was approved by the Institutional Review Board (or Ethics Committee) of Faculty of Medicine, Universitas Islam Sultan Agung (136/IV/2024/Bioethics Commission on June 2024).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: No additional datasets were generated or analyzed during this study beyond the data presented in the manuscript. All data supporting the reported results are already included within the article, and therefore no external data repository is applicable.

Acknowledgments: The completion of this research would not have been possible without the support and guidance of Prof. Dr. apt. Satibi. M.Si, Dr. Dwi Endarti, S.F., M.Si. dr. Lutfan Lazuardi, M.Kes., PhD, Universitas Gadjah Mada. The encouragement and insightful feedback were instrumental in accomplishing this task.

Conflicts of Interest: The authors declare no conflict of interest

References

1. Luo Y, Reimers K, Yang L, Lin J. Household drug management practices of residents in a second-tier city in China: Opportunities for reducing drug waste and environmental pollution. *Int J Environ Res Public Health*. 2021;18(16):1-15. doi:10.3390/ijerph18168544

2. Kehutanan KLH dan. SIARAN PERS Nomor SP. 204/HUMAS/PP/HMS.3/5/2020: KLHK Perkuat Regional Untuk Respon Limbah Infeksius COVID-19. https://ppid.menlhk.go.id/siaran_pers/browse/2477.
3. Chung S shan, Brooks BW. Identifying household pharmaceutical waste characteristics and population behaviors in one of the most densely populated global cities. *Resour Conserv Recycl*. Published online 2019. doi:10.1016/j.resconrec.2018.09.024
4. Ayalew MB. Self-medication practice in Ethiopia: A systematic review. *Patient Prefer Adherence*. Published online 2017. doi:10.2147/PPA.S131496
5. Locquet M, Honvo G, Rabenda V, et al. Adverse Health Events Related to Self-Medication Practices Among Elderly: A Systematic Review. *Drugs Aging*. Published online 2017. doi:10.1007/s40266-017-0445-y
6. Badan Pusat Statistik. Persentase Penduduk yang Mengobati Sendiri Selama Sebulan Terakhir (Persen), 2020-2022. https://www.bps.go.id/indicator/30/1974/1/persentase-penduduk-yang-mengobati-sendiri-selama-sebulan-terakhir.html.
7. Kementerian Kesehatan RI. Riskesdas 2018. *Laporan Nasional Riskesndas 2018*. Published online 2018.
8. Rahayu AP, Rindarwati AY. Pengelolaan Obat yang Tidak Terpakai Dalam Skala Rumah Tangga di Kota Bandung. *Majalah Farmaseutik*. 2021;17(2):238-244. doi:10.22146/farmaseutik.v17i2.64389
9. Kemenkes R. Pedoman Pengelolaan Obat Rusak dan Kedaluwarsa di Fasilitas Pelayanan Kesehatan dan Rumah tangga. *Kemenkes RI*. Published online 2021.
10. Harahap NA, Khairunnisa K, Tanuwijaya J. Patient knowledge and rationality of self-medication in three pharmacies of Panyabungan City, Indonesia. *Jurnal Sains Farmasi & Klinis*. Published online 2017. doi:10.29208/jsfk.2017.3.2.124
11. Rahmadi R, Utama WT, Ismunandar H. Praktik Pembuangan Limbah Obat di Rumah Tangga: Tinjauan Terhadap Drug Waste. *Medula*. 2023;13:846-850.
12. Adedeji-Adenola H, Adesina A, Obon M, et al. Knowledge, perception and practice of pharmaceutical waste disposal among the public in Lagos State, Nigeria. *Pan African Medical Journal*. 2022;42. doi:10.11604/pamj.2022.42.106.34529
13. Webber M. Development and evaluation of interventions in social work practice research. *China Journal of Social Work*. 2022;15(3):221-232. doi:10.1080/17525098.2022.2114137
14. Falihah AH, Azizah Z, Bakti B, Santoso A, Puspitasari I, Sahid MNA. Alergi Nonmakanan: Pola dan Karakteristik pada Orang Dewasa. *Majalah Farmaseutik*. 2023;63(1):2024.
15. Maltseva N, Borzova E, Fomina D, et al. Cold urticaria – What we know and what we do not know. *Allergy: European Journal of Allergy and Clinical Immunology*. Published online 2021. doi:10.1111/all.14674
16. Kementerian Kesehatan RI. Peraturan Menteri Kesehatan Republik Indonesia Nomor 28 Tahun 2022 tentang Perubahan Penggolongan, Pembatasan, Dan Kategori Obat. *Kementrian Kesehatan Republik Indonesia*. 2022;151(2):10-17.
17. O'Leary J, Huan TC, Kozak M, Karadag L. Who influences aspects of family decision making? *International Journal of Culture, Tourism and Hospitality Research*. 2012;6(1):8-20. doi:10.1108/17506181211206216
18. Hogue A, Becker SJ, Wenzel K, et al. Family involvement in treatment and recovery for substance use disorders among transition-age youth: Research bedrocks and opportunities. *J Subst Abuse Treat*. Published online 2021. doi:10.1016/j.jsat.2021.108402
19. Schroeder SR, Salomon MM, Galanter WL, et al. Cognitive tests predict real-world errors: The relationship between drug name confusion rates in laboratory-based memory and perception tests and corresponding error rates in large pharmacy chains. *BMJ Qual Saf*. 2017;26(5):395-407. doi:10.1136/bmjqs-2015-005099
20. Mariam, Babu ND. a Study of Buying Behavioural Pattern of Generic Drugs and Branded Drugs. *Well Testing*. 2023;32(December 2022):46-57.
21. Hajleh MNA, Al-Samydai A, Aloosi Z, et al. Factors affecting purchasing behaviors of generic drugs versus originator counterparts in Jordan. *J Appl Pharm Sci*. 2021;11(9):009-017. doi:10.7324/JAPS.2021.110902
22. Fathnin FH, Santoso A. Edukasi Mendapatkan Obat Berkualitas Melalui "Cek Klik Bpom" Berdasarkan Panduan Dagusibu Ikatan Apoteker Indonesia. *Jurnal Pengabdian Farmasi dan Sains (JPFS)*. 2023;02(01):14-18.
23. Rasdianah N, Uno WZ. Edukasi Penyimpanan dan Pembuangan Obat Rusak / Expire date dalam Keluarga. *Jurnal Pengabdian Masyarakat Farmasi : Pharmacare Society*. 2022;1:27-34.

24. O'Donovan B, Rodgers RM, Cox AR, Krska J. Use of information sources regarding medicine side effects among the general population: A cross-sectional survey. *Prim Health Care Res Dev*. 2019;20. doi:10.1017/S1463423619000574
25. Gari A, Yarlagadda R, Wolde-Mariam M. Knowledge, attitude, practice, and management of traditional medicine among people of Burka Jato Kebele, West Ethiopia. *J Pharm Bioallied Sci*. 2015;7(2):136-144. doi:10.4103/0975-7406.148782
26. Al Zoubi S, Gharaibeh L, Jaber HM, Al-Zoubi Z. Household Drug Stockpiling and Panic Buying of Drugs During the COVID-19 Pandemic: A Study From Jordan. *Front Pharmacol*. 2021;12(December):1-8. doi:10.3389/fphar.2021.813405
27. Kahsay H, Ahmedin M, Kebede B, Gebrezihar K, Araya H, Tesfay D. Assessment of Knowledge, Attitude, and Disposal Practice of Unused and Expired Pharmaceuticals in Community of Adigrat City, Northern Ethiopia. Gerber LM, ed. *J Environ Public Health*. 2020;2020:6725423. doi:10.1155/2020/6725423
28. University Department of Psychology Cornell. *Advances in Experimental Social Psychology*. Vol 44. 1st ed. Elsevier Inc.; 2011. doi:10.1016/B978-0-12-385522-0.00005-6
29. Akande-Sholabi W, Olaoye DQ, Adebisi YA. Drug take-back program: assessment of knowledge, practices, and barriers to safe disposal of unused medication among healthcare students in a Nigerian university. *BMC Med Educ*. 2023;23(1):1-9. doi:10.1186/s12909-023-04788-y