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Article

Economic Burden of Unused Medications in Households Across Central Java, Indonesia

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Abstract: (1) Background: People need to understand how to select, obtain, use, store and destroy drugs correctly and appropriately so that they can optimize the use of drugs. The use of drugs that are not optimal can have an impact on the economy, such as increasing medical costs. Purpose: This study was conducted to determine the estimated economic value and percentage of unused drugs and the drugs that are most stored in Central Java Province households. (2) Methods: This research is an observational research with quantitative descriptive method using a cross sectional research design through questionnaire survey research procedures. Sampling was done using snowball sampling technique with a sample of 812 respondents from households in central java Province, Indonesia. The analysis of the research results was carried out using SPSS; (3) Results: The total price of unused drugs and stored drugs in Central Java Province, Indonesia, households was IDR 2,948,412, and the average cost per family was IDR 10,880. The drug group that was stored the most was the analgesic drug group, namely 117 (26.4%), and the drug group with the highest estimated cost was the respiratory system drug, with a total price of IDR 852,837 (28.9%). The most stored medicinal product is paracetamol, namely 275 tablets, and the price was IDR 63,525 (2.2%). 812 Central Java Province households/families have never received any information/training on how to handle unused drugs; (4) Conclusions: There is a need for increased education related to the handling of unused drugs among households in Central Java Province by pharmacists so that pharmacists can manage unused drugs according to standards.

Keywords: Unused Drugs, Drug Cost, Self Medication

1. Introduction

Drugs are one of the largest commodities consumed by the community as an effort to cure health disorders as of people need to understand that the use of drugs must be carried out appropriately and rationally in order to achieve the therapeutic goals and increase effectiveness and efficiency in purchasing drugs which illustrates one of the cost effective medical interventions. (1). In some conditions, people cannot finish the drugs they receive during treatment, thus triggering drug storage Drugs which are stored in the household could consist of drugs that are still used, stock drugs and unused drugs (2). The Basic Health Research (3) recorded that 35.2% of 294,959 households in Indonesia or around 103,860 households keep medicines for self-medication. If it is grouped based on the drug storage status, there are 32.1% households store medicines that are currently being used, 42.2% households keep medicines in stock and 47.0% households store left-over medicines. Based on the research from (4) with 261 respondents of households, it was found that the total price of drugs was 7,082,556 IDR which was divided into several

groups based on their storage status, namely stock medicine or drugs being used with a total of 5,668,570 IDR or 80% of the total drug price obtained on average per family 25,419 IDR for drugs not used with a total 1,273,921 IDR or 18% of the total drug price, the average per family was 13,698 IDR and for expired drugs with a total of 140,065 IDR or 2% of the total price of drugs, the average per family is 12,733 IDR. It can be concluded that 20% of the estimated drug prices that are still kept by the public are drugs that are no longer used.

The analysis (5) explained that regulations on controlling all types of drugs which are no longer used by being returned to health facilities like pharmacies or handed over to drug waste collection points are still not properly functioning. As a result, there is lack of adequate information and clear instructions on unused drug management. So that there is not a small amount of drug waste from the community whose disposal is not managed according to the standards, with the result that it brings impact to the environment and health. Unused Drugs also brings impact on the economic value because the need for drugs is a dominant proportion of the increasing medical costs. The impact on the economic value shows that the waste of medical expenses causes people lose the opportunity to pay for health care that is at any time needed (4). The important role of pharmacists is in providing education to the community to minimize the occurrence of unused drugs is as a rational treatment effort and a saving treatment costs. Moreover, people can manage unused drugs through standardized self-destruction or through a medicine take back program. One approach that can support the role of pharmacists is to ensure that the percentage and estimated economic value of unused drugs through data mining in the community, especially in Semarang municipality which has the highest household population in Central Java based on the data from the Central Java Provincial Statistics Agency in 2020. Estimated economic value of unused drugs show different results in the wider area. Based on the above background, it is necessary to conduct a research related to the estimation of the Economic Value of unused Drugs in Households in Semarang Municipality. The results of this study are expected to provide an overview to pharmaceutical staff about the management of drugs especially unused drugs in the community. In addition, it can then be used in an effort to increase the knowledge of Central Java Province community dealing with the accuracy and rationality in the use of drugs as of to prevent the occurrence of unused drugs which bring implications for saving cost of treatment

2. Materials and Methods

Study Desaign And Tools: This is an observational research with quantitative descriptive method using a cross sectional research design. This research was conducted online, on January-July 2022. The data was taken using a questionnaire, with a google form. The sample was determined using non-probability sampling technique. There are 812 respondents from the household in central java province. This study protocol was approved by Universitas Islam Sultan Agung e with approval number No. 179/ VI/ 2022/.

Survey Development : The survey questionnaire developed was divided into two parts. The first part of the questionnaire was to gain demographic information of the respondents and the second part of the questionnaire was to gain the data on unused drugs and its management. Data collection was carried out using the snowball sampling technique.

Data analysis: The questionnaire data was analyzed using SPSS software to determine the estimated economic value and percentage of unused drugs. Each drug has a price and is calculated based on the pharmacy net price (HNA). Conclusions were drawn using each research indicator (name of drug, form of drug and amount of drug).

3. Results and Discussion

Drugs are one of the most important elements for health so that drugs have become the main commodity consumed by people throughout the country, especially in Indonesia

(6). People need to understand how to select, obtain, use, store and destroy drugs properly and correctly so as to increase rational drug use (7). The consequences of irrational drugs use, one of them, is in economic such as wasted resources which reduce drug availability and increase medical costs (1).

Respondents Characteristics

During the research time, data were obtained from 812 household respondents in Central Java Province. The data were then processed using the SPSS program so that the distribution of the respondents characteristics was shown in Table 1. When it was seen from the status in the family, it showed that respondents represented family members were dominated by children. Because the distribution of questionnaires is done online using Whatsapp platform, this is supported by research (8) that in Indonesia, 89.7% of internet users are students which are children in the family. If it is seen from the gender of the respondents, the majority is female. Women tend to have a greater curiosity than men because women are more concerned about health such as in the drug management, so that in this research the respondents were dominated by women since this research involved extracting data on drug management (9).

When it was viewed from the profession of the head of the family, most of the head of the household respondent is self-employed, with a total of 144. Research (10) stated that a profession as an entrepreneur is not limited in time so it tends to be difficult to manage his working time. Moreover, research (11) stated that a profession as an entrepreneur is not limited in time so it tends to be difficult to manage his working time. Moreover, research [12] stated that an entrepreneur tends to do self-medication, this is supported by research (12) bahwa swamedikasi memiliki keuntungan yaitu bisa menghemat waktu dalam mencari fasilitas kesehatan. Pada penelitian (13) self-medication that was not in accordance with the regulations due to lack of knowledge about proper and rational drug use could lead to excessive use of free drugs and lack of knowledge on proper storage and disposal of drugs. Statements from previous studies are in line with the results of this study which presented that the people of Central Java Province whose majority profession of the head of the family are self-employed store unused drugs obtained from pharmacies.

When it was seen from the total income of the head of the family, the majority of income is in the range of IDR 200.000 - IDR 500.000, there are 115 families. Based on (14) Central Java Province has the highest rank of MSE in Central Java Province, namely IDR 2,835,021.29 so that the majority of family income in this study can be categorized as being able to support the use of health services, especially in purchasing drugs, this is supported by research(15) that the economic status is a factor of individual ability in the form of income as a support for using health services because the use of health services depends on the ability of consumers to pay, this includes the use of drugs. The higher the income or economic status of the family, the higher the practice of a luxurious and consumptive lifestyle because they have ability to buy everything they need compared to families with low income or low economic status. Meanwhile, if it was viewed from the insurance used by respondents, the majority of health insurance owned by the government was 165 and 50 families which had private insurance but there were 56 families did not have insurance. Health insurance provides opportunity for family members to conduct health consultations and purchase drugs prescription so that they will store drugs more often (4). Research (16) stated that people who do not have health insurance can also increase health financing, especially in the field of medicine because they store drugs due to improper self-medication.

Tabel 1. Respondent Characteristics

Characteristics	Percentage (%)
Status in Family	
Father	17,0%
Mother	18,5%
Children	64,6%
Gender	
Male	29,2%
Female	70,8%
Profession of the head of the family	
unemployed	3,7%
Civil servants	19,6%
Teacher	9,6%
Enterprenuer	53,1%
Farmer	6,3%
Labourer	3,0%
Retired person	4,8%
Total Income of the head of the family (IDR)	
< Rp2000.000,-	21,8%
Rp2.000.000,- Rp5.000.000,-	42,4%
Rp5.000.000,- Rp10.000.000,-	20,7%
> Rp10.000.000,-	15,1%
Health insurance	
Governmental	60,9%
Private	18,5%
No Insurance	20,7%

Estimated Economic Value of Unused Drugs

Indonesian society spends an average of IDR 359,000 for medicinal purposes per individual per year (17). From the results of research that has been conducted on 812 respondents as shown in Table 2, it is found that medicines which are no longer used and are still stored in Central Java Province households was IDR 2,948,412 in total and the average wasIDR 10. 880 per individual, while the minimum price per individual is IDR 431 and the maximum price per individual is IDR 69,580. Compared to research conducted in Yogyakarta (4) with 261 respondents, the total price of unused drugs that are still kept by households was IDR 1,273,921, so that the average cost per individu was IDR 13,698. In a study conducted in East Banjarmasin (18) with 114 respondents, the total price of unused drugs was IDR 224,317 so that the average cost per individu was IDR 3,348.

Research conducted in Central Java Province showed greater results than research conducted in Banjarmasin because the respondents in Central Java Province were larger than in Banjarmasin. It was supported by research (4) the results shown was different due to differences in the number of respondents, region and reference the price of drugs used. However, the research conducted in Central Java Province showed fewer results compared to the

research conducted in Yogyakarta because the types of drugs stored by the people of central java province with a large frequency were dominated with generic drugs, research(19) stated that generic drugs have lower price than branded drugs (trade names).

Based on the results of Basic Health Research (3) that 35.2% of households in Indonesia store drugs. If it is grouped according to the storage status, 47% of households store leftover or unused drugs. If the number of households that store unused drugs is multiplied by the average price of unused drugs per individual in the household in this study, which is IDR 10,880,- then the cost of unused drugs was not wasted or save IDR 531,096,320.

Tabel 2. Estimated Economic Value of Unused Drugs

Drug Status	Drug Estimation price (IDR)	Average Cost per Family (IDR)	Minimum Price per Family (IDR)	Maximum Price per Family (IDR)
Unused Drugs	IDR 2.948.412	IDR 10.880	IDR 431	IDR 69.580

Drugs Not Used Based on Therapeutic Class

If it was viewed from the number of drug groups based on therapeutic classes and body systems in Table 3, the analgesic drug group is more dominant, namely 26.4%. This is similar to the quote in a study (6) that the drug commonly found or the most widely kept among households around the world is an antipyretic analgesic drug. However, if it was viewed from the estimated drug cost, the largest was the drug in the respiratory system group with a total of IDR 852.837. The results of this study were close to the results of research (4) with a total cost of respiratory system drugs was IDR 910,420. Unused drug storage is dominant in paracetamol with a total of 275 tablets with a total price of IDR 63.525, then followed by amoxicillin, with a total 114 tablets and the total price was IDR 41.610. Paracetamol tends to be safer to use if it is in accordance to the dose and it gave a hepatotoxic effect if the use is more than 4 grams per day. This causes many people to use paracetamol because it is easily obtained freely, is considered the safest and the price is affordable so that paracetamol is found in many households in Central Java Province (18).

Antibiotics are agents used to prevent and treat infections caused by bacteria and are substances produced from various microorganisms species such as bacteria and fungi that can suppress the growth and kill other bacteria. The antibiotics must be taken thoroughly and regularly (20). If the use of antibiotics is not appropriate, it can cause antibiotic resistance since the bacteria develop genetic capabilities so that they become less and even insensitive to antibiotics. Amoxicillin is one of the antibiotics easily obtained by the community so that its use is often inappropriate (21). The high use of amoxicillin is due to the fact that there are still many people who think that amoxicillin is a drug that can be used when somebody experience fever without regarding to the correct dose (21), this is in line with the results of this study, it is the high storage of amoxicillin among households in Central Java Province. Meanwhile, if it was viewed from the total price, the highest is Bisolvon, 4 bottles of Bisolvon cost IDR 152,180. Bisolvon is produced by PT. Boehringer Ingelheim and is one of the most popular liquid preparations to cure coughs with its content of bromhexine hydrochloride and guaifenesin(22).

Tabel 3. Unused Drugs based on Therapeutic Ckass Obat

Drug group based on Therapeutic Class and Body System	Total Drug Group (n) (%)	Total Cost (Rp)	Price Percentage (%)
Analgesic	117 (26,4%)	Rp396.879,-	13,5%
Antidiabetes	3 (0,7%)	Rp7.970,-	0,3%
Antihistamin	10 (2,3%)	Rp68.081,-	2,3%
Antiinflamasion	39 (8,8%)	Rp157.478,-	5,3%
Antimicroba	63 (14,2%)	Rp435.718,-	14,8%
Antiseptic	4 (0,9%)	Rp50.264,-	1,7%
Cardiovaskular System	10 (2,3%)	Rp146.588,-	5,0%
Digest System	82 (18,5%)	Rp494.021,-	16,8%
Respiratory System	73 (16,5%)	Rp852.837,-	28,9%
Nervous System	2 (0,5%)	Rp19.395,-	0,7%
Vitamin and mineral	40 (9,0%)	Rp319.181,-	10,8%

Reason for Unused Drugs

The reason for the unused Central Java Province households can be seen in Table 4, the first dominant reason was the improved condition with a total of 233. If the patient's condition has improved, it is allow to discontinue the use of the drug but if the discontinuation is not carried out under the supervision of a doctor or based on information on the rules for using the drug, it can cause adverse drug withdrawal events that occur due to the body's physiological reaction to suddenly not getting the drug or due to the development of the disease getting worse (23). In contrast to antibiotics, even though the condition has improved, the drug must still be consumed (20). Broadly speaking, the various reasons that lead to discontinuation of treatment indicate the large amount of wasted drug.

Tabel 4. Reason for Unused Drugs

Reasons for Unused Drug	(%)
Moving to Traditional Treatment	0,4%
Unimproved Condition	1,5%
Improved Condition	86,0%
Expired Drugs	4,8%
Discontinuation treatment of the doctor	1,5%
Changing the drug type/dose	4,1%
Side effect/allergic	1,8%

How to handle unused drugs

Table 5 explains that households in Central Java Province are more dominant in handling unused drugs by storing them with a family, namely 169 families. There are still many Central Java Province households who store medicines at home because they can save time if the medicine is needed again for self-medication to reduce the pain (24). In general, leftover prescription drugs should not be stored because they can lead to misused (9) potentially spreading infection and even resistance to microorganisms due to high piles of drug waste and drugs being damaged due to being stored for a long time and with improper storage. Storage temperature and length of time bring impact on drug concentration and stability. Drug concentrations can increase or decrease depending on storage conditions so that potential changes in drug concentration can result in different estimates of drug toxicity (24).

Unused drugs that are destroyed by throwing them in the trash must be crushed or mixed with other waste materials so that they cannot be reused (25). Drugs that with a tube-shaped container such as cream/ointment must be cut and separated from the cap before being disposed of. Drugs in the form of syrup can be disposed of through sewers (latrines) by diluting them with water first. The patient labels and personal information contained in the container must be removed and the drug packaging must be tampered prior to disposal (25).

Based on the results of the study, there was only 1 respondent who returned unused drugs to the pharmacy staff. Medicine take back program or policy of returning drugs to community pharmacy services such as in pharmacies, clinics and public health services such as health centers that are not evenly distributed and the constrained distance between homes and pharmacies or health facilities makes it difficult for the community and objections if they have to return unused drugs to the hospital, pharmacies or health facilities and prefer to store medicines at home (2)

Tabel 5.How to handle unused Drugs

How to Handle	(%)
Burnt	3,0%
Thrown in the trash	27,3%
Thrown in the toilet	0,7%
Returned to the Pharmacist	0,4%
Done after expirate date	6,3%
Stored	62,4%

Information/Training on how to handle unused drugs

Table 6 shows that 87% of Central Java Province households still do not know/get information/training from pharmacists on how to handle unused drugs. There are still many families who have not received information/training on how to handle unused drugs, which illustrates the not yet optimal role of pharmacists in Semarang because the communication between organizations has not been well coordinated (26) so that the next solution is the need to intensively disseminate information on how to manage unused drugswhich can be started at the stage of delivering drugs to patients in health care facilities, especially in pharmacies. Pharmacists can also play an active role through careful echoes or the smart community movement using drugs which is a joint effort of the government and the community to create awareness, concern, knowledge and skills of the community in using drugs appropriately and correctly (7).

Tabel 6. Information/Training to handle Unused Drugs

Information/Training to handle	Total percentage (%)
Ever	13%
Never	87%

Places to Get Drugs

Households in Semarang based on Table 7 are more dominant in getting drugs from pharmacies with a total 201 families, while theleast getting drugs from online pharmacies / online stores were 3 families. It is in line with the research (27) which stated that pharmacy provides complete drug, affordable, easy access, able to have drug consultations and disease consultations which make people prefer to buy drugs at pharmacies.

Tabel 7. Place to get Drugs

Place to get Drug	Total Percentage (%)
Pharmacies	74%
Primary Health care/Clinic	10%
Hospital	8%
Minimarket	3%
Drugstore	4%
Online Pharmacy/Online Shop	1%

Based on the results of research on aspects of drug payments, it was found that most of the patients' perceptions were high at 65.8% of 600 respondents. These results indicate that patients are of the opinion that drug payments should not be subject to additional fees for the drugs received and the payment of the drug costs, which is entirely the responsibility of BPJS because the amount of contributions that have been paid by JKN participants should be in accordance with the quality of the drugs obtained. If there are additional drug costs, the health facility will notify the patient in the hope that the patient can give approval regarding the cost of the drug for the drug received. This is supported by Suharmiati et al (28) in their research statid that the patient should not have additional costs related to the drugs received because the cost of the drug is in accordance with the capitation package, if there are drug costs due to drug administration outside the national official reference then it is not allowed to charge it to the patient. Controlling drug costs in the JKN era by making prescribing references such as the National Health Service.

Based on the results of the study, it was found that not a few patients were willing to pay for drugs with their own money unless they exceeded the limits of the costs in the capitation system. This happened because the patient's perception of his health was already high. Muhlisin and Ida (29) in their research stated that patients with high incomes will have high demands and expectations regarding health services at health facilities because patients with high incomes can meet their basic health needs, while patients with low incomes do not have more demands and expectations. Kirilmaz (30) also stated that low-income patients have less hope than high-income patients in meeting

This section may be divided by subheadings. It should provide a concise and precise description of the experimental results, their interpretation, as well as the experimental conclusions that can be drawn.

4. Conclusions

The total price of Unused Drugs and] stored drug in Central Java Province households was IDR 2,948,412, and the average cost per family was IDR 10,880. The drug group that was stored the most was the analgesic drug group, namely 117 (26.4%) and the drug group with the highest estimated cost was the respiratory system drug with a total price was IDR 852.837, (28.9%). The most stored drug product was paracetamol with a total of 275 tablets and a total price was IDR 63,525, (2.2%). 235 families in Central Java Province households have never received any information/training on how to handle unused drugs.

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