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# Rural Community Knowledge and Awareness Regarding Drug Waste as Hazardous and Toxic Waste (B3)

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**ABSTRACT.** Waste is a very crucial environmental problem. One of the wastes that are very harmful to the environment is B3 waste. B3 waste is the residual result of activities or businesses that contain elements of hazardous and toxic materials. The household sector can produce B3 waste. A total of 11.62% of household waste is in the form of medical waste which is categorized as B3 waste. This waste consists of drug residue, drug packaging, syringes, and mercury thermometers. Medical waste contains toxic chemicals, pathogens, sharp objects, and expired drugs. If not managed properly, it will cause environmental problems and have a direct impact on the health of living things, especially humans. The potential impacts are in the form of causing acute and chronic disease, poisoning, infection, injury, and transmitting disease. Public knowledge about B3 waste or medical waste is still a concern. Most of the community has minimal knowledge so that they do not manage medical waste properly and correctly according to the recommended procedures. The purpose of this study was to find out how far the knowledge of people in rural areas regarding drug waste as B3 waste, as well as to determine public awareness in disposing and storing medicinal waste so that it does not have an impact on the environment and also the health of the community itself. The research method used is descriptive qualitative by analyzing the primary and secondary data that have been collected. The handling of residual drug waste/expired drugs by the community is still relatively lacking, as much as 50% is thrown away, 35% handles waste by burning and the rest handles waste by landfilling. In addition, 60% stated that the disposal of drug residues/expired drugs in the trash is the correct way to manage drug waste which is included in B3 waste.

**Keywords:** B3 waste, environment, medical waste, medicine, rural

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## 1. Introduction

At this time, the waste problem is one of the environmental problems that still requires special attention. This occurs as a result of the increase in the rate of development, the increase in population and the socio-economic level of the community (Wardana, 2015). A lot of waste is generated from various sectors that can have a negative impact on the environment, for example waste from the industrial, agricultural, household sectors and also medical waste. One type of waste that can threaten the environment is B3 waste. Not only threatening the environment, B3 waste can also have an impact on human health (Kurniawan, 2019).

Hazardous and Toxic Waste or also known as B3 Waste is the residue or waste from a business or activity which contains B3 elements (Putra et al., 2019). Although the concentration in it is small, it still contains B3, it is called B3 waste. There are many types of B3 waste, B3 waste itself can come from industrial waste which uses hazardous chemicals in the production process, agricultural waste such as B3 waste, as well as waste from medical waste such as masks and medicines.

Hazardous waste that is not managed properly will cause environmental health impacts that are considered more dangerous than ordinary waste such as being able to spread through the soil, water and air to the food chain, enter the

human body and animals through respiration, digestion and skin which can threaten the skin, eyes, kidneys, respiratory tract, brain, lungs, nervous system and liver (Prasetyaningrum et al., 2017).

Medical waste is included in Hazardous and Toxic Waste (B3) because it contains chemicals that are harmful to the environment. Drug waste can come from drugs that have expired, drugs that do not meet specifications or their packaging is contaminated so they must be disposed of (hospitals), and drugs that are thrown away by the public because they are no longer needed (Firdaus, 2021). When this waste is not managed properly, this waste will have an impact on the environment and also have an impact on the health of living things such as humans, animals and plants in the vicinity. Drug waste can have negative impacts such as water toxicity, genotoxicity or the ability of chemicals to damage genetic information which can cause cell mutations within the cells themselves, cause endocrine disorders, and can also cause resistance to pathogenic bacteria (Wardi et al., 2019).

Medical waste is basically included in medical waste which when the drug waste is in the hospital there will be a separate procedure for its management. Because it includes B3 waste, special handling is needed. However, drug waste can also be found in everyday life such as at home where in disposing of drug waste it cannot be done carelessly. Because the waste

from these drugs can have an impact on the environment and can also have an impact on the health of humans who are in the vicinity.

Drugs can be easily found around human life and cannot be separated from human life, especially in the midst of the current pandemic. This causes a lot of drug waste to be disposed of by the community. However, in disposing of drug waste is not necessarily done correctly by the community.

Most people in rural and urban areas are accustomed to disposing of B3 waste in the form of medicines along with non-B3 waste. When disposing of waste, most of the people claim that they do not know that the waste produced is classified as B3 waste (Ulimaz et al., 2021).

Public knowledge in disposing or storing medicinal waste is very important so that the waste does not have an impact on the environment and human health. Especially people living in rural areas. Communities in rural areas need special attention, due to the lack of public knowledge about this drug waste. Therefore, it is important to know the knowledge and awareness of the public regarding drug waste as B3 waste. This study aims to determine the knowledge of people in rural areas regarding drug waste as B3 waste, as well as to determine public awareness in disposing and storing medicinal waste so that it does not have an impact on the environment and also the health of the community itself.

## 2. Materials and Methods

### 2.1 Methods

This study uses a qualitative descriptive method, its a qualitative method in which the description uses facts or phenomena obtained from actual data. This method is used to analyze primary and secondary data by describing, explaining, and validating research results (Sulistiyono, 2015). Sources of data used are primary data and secondary data. Primary data was obtained through a questionnaire. Its data collection technique was carried out by giving questions and statements answered by the respondents. Secondary data were obtained from various books, articles, and websites related to research. The object of this research is the people who live in rural areas with the sampling technique is random (probability sampling) namely the sample selection method, where every member of the population has the same opportunity to be selected as a member of the sample (Umar, 2003). The data processing technique is carried out by calculating the frequency of public knowledge of drug waste based on the data from the questionnaire which is then processed to obtain the percentage value shown through the diagram.

### 2.2 Location

This research was conducted in two areas, it is in Sanggrahan Village, Boyolali Regency and in Kedung Puji Village, Kebumen Regency.

## 3. Results and Discussion

### 3.1 Identification Kinds of Drugs

The majority of households keep medicines at home, both those that are still used for urgent needs when sick or those that have expired/unused because they do not know how to dispose of expired medicines so they just leave them alone. Research conducted in Sleman Regency, Yogyakarta shows that 11.62% of the total amount of household waste is in the form of medical waste, which consists of 56.97% remaining

tablets/solid/powder drugs, 37.97% liquid medicine packaging, 12.12 % of external drug packaging, 1.52% of syringes, and 1.52% of mercury thermometers. The medical waste contains toxic chemicals, pathogens, sharp objects, and expired drugs that have the potential to have an impact on health, namely acute and chronic effects, causing poisoning, infection, injury, and transmitting disease (Isiwanto et al., 2016). Therefore, increasing knowledge about how to dispose of expired, unwanted or unused medicines by households is a matter of concern at this time.

In its use, drugs have various forms. All forms of medicine have their own characteristics and purposes. There are substances that are unstable if they are in tablet preparations so that they must be in capsule form or there are also drugs that are intended to dissolve in the intestines not in the stomach. All are specially formulated to achieve the desired therapeutic effect. For example, tablets and caplets are different, or tablets that must be chewed first (such as antacids). Do not allow the patient to be confused by the instructions for drug etiquette. Therefore, it is very important for all of us to know the dosage form of the drug. Several forms of drug preparation, namely (Health Department, 2016):

#### 1) Pulvis (powder)

Is a dry mixture of medicinal ingredients or chemical substances that are mashed, intended for external use.

#### 2) Pulveres

It is a powder that is divided into approximately equal weight, wrapped using packaging materials that are suitable for one drink. An example is powder.

#### 3) Tablets (compression)

It is a compact solid dosage form made by compression molding in the form of a flat or circular tube with both flat or convex surfaces containing one or more types of drug with or without additives.

#### 4) Pills (pilulae)

It is a small, round solid dosage form containing medicinal substances and intended for oral use. Currently, it is rarely found because tablets and capsules have been displaced. There are still many found in herbal teas.

#### 5) Capsules

It is a solid dosage form consisting of a drug in a soluble hard or soft shell.

#### 6) Caplets (tablet capsules)

It is a compact solid dosage form made by compression molding, oval in shape like capsules.

#### 7) Solutions

Is a liquid preparation containing one or more soluble chemical substances, usually dissolved in water, which because of their ingredients, method of compounding, or use, are not included in other product groups. It can also be said to be a liquid preparation containing one or more soluble chemicals, for example molecularly dispersed in a suitable solvent or a mixture of miscible solvents. How to use it is an oral solution (taken by mouth) and a topical solution (skin).

#### 8) Suspension

It is a liquid preparation containing insoluble solid particles dispersed in the liquid phase. Types of suspension include: oral suspension (also includes milk/magma), topical suspension (for use on the skin), ear drop suspension (outer ear), ophthalmic suspension, dry syrup suspension.

#### 9) Emulsions (emulsiones)

Is a preparation in the form of a mixture of two phases in a dispersion system, one liquid phase is very finely and evenly dispersed in the other liquid phase, generally stabilized by an emulsifying agent.

## 10) Galenic

Are preparations made from raw materials derived from extracted animals or plants.

## 11) Extract (extractum)

Is a concentrated preparation obtained by extracting substances from vegetable simplicia or animal simplicia using a suitable solvent. then almost all of the solvent is evaporated and the remaining mass or powder is treated in such a way that it complies with the specified standard.

## 12) Infusion

Is a liquid preparation made by extracting vegetable simplicia with water at a temperature of 90 degrees Celsius for 15 minutes.

## 13) Immunoserum (immunoserum)

Is a preparation containing a typical immunoglobulin obtained from animal serum by purification. germs/viruses/antigens.

## 14) Ointment (unguenta)

It is a semi-solid preparation intended for topical application to the skin or mucous membranes. Ointment can also be said to be a semi-solid preparation that is easily applied and used as an external medicine. The drug substance must be dissolved or homogeneously dispersed in a suitable ointment base.

## 15) Suppositories

It is a solid dosage form in various weights and forms, administered rectally, vaginally or urethral, generally melting, softening or dissolving at body temperature.

## 16) Drops (guttae)

Is a liquid preparation in the form of a solution, emulsion or suspension, intended for internal medicine or external medicine. Used by dripping using a dropper that produces droplets equivalent to the droplets produced by the standard dropper mentioned by the Indonesian Pharmacopoeia. Preparations for drops can include: guttae (internal medicine), guttae oris (mouth drops), guttae auriculares (ear drops), guttae nasales (nose drops), guttae ophthalmicae (eye drops).

## 17) Injections

Is a sterile preparation in the form of a solution, emulsion or suspension or powder that must be dissolved or suspended before use, which is injected by tearing the tissue into the skin or through the skin or mucous membranes. The goal is that the drug works quickly and can be given to patients who cannot receive medication by mouth.

## 3.2 Public Knowledge Regarding Expired Drugs As B3 Waste

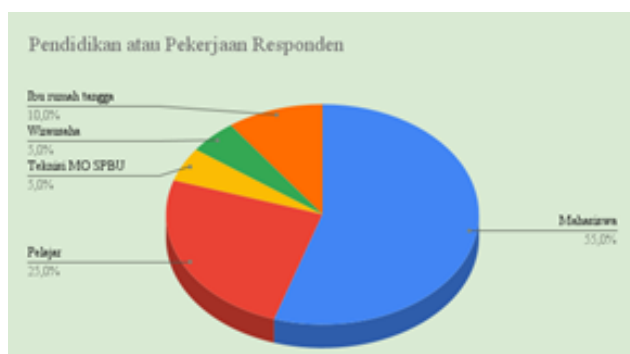


Fig. 1 Respondent's education and occupation

Based on the results of the study, it is known from Figure 1. that the background of the 20 respondents are 55% are students, 25% are students, 10% are housewives, the rest are MO gas station technicians and an entrepreneur. Then 90% of

respondents' ages are in the range of 17-24 years. Notoatmodjo (in Agustina et al., 2017) argues that age affects a person's grasping power and mindset, where as you get older, your grasping power and mindset will also develop, so that more knowledge is obtained. This further shows that in this age range, they are classified as productive age which allows them to have high learning opportunities so they have broad knowledge. And it is hoped that it can increase knowledge about correct and appropriate B3 waste management so that later it will change positive attitudes and behaviors towards B3 waste management.

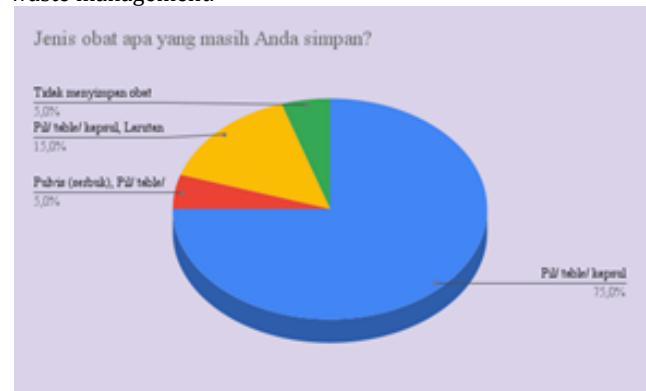


Fig. 2 Types of drugs stored by respondents

Furthermore, the results of the study are shown in Figure 2. For the types of drug residues that are still stored from 20 respondents, 75% have the remaining drugs in the form of pills, tablets, and capsules. Each respondent has their own reasons for still keeping the remaining medicine. Then the results of the survey regarding the knowledge of respondents about the remaining expired drugs/drugs included in B3 waste in Diagram 3. It is known that 50% of respondents do not know that the remaining expired drugs or drugs are included in the B3 waste category. This shows that public knowledge about B3 waste is still relatively low.

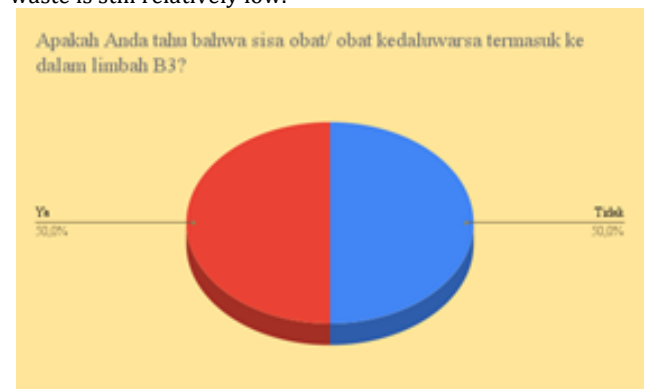


Fig. 3 Respondent's level of understanding of drug waste

Regarding the handling behavior of residual drug waste/expired drugs, it can be seen from Figure 4. that 50% of respondents in managing drug waste are simply thrown away, another 35% stated that the waste is handled by burning and the rest by stockpiling. Then as many as 60% of respondents stated that the disposal of drug residues/expired drugs in the trash is the correct way to manage drug waste which is included in B3 waste. This shows that there is still a lack of public knowledge regarding the management of drug waste properly where improper handling will have a harmful impact on the environment and human health. Therefore, counseling

or socialization regarding B3 waste management in villages or regions is very necessary.

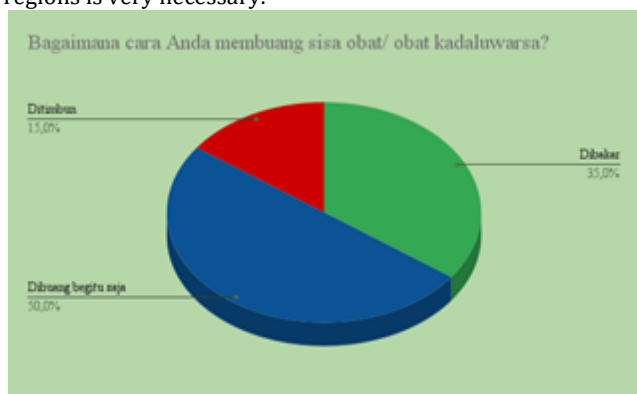


Fig. 4 Handling of drug waste by respondents

According to Chandra (in Leonita & Yulianto, 2014) a good waste storage area is divided according to its category, both plastic wrap and waste storage containers. This is in line with the statement (Priyanto et al., 2010) which shows that drugs that are damaged or expired are first separated from other drugs. Handling damaged/expired drugs is in accordance with Nuraini (2013) that the method of handling expired drugs is carried out in 2 ways, namely returning to distributors and exterminating using an incinerator. The preparation of residual drugs in the form of expired tablets indicates that the management of drug waste in the tablet type must be carried out properly and in accordance with existing operational standards (SOPs) so as not to pollute the surrounding environment and drug abuse does not occur. This is in line with the statement by the Food and Drug Supervisory Agency (BPOM) (2016) that if the drug is a tablet or solid dosage form, it must be destroyed by burning in an incinerator at high temperature or dissolved in water if the solid dosage form is in large quantities. a little. Further procedures for disposal of the drug in the form of a solution must be diluted or mixed with water and the bottle must be crushed. After that, the drug is disposed of in a place that cannot be reached by people who want to abuse the drug and also far from residential areas.

### 3.3 The impact of expired drug waste

#### 1) Abused by irresponsible parties.

In social media accounts, the Food and Drug Monitoring Agency of the Republic of Indonesia explained that drugs that are disposed of carelessly have the potential to be used by irresponsible parties for resale. The illegal drugs are resold by:

- a. Medicines that are made in their entirety along with their packaging, have great potential to be taken and resold. The perpetrator will change the label and expiration date of the drug.
- b. For syrup drugs that are disposed of in labeled bottles (with marking caps), it can also be misused by replacing the contents of the bottles with illegal drugs and then repackaging them to resemble their original form.

#### 2) Not good for environment and health.

It should be noted that drugs that have passed their expiration date do not actually mean that they will lose their potency or efficacy. According to research results published in an article in the Mahatma Gandhi Institute of Medical Science, expired drugs still have 90% of their original potency. Therefore, the disposal of drugs that have expired should not be done arbitrarily because it can have an impact on the environment. Drugs still

have their original potential even though they have expired, so exposure to drugs that are discarded carelessly will adversely affect the health of living things such as animals or even humans. For example, bat tablets are disposed of in a trash can that is visible or easily accessible to children. because the curiosity of a child is still high, it is possible that he will take the drug and eat it.

### 3.4 How to properly dispose of expired medicine

If you have expired medicine and want to dispose of expired medicine yourself, there are several things that need to be considered in complying with the rules, including:

- a. Read drug labels first and if there are special disposal instructions attached, then follow the directions.
- b. Separate expired medicine from medicine packaging or plastic.
- c. Do not crush the drug in tablet or capsule form, but mix the expired drug with soil, cat litter, coffee grounds or other substances that absorb the drug.
- d. Place the medicine to be disposed of in a sealed plastic bag to prevent small children, pets or other people from picking up trash.
- e. Dispose of medication in the trash.
- f. When disposing of a medicine prescribed by a doctor, cross out all the information on the label of the medicine bottle or plastic.
- g. Remove information from prescription drug labels to help maintain privacy and protect health information.

Waste treatment in hospitals usually uses aerobic biological waste treatment which can be broadly divided into three, namely biological processes with suspended cultures, biological processes with attached cultures and treatment processes using a lagoon or pond system. Biological process with suspended culture is a treatment system using the activity of microorganisms to decompose pollutant compounds present in water and the microorganisms used are cultured in suspension in a reactor. Some examples of processing processes with this system include: standard activated sludge processes (standard activated sludge), step aeration, contact stabilization, extended aeration, oxidation ditch (oxidation pool ditch system) and others.

## 4. Conclusion

From the research that has been done, it can be concluded that the knowledge of people in rural areas regarding drug waste as B3 waste is still lacking. as much as 50% of all respondents stated that they did not know that the rest of the drugs or expired drugs were included in the category of B3 waste. In addition, public awareness in disposing and storing medical waste is very low. In managing their medical waste, there are still many people who just throw it away with the largest percentage, namely 50%, another 35% handle waste by burning and 15% handle waste by landfilling. In addition, there are as many as 60% of respondents who stated that disposing of residual drugs or drugs that have expired in the trash is the correct way to manage drug waste which is included in B3 waste. Based on this, it can be seen that the knowledge and awareness of rural communities in managing B3 waste is still very concerning. So it is necessary to conduct further studies and socialization of B3 waste so that B3 waste generated in the household sector does not endanger the community and the surrounding environment.

## References

- Bantul District Government Health Office. 2016. *Macam-Macam Obat dan Tujuan Penggunaannya*. Macam-Macam Obat dan Tujuan Penggunaannya – Dinas Kesehatan (bantulkab.go.id). Retrieved 15 November 2021.
- Firdaus, N. 2021. Analisis Pengolahan Limbah Padat Rumah Sakit Bhayangkara Kota Palangka Raya Kalimantan Tengah. *Sultan Agung Fundamental Research Journal*. 2(1): 41-64.
- Husein Umar, Metode Riset Bisnis, Jakarta: PT. Gramedia Pustaka Utama, 2003, pg. 137.
- Iswanto, I., Sudarmadji, Wahyuni, E. T. & Sutomo, A. H. 2016. Timbulan Sampah B3 Rumah Tangga dan Potensi Dampak Kesehatan Lingkungan di Kabupaten Sleman, Yogyakarta (Generation of Household Hazardous Solid Waste and Potential Impacts on Environmental Health in Sleman Regency, Yogyakarta). *Jurnal Manusia dan Lingkungan*. 23(1) : 179-188.
- Kurniawan, B. 2019. Pengawasan Pengelolaan Limbah Bahan Berbahaya dan Beracun (B3) di Indonesia dan Tantangannya. *Jurnal Dinamika Governance FISIP UPN "Veteran" Jatim*. 9(1): 39-49.
- Leonita, E. & Yulianto, B. 2014. Pengelolaan Limbah Medis Padat Puskesmas Se-Kota Pekanbaru. *Jurnal Kesehatan Komunitas*. 2(4) : 158-162.
- Nuraini, W.F. 2013. Analisa Pengelolaan Obat Kadaluarsa di Instalasi Farmasi Rumah Sakit Umum Daerah Sukoharjo Tahun 2011. *Skripsi* : Universitas Sebelas Maret.
- Prasetyaningrum, N. D. K., Joko, T., & Dewanti, N. A. Y. (2017). Kajian timbulan sampah Bahan Berbahaya Dan Beracun (B3) rumah tangga di Kelurahan Sendangmulyo Kecamatan Tembalang Kota Semarang. *Jurnal Kesehatan Masyarakat (Undip)*, 5(5), 766-775.
- Prasmawari, S., Hermansyah, A., & Rahem, A. 2020. Identifikasi Pengetahuan, Sikap, Tindakan Masyarakat dalam Memusnahkan Obat Kedaluwarsa dan Tidak Terpakai Di Rumah Tangga. *Jurnal Farmasi Dan Ilmu Kefarmasian Indonesia*. 7(3) : 31-38.
- Putra, T. I., N. Setyowati, and E. Apriyanto. 2019. Identifikasi Jenis dan Pengelolaan Limbah Bahan Berbahaya dan Beracun Rumah Tangga: Studi Kasus Kelurahan Pasar Tais Kecamatan Seluma Kabupaten Seluma. *NATURALIS – Jurnal Penelitian Pengelolaan Sumberdaya Alam dan Lingkungan* . 8(2): 49-61.
- Sulistiyono. 2015. *Studi Kualitatif Deskriptif Perilaku Konsumen Rilis Fisik Vinyl di Yogyakarta*. S1 thesis, Fakultas Ekonomi. Universitas Negeri Yogyakarta.
- Ulimaz, M., Harfadli, M. M. A., & Jordan, N. A. (2021). Socialization of Understanding the Risk of B3 Household Products and Waste. *JCES (Journal of Character Education Society)*, 4(1), 21-28.
- Wardi, E. S., S. T. J. Fandri, and L. Tanjung. 2019. Biosorpsi Senyawa Parasetamol yang Berpotensi dalam Penanganan Limbah Obat. *Jurnal Katalisator*. 4(1): 53-60.
- Wardana, Y. N., Syafrudin, S., & Rezagama, A. (2015). Sistem Perencanaan Pengelolaan Sampah B3 Rumah Tangga Di Kecamatan Semarang Barat, Kota Semarang. *Jurnal Teknik Lingkungan*.4(3), 1-12.