Knowledge and attitude of the people in San Juan de Miraflores towards the disposal of medicines [version 1; peer review: awaiting peer review]

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Abstract

Background: Medicines that are expired or deteriorated within a household must be disposed of in an effective and environmentally friendly manner, to the point that they do not end up being a risk to the community and the environment. To do this, the members of Peruvian households must have the knowledge and the appropriate attitude, together with the necessary tools for the effective disposal of these drugs. For this reason, the research objective is as follows: to evaluates the relationship between the level of knowledge and attitudes on how to dispose of medicines in households in the district of San Juan de Miraflores.

Methods: Hypothetical-deductive, quantitative approach, applied type and non-experimental, observational design, for which 385 households in the district of San Juan de Miraflores were surveyed.

Results: 48.3% of the respondents have an average level of knowledge of how to dispose of medicines. 93.2% of the respondents have a positive attitude towards the disposal of medicines, and there is a relationship between the level of knowledge and attitude towards the disposal of medicines (P-value = 0.000).

Conclusions: Increased knowledge is associated with a better attitude to the disposal of medicines.

Keywords

Disposal, medicines, attitude, knowledge, medicine waste
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Introduction
One of the problems that people currently face is how to dispose of expired, deteriorated, and unusable medicines in their homes, as there is no system for returning medicines, which is why people inappropriately dispose of medicines, contributing to environmental pollution and public health problems. The cause of this problem is due to the lack of advice to the population and also the absence of regulations and laws on the part of the authorities that allow the disposal of waste medicines at home, as happens in many countries in the world.¹

Globally, the consumption of medicines is on the rise. In the last five years, it has increased by 4-5% according to a report detailed by the Institute of Human Data Science (IQVIA) in 2019. According to Olivar, Berenguer, and Rodilla, when a patient is undergoing pharmacological treatment, he or she does not fully or correctly consume his or her medicines due to various factors, causing them to accumulate at home. It is estimated that billions of medicines are wasted worldwide.² Per the Food and Drug Administration (FDA), unusable and expired medicines that are not consumed in households should be disposed of as soon as possible to reduce the likelihood of others accidentally taking or misusing the medicine, as well as to reduce the number of medicines in the environment.

Currently, there are developed countries and some regions in Latin America that have the support of their national government in presenting initiatives to solve the disposal of unwanted medicines from the home. One of these initiatives is to collect medicines in authorized pharmacies, where people can deposit their medicines properly in special bins, raising awareness among people about the correct disposal of medicines and protecting the environment.³,⁴

In 2015, the Ibero-American Network of Medicines Post-consumption Programs (RIPPM) was created, and is an organization formed with the aim of exchanging experiences that contribute to identifying the advantages and disadvantages of the different medicines’ post-consumption programs in the following countries: Spain, where there is an organization known as the Integrated System for the Management and Collection of Packaging (SIGRE); Mexico, where there is the organization Sistema Nacional de Gestión de Residuos de Ensayos y Medicamentos (SINGREM); Portugal, with the organization Valormed Sociedade Gestora de Resíduos de Embalagens e Medicamentos, Lda. (VALORMED); and in Colombia, with the Punto Azul Corporation.

In Peru there is Law Nº 27314: “General Law on Solid Waste” which ensures the management and handling of solid waste. In addition, there is the Technical Health Standard (NTS) Nº144-MINSA/2018/DIGESA which sets out the management and handling of solid waste in health facilities, medical support services and research centers, but does not specify the disposal of unusable and expired medicines in households. According to the National Centro Nacional de Documentación e Información de Medicamentos (CENADIM), the 2012 bulletin “Disposal of medicine waste in the home” contains certain recommendations provided by international institutions for the proper disposal of medicines in households.

On 18 December 2019, the Ministerio de Salud (MINSA), in Perú, launched a national campaign called ‘Collection points for expired and unusable medicines from the home’, implemented in each district of Lima and various regions nationwide. The collection points are red containers where people can dispose of their expired and unused medicines, as this waste puts people’s health at risk, contaminates the environment and promotes illegal trade. This campaign was in turn promoted by the Dirección General de Medicamentos Insumos y Drogas (DIGEMID) and the Colegio Químico Farmacéutico del Perú who provided information on the collection points and promoted awareness of waste disposal.

For all of the above reasons, and taking into account the negative impact on public health and the increase in environmental pollution caused by medicines, unused and expired medicines should be disposed of correctly in order to avoid possible consequences. It is essential to know how much the population knows about how to dispose of medicines and also to investigate whether there is any relationship between the knowledge of the population and their attitude towards medicine waste management.

The purpose of the study is to provide up-to-date information on the disposal of expired and unusable medicines since it is of interest to compare the level of knowledge and attitudes regarding the disposal of medicines with what is reported in households in the district of San Juan de Miraflores and in other towns. This information will help to find out how the current campaign established by MINSA to comply with the regulations on solid waste management is being implemented. This will serve to solve a collective problem, proposing activities such as: educational talks, pharmaceutical counselling by pharmaceutical chemists and health professionals through pharmacies and health centers; as well as the reinforcement of information to the population about the campaigns in force by the competent authorities.
Methods

Ethics and consent

The research carried out did not harm the ethics and morals of the people. When visiting homes in the district of San Juan de Miraflores, the people living in each home were informed of the purpose of the survey and were asked to sign a voluntary informed consent form before the survey was carried out.

Participants were assured that their data would be anonymous and confidential, and that the information was for academic purposes.

The research was approved by Resolution No. 042-2022-DFFB/UPNW issued January 14, 2022, by the Dean of the Faculty of Pharmacy and Biochemistry of the Norbert Wiener Private University.

Participants and procedure

The research method was hypothetico-deductive, with a quantitative approach, applied and non-experimental, observational design.5,6

The population consisted of 7589 households in the Pamplona Alta and Pamplona Baja areas.

It should be noted that for each household only one person will be interviewed who meets the inclusion and exclusion criteria.

Inclusion criteria:

- Male or female persons, who is over 18 years of age and who lives in the Pamplona Alta and Pamplona Baja areas.

Exclusion criteria:

- Children, youth or adolescent minors (under 18 years of age).

- Persons with any mental disability.

The sample was made up of 385 households in the districts of Pamplona Alta and Pamplona Baja, San Juan de Miraflores.

The sample consisted of 385 households in the neighborhoods of Pamplona Alta and Pamplona Baja, San Juan de Miraflores.

None of the 385 people refused to participate in the study. Each person was surveyed at the door of their respective homes, they read and filled out the questionnaire given voluntarily and personally, the researchers only observed and did not intervene in the answers given by each respondent.

Data collection took place between March and April 2022.

Materials

The technique used was the survey and the instrument used was a questionnaire, applied to the study sample and divided into three sections. The first section was focused on providing information on the socio-demographic factors of the sample and comprised of questions one to five. The second part is focused on measuring the level of knowledge of the inhabitants on how to dispose of medicines in household, measured on a three-level scale (low level of knowledge, medium level of knowledge and high level of knowledge) evaluated by means of single responses within the questionnaire and comprised of a single dimension called “Knowledge of how to dispose of medicines” where nine evaluation indicators are comprised. Finally, the third part of the questionnaire is focused on measuring the attitude of the population on how to dispose of medicines in households; this was measured on a two-level scale (negative attitude and positive attitude) made up of a dimension called “Attitude towards how to dispose of medicines”; with response alternatives: Strongly disagree,1 Disagree,2 Neither disagree nor agree,3 Agree4 and Strongly agree.5
Categorization of the knowledge level variable
Level of knowledge:

- High knowledge = 6 to 9 points.
- Medium knowledge = 2 to 5 points.
- Low knowledge = 0 to 1 point.

Categorization on attitude variable
Type to attitude:

- Positive attitude: 19 to 30 points
- Negative attitude: 6 to 18 points.

The instrument was validated through the judgement of four experts and reliability was obtained through a pilot test of 30 people. The questions with dichotomous answers were evaluated with the Kuder Richardson test (Kr-20>0.5) and the questions with polytomous answers were evaluated with Cronbach's Alpha test (α>0.7), in both tests the instrument obtained a value of Kr-20>0.676 and α>0.784 positive reliability results.

Analysis
The data were processed using the statistical program IBM SPSS Statistics version 26.

To analyze the results, descriptive statistics were used and cross tables were drawn up. Inferential statistics, for which tables and graphs were drawn up, were used to show the results. Finally, the correlation was analysed with Spearman's Rho coefficient.

Results
Out of a total of 385 households, 41.56% indicated that they correctly dispose of unused, expired, or damaged pills at home, 37.66% of ointments, 30.39% for syrups and 39.22% indicated that they dispose of inhalers by depositing them at the drug disposal collection point. Others in the sample indicated that they disposed of medicines such as tablets (58.44%), ointments (62.34%), syrups (69.61%) and inhalers (60.78%) by throwing them in the bin, flushing them down the toilet or simply kept them at home without knowing what to do with them (see Table 1 and Table 2).

![Figure 1](image_url) shows the level of knowledge about how to dispose of expired, deteriorated and unused medicines in households, where people were asked whether they knew how to dispose of certain medicines and the negative environmental and

| Table 1. Information on the demographics of participants. |
|---------------|-------|------|
|               | N    | %    |
| **Sex**       |       |      |
| Female        | 229   | 59.5%|
| Male          | 156   | 40.5%|
| Total         | 385   | 100.0%|
| **Age**       |       |      |
| 18-24 years old | 50   | 13.0%|
| 25-35 years old | 78  | 20.3%|
| >35 years old | 257   | 66.8%|
| Total         | 385   | 100.0%|
| **Marital status** |     |      |
| Single        | 226   | 58.7%|
| Married       | 131   | 34.0%|
| Divorced      | 15    | 3.9% |
| Widower       | 13    | 3.4% |
| Total         | 385   | 100.0%|
community impact that these could cause if certain criteria for correct disposal were not taken into account. Of the sample studied, 19.74% (76 households) had a low level of knowledge about how to dispose of pharmaceuticals, 48.31% (186 households) had a medium level and 31.95% (123 households) had a high level of knowledge about the topic under study.

Figure 2 shows the attitudes of family members in households in the district of San Juan de Miraflores regarding the disposal of medicines, evaluating the care, opinions and actions that people take regarding the disposal of medicines in their place of residence. Of the sample studied, 93.25% (359 households) had positive attitudes towards the disposal of medicines and 6.75% (26 households) had negative attitudes towards the subject studied.

Table 1. Continued

<table>
<thead>
<tr>
<th>Level of education</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>51</td>
<td>13.2%</td>
</tr>
<tr>
<td>Secondary</td>
<td>159</td>
<td>41.3%</td>
</tr>
<tr>
<td>Higher technical</td>
<td>101</td>
<td>26.2%</td>
</tr>
<tr>
<td>University</td>
<td>74</td>
<td>19.2%</td>
</tr>
<tr>
<td>Total</td>
<td>385</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table 2. Methods of disposal of medicines by respondents in San Juan de Miraflores.

<table>
<thead>
<tr>
<th>Type of medicine</th>
<th>Deposit expired and unused medicines from the household at designated collection points</th>
<th>Disposal of medicines by throwing them in the trash flushing them down the toilet or not knowing what to do with them</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tablets</td>
<td>41.56%</td>
<td>58.44%</td>
<td>100%</td>
</tr>
<tr>
<td>Ointments</td>
<td>37.66%</td>
<td>62.34%</td>
<td>100%</td>
</tr>
<tr>
<td>Cough Syrup</td>
<td>30.39%</td>
<td>69.61%</td>
<td>100%</td>
</tr>
<tr>
<td>Inhalers</td>
<td>39.22%</td>
<td>60.78%</td>
<td>100%</td>
</tr>
</tbody>
</table>
There is no relationship between the level of knowledge and attitude towards the disposal of medicines in households in the district of San Juan de Miraflores.

Hi: There is a relationship between the level of knowledge and attitude towards the disposal of medicines in households in the district of San Juan de Miraflores.

In Table 3, Spearman’s Rho correlation test (Sig.>0.05) found that the p-value of the statistical test was 0.000 with a low positive correlation (Rho = 0.345), approving the alternative hypothesis (Hi), indicating that there is a relationship between the level of knowledge and attitude towards the disposal of medicines. This indicates that the greater the knowledge and increase in the level of knowledge, the greater the attitude towards the correct disposal of medicines that are expired, deteriorated and unusable in the households of San Juan de Miraflores.

Discussion and conclusion
Although there are several studies on the subject, our study is important because it is one of the few studies in the area. In addition, it allows us to understand and get closer to the local reality about knowledge and attitudes towards medicine disposal.

One of the main limitations of the study is that the data represent only one district of Lima, therefore the data could not be generalized to the whole department. The objective of the study was to identify medicine disposal practices, so data such as the quantity of medicines discarded and the cost of disposal have not been quantified. In other words, the results are general ideas for future studies to highlight the extent of medicine disposal problems and to investigate the environmental impact in depth.

As can be seen, more than 50% of the population disposes of medicines by throwing them in the trash or flushing them down the toilet, or does not know what to do with them, while fewer dispose of expired and unused medicines from the household at designated collection points.

One study analyzed the environmental impact of different methods of medicine disposal, such as incineration, dumping and landfilling, and found that medicines entering the environment through different disposal methods cause air pollution and can harm children, adults, animals, and the environment through improper disposal.
Regarding the level of knowledge of how to dispose of medicines in the households of the study site, it was found that 48.31% had a medium level of knowledge and 31.95% had a high level of knowledge. These indicators are positive in the study, due to the clear evidence that the locals have some knowledge of how to dispose of medicines and have also learned about what they should do to get rid of medicines that will no longer be used by family members in the household or that have simply expired. This differs from the findings of Rodríguez and Vargas,8 who conclude that the level of knowledge of the population of San Borja and Puente Piedra is low, with 76.2% and 97.0%, respectively, not knowing how to dispose of medicines, whose study population was in Gujarat (India), found that 61% did not know the methods and places to dispose of their medicines, implying a low level of knowledge, due to a lack of education on safe medicine disposal methods on the part of patients.

About the attitude towards the disposal of medicines in households in the district of the study site, it was found that 93.25% had a positive attitude, a positive indicator that shows that people have a good attitude towards the disposal of medicines that are no longer available for consumption in their homes. This is similar to what was found by Kahsay, et al.,10 who concluded that the population of the cities of Adrigat and Tigray (Ethiopia) had a positive attitude of 82.2% in the disposal of medicines, as did Zuñiga11 who showed similar results, concluding that the population of the district of Los Olivos had a positive attitude of 96.3% in the disposal of medicines in their homes.

Finally, about the relationship between the level of knowledge and attitude on how to dispose of medicines, a significant relationship was found between the two variables using Spearman’s correlation test (P-value = 0.000), similar to the study by Zuñiga,11 which showed a significant relationship (P-value 0.015) between attitude and level of knowledge, using the same correlation test. Therefore, health professionals should be trained and knowledgeable about the correct and safe disposal of medicines and provide this information to patients when they visit them, and pharmacy specialists have an important role to play in providing adequate information about the safe disposal of medicines to develop positive disposal practices.12

In conclusion, the level of knowledge and attitude of household residents in the San Juan de Miraflores district regarding the disposal of expired, damaged and/or unusable medicines is positively correlated, showing that if they know about the measures and are aware of the forms and methods to be considered when disposing of medicines, they will dispose of them correctly. This highlights the importance of developing environmental policies through public policies that are not only publicized, but also educate through awareness programs for the safe and proper disposal of expired, unwanted, or unused medicines.

Data availability
Underlying data
Zenodo: Knowledge and attitude of the people in San Juan de Miraflores towards the disposal of medicines, https://doi.org/10.5281/zenodo.6991474.13

This project contains the following underlying data:
- DATA.csv
- DATA.sav

Extended data
Zenodo: Knowledge and attitude of the people in San Juan de Miraflores towards the disposal of medicines, https://zenodo.org/record/7109117#.Yy9xmnbMLIU.13

This project contains the following extended data:
- DATA KEY Knowledge and attitude.txt
- English questionnaire.docx
- Spanish questionnaire.docx

Data are available under the terms of the Creative Commons Attribution 4.0 International license (CC-BY 4.0).
References

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