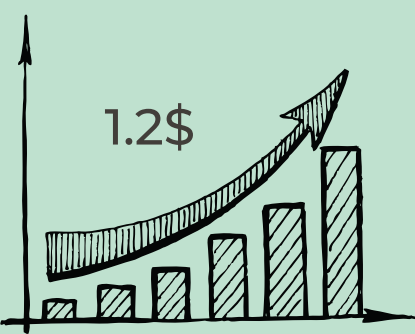


EcoPharm AI: Smart Pharmaceutical Waste Disposal



Introduction

The improper disposal of expired medicines and medical waste has become a significant environmental challenge. Addressing this issue is now an urgent necessity. To contribute to a solution, we developed a smart machine to ensure safe and sustainable waste management.



Global pharmaceutical spending has reached an astounding \$1.2 trillion annually, according to the IQVIA Institute.

Objectives

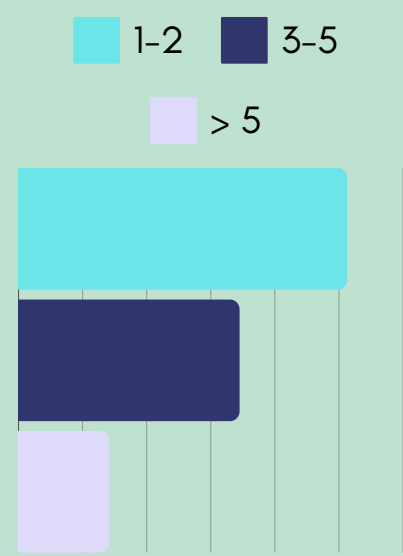
- To raise awareness among future generations about best practices of medical waste disposal.
- To motivate the public to be part of the process by rewarding them when they use our machine.
- To protect the environment from pollution
- To benefit from recycled drugs into substances such as building materials or fertilizers.

Methods

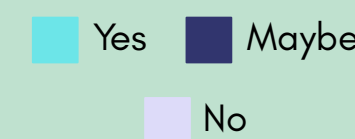
This study combined a survey of 112 respondents with the development of the EcoPharm Disposal Machine prototype. Data analyzed using SPSS revealed trends and barriers in waste management, while prior studies informed the machine’s design, featuring automated sorting and IoT connectivity.



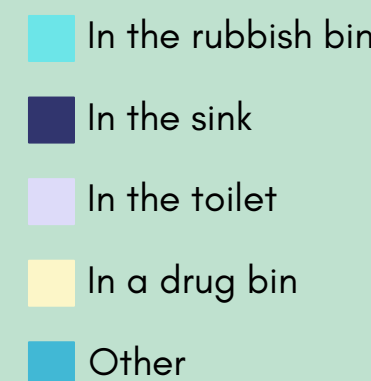
Data Analysis



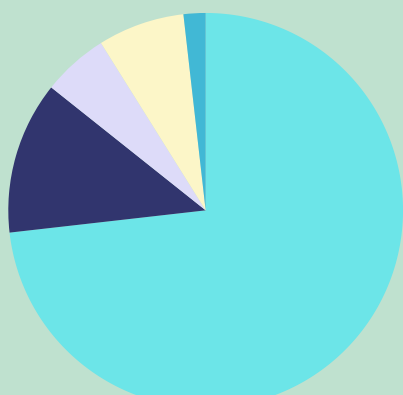
What is the approximate number of medications you use per month?



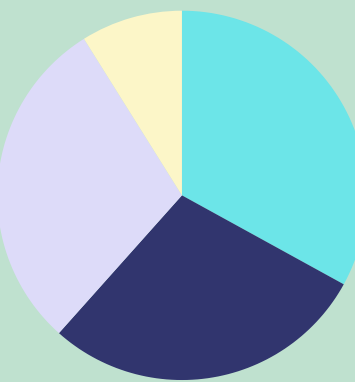
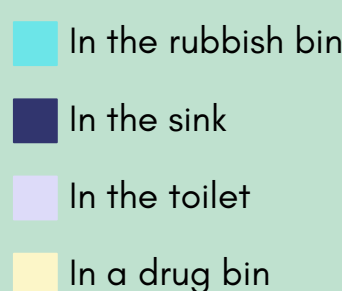
Do you think disposing any expired/unused drug in your household important?



How do you normally dispose **SOLID** dosage forms (e.g. tablets, capsules, suppositories, transdermal patches)?

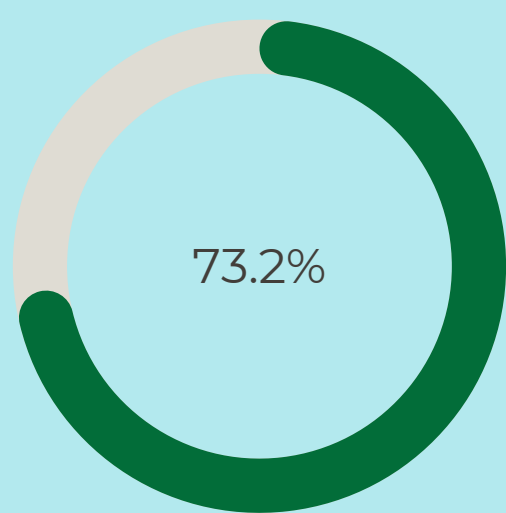


How do you normally dispose **LIQUID** dosage forms (e.g. suspensions, elixirs, topical lotions injections)?



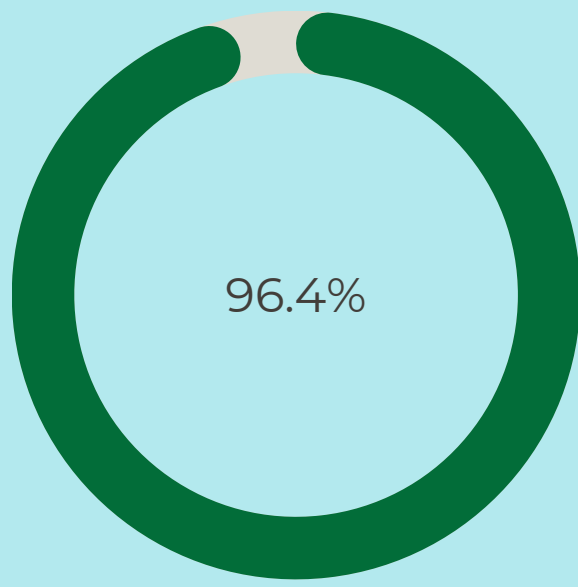
Results

This study highlighted the need for a centralized system to dispose of expired medications. The EcoPharm system emerged as an eco-friendly solution, encouraging responsible disposal and protecting health and the environment.



Nearly all respondents (108) agreed that improper disposal of unused and expired medicines harms the environment and health.

82 of the people dispose of Solid dosage forms such as (tablets, capsules, and suppositories..) in the rubbish bin.



YOUR ULTIMATE GUIDE TO THE
INNOVATIVE DRUG DISPOSAL MACHINE

1. Scan your ID card
Through our mobile phone application, open your digital ID card and scan your card on the machine so you can access your profile.

2- Pick your desired category
Pick the right category according to which type of medicine you are disposing. The categories are Solid dosage form, Liquid dosage form, Semi-solid dosage form, or Gaseous dosage form.

3. Place the medicine bottle/ strip in the machine
Place the medicine into the machine, based on your choice of category the machine will open the space for your medicine to be inserted. Ensure the medicine is in its bottle or strip

4. Collect your points
The machine will confirm your contribution and will add points to your registered ID card

5. Claim your rewards!
After collecting your points you should be eligible for a reward such as a voucher!

Thank you for recycling your medications at TIDDM!

POCKET GUIDE
الدليل الإرشادي

1. Solid Dosage Form:
الأشكال الصيدلانية الصلبة:
(Powders) المساحيق (Granules) الحبيبات (Tablets) المصفوفات (Capsules) الكبسولات (Lozenge pellets) الأقراص السكرية

2- Semi- Solid Dosage Form:
الأشكال الصيدلانية الشبه صلبة:
(Gels) الهلاميات (Suppositories) السحامين (Ointment) المراهم (Creams) الكريم (Pastes) المعاجين

3- Liquid Dosage Form:
الأشكال الصيدلانية السائلة:
(Solutions) المحاليل (Syrups) الشراب (Suspension) المعلقات (Colloids) القويبات (Drops) القطرات

4- Gaseous Dosage Form:
الأشكال الصيدلانية الغازية:
(Sprays) بخاخات (Vaporizer) المررداد (Inhalers) المستنشقات

References

Amoabeng, I., Otoo, B., Darko, G., Borquaye, L. (2022, May 26). Disposal of Unused and Expired Medicines within the Sunyani Municipality of Ghana: A Cross-Sectional Survey. J Environ Public Health, 2022 May 26; 2022:6113346. doi: 10.1155/2022/6113346. E Collection 2022

FDA. Disposal of Unused Medicines: What You Should Know Learn how to dispose of unused or expired drugs. 2020.

Abbas MO, Beshir S, Kamal AIKhalidi D, et al. UAE pharmacists' perceptions of the causes of unwanted or unused medications, their practices, and barriers to promoting safe medication disposal by the public. BMC Public Health. 2025;25(1):236. Published 2025 Jan 20. doi:10.1186/s12889-025-21332-3

Kinrys G, Gold AK, Worthington JJ, Nierenberg AA. Medication disposal prac-tices: increasing patient and clinician education on safe methods. J Int Med Res. 2018;46(3):927-39.

