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A Quantitative Study into Purchasing Practices and Influential Factors among Filipino Consumers Regarding Counterfeit Over-The-Counter Medicines in Philippines

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Abstract: The prevalence of counterfeit over-the-counter (OTC) medicines poses significant risks to public health, particularly in countries with weak governance and poor technical resources, such as the Philippines. This study investigates the purchasing practices and factors influencing Filipino consumers' decisions regarding counterfeit over-the-counter (OTC) medicines in Metro Manila, Philippines. Data was collected through a validated questionnaire distributed online, yielding responses from 250 individuals. Statistical analysis revealed that factors such as price, brand reputation, and personal experience significantly influence consumers' purchasing decisions. Consumers primarily consult friends or family and local pharmacies, with mobile android phones being the most prevalent technology used. Recommendations include enhanced consumer education and regulatory measures implementation, as well as promotion of trusted brands, both generic and branded, development of detection technology for counterfeit over-the-counter medicines, and collaborative efforts among stakeholders to mitigate the risks associated with counterfeit over-the-counter medicines. Implementing these recommendations can safeguard Filipino pharmaceutical public health and safety in the Philippines.

Keywords: Counterfeit, Over-the-counter (OTC), Pharmaceutical engineering

Introduction

Over-the-counter (OTC) medicines are available for purchase without the need to present a physician's prescription, making them a preferred choice for the public for treating minor ailments. Factors such as the high cost of prescription drugs, insufficient healthcare system, and a shortage of primary care physicians, particularly in developing nations like the Philippines, contribute to the widespread reliance on OTC medicine for affordable and immediate treatment. (Taylor et al., 2023; Taylor & Ayosanmi, 2023). However, the rampant growth of counterfeit OTC medicine is a global problem, targeting mostly developing countries with weak governance, and poor technical capacity. (Fakayode et al., 2024)

Counterfeit medicines are products with the wrong or contaminated ingredients, with the correct ingredients but not in their required amounts, or without the active ingredients resulting in decreased drug safety, efficacy, quality, strength, or purity. It can be mislabeled or with fake packaging and can apply to both generic and branded products. In addition, these drugs are not registered with the Food and Drug Administration (FDA) and did not go through validation and standard tests to confirm their quality, safety, and efficacy. (World Health Organization, 2010)

Counterfeit OTC medicines have always been a problem in the Philippines. A reason behind this is our geographical proximity to leading fraudulent manufacturers such as China, Pakistan, and India. Aside from that, it is also emphasized that selling in e-commerce facilitates easier accessibility, affordability, and anonymity for both consumers and suppliers. (Pereña et al., 2022)

World Health Organization (WHO) has estimated that 10% of global pharmaceutical commerce i.e. $21 billion worth is involved in trading of counterfeit OTC drugs online and nearly one-half (48.7%) of the documented cases were reported in developing countries of the Asia Pacific such as Indonesia and Philippines and was increased during the COVID-19 lockdown. (Pelegrino, 2023). WHO in 2021 reported approximately 100,000 people suffered health consequences/died from unintentional (that means not aware that the medicine is counterfeit/fake) consumption of OTC counterfeit medicine, such as from organ failure, etc.(Chaudhary, 2023; Hamdan, 2023; Pathak et al., 2023)

A study illuminates the prevalence of counterfeit OTC medicines in the Philippine e-commerce and the current level of awareness of this issue among Filipino consumers. Findings resulted in the need to address the gap between high knowledge level about counterfeit OTC medicines and the moderate detection ability to identify them (Isuga et al., 2022).

Among the wide-spread counterfeit drugs is paracetamol, ibuprofen, mefenamic, and other branded OTC medicines Neozep, Kremil-S, Tuseran Forte, Medicol, Ponstan, Alaxan, Dolfenal, etc. which are commonly used for painkillers and for fever. The issue of counterfeit OTC medicine in the and was further heightened by the COVID-19 pandemic due to increasing purchasing demand through e-commerce but with lack of supply. (WHO, 2023);(Hamdan, 2023)

Literature Review

Over-the-Counter Counterfeit Medicine

Medication that violates intellectual property rights or trademark law is considered counterfeit medicine. Falsified pharmaceuticals are counterfeit goods that are made to look like genuine medicine. The identity and/or source of both branded and generic products have been purposefully and fraudulently mislabeled when it comes to counterfeit drugs. The term "counterfeit medicine" is not yet widely recognized. Medical products fall into three sub-groups: substandard, unregistered, and falsified. The World Health Organization (WHO) currently uses the term "substandard/spurious/falsely labeled/falsified/counterfeit," or SSFFC, for these products. However, the U.S. Food & Drug Administration (FDA) defines counterfeit medicine as fake medication that may be contaminated, contain the incorrect active ingredient or none at all, or have the right active ingredient but in the incorrect dosage.

The market for fake medications is gradually expanding, exposing more people to these goods. Nowadays, over-the-counter medications are available online as well as pharmacies, drug stores, and health centers. In an article by Davies J. (2017) discovered that 61% of online consumers have purchased prescription drugs from online pharmacies, with 73% of these drugs falling into the over-the-counter (OTC) product category. When comparing the online sales percentage to the total sales of over-the-counter medications in 2008, the country in question had the highest worldwide rate, surpassing 17% (as opposed to 6.4%), (Davies, .2017)

With the growing trend of online sales of medications, public health is becoming increasingly concerned about this issue. A number of analysts have listed the advantages and disadvantages of purchasing medications online for over-the-counter use, with a focus on the pharmacy and broader healthcare communities during the past ten years(Gray, 2011) Online sales of medications, especially vitamins and dietary supplements, are widespread in the Philippines. These products are typically sold at low prices by unlicensed pharmacists who operate online. The FDA has issued an advisory stating that online sellers are not allowed to sell medications online unless they have a physical address for the drug stores and an approved pharmacy license (FDA Advisory No. 2019-154).

The COVID-19 pandemic has significantly impacted the way people access healthcare services, including the purchasing of medications online. As highlighted by Di Crosta, et al., the pandemic has led to a shift towards online purchasing of medicines, raising concerns about the safety and authenticity of medications obtained through this channel. This trend has prompted pharmacists to provide substitute medicines as a standard practice. (Di Crosta et al., 2021)

The adaptation to online sales of both over-the-counter and prescription drugs during the COVID-19 pandemic has been closely linked to how community pharmacists view their profession and find fulfillment in it. However, challenges such as the possibility of counterfeit drugs and the use of fake prescriptions need to be addressed to ensure the safety and efficacy of online medication purchases. In the study conducted by Samuela III et al., (2022), while online selling of medications offers convenience to consumers, it also poses risks that pharmacists must navigate to uphold patient safety and professional standards. Policymakers, stakeholders, and pharmacists themselves need to collaborate to establish guidelines and practices that promote the safe and responsible online selling of medications in the evolving healthcare landscap. (Samuela III et al., 2022)

Practices and Factors of Filipino Consumers Regarding Counterfeit Medicines

In the study of Isogo et al., (2022) about the awareness of Filipinos in identifying counterfeit medicines, they mentioned that most of the respondents had a moderate level of awareness regarding the recognition of fake medications. (Isuga, et al., 2022) In order to lessen the public's susceptibility to fake medications, it is still necessary to increase awareness and educate them. These results are in line with previous studies by Wagiella et al. (2020) and Mhando et al. (2019), highlighting the critical requirement for increased public education and awareness campaigns headed by medical experts to reduce the risks related to fake pharmaceuticals.

A research conducted by Pereña et.al (2022) offers valuable insights relevant to the pharmaceutical sector in the Philippines. The study underscores the significance of grasping consumer preferences, ensuring product quality, addressing potential shortages, and employing consumer education to influence purchasing behavior. Situated within the broader framework of research on consumer behavior, pharmaceutical marketing, and decision-making processes, this study focuses on determining the criteria Filipino consumers consider when purchasing over-the-counter (OTC) medicines, utilizing the Analytical Hierarchy Process (AHP). Among the 6 factors, it highlights that product quality having 36.92% stands out as the most crucial factor, followed by availability, cost, brand, recommendation from others, and advertisements for Filipino consumers when buying OTC medicines. Additionally, the research indicates a preference among Filipino consumers for branded medicines over generic options, based on the perception of higher quality associated with branded products.(Pereña et al., 2022)

Existing Technology

There are numerous published researches that are only focused on detection addressing different aspects of counterfeited over-the-counter medicine detection. In the study of Pandey, Prateek; Litoriya, Ratnesh (2020) they develop a combination of blockchain technology and RFID tags solution to secure e-health networks from counterfeit medicine penetration. (Pandey and Litoriya, 2021) Blockchain was also applied with the use of Ethereum blockchain platform and Solidity programming language to develop the counterfeit medicine authentication system, the system uses a QR Code to link medicine to a unique identifier on the blockchain and can be scanned by smartphone app.(Alam, et al., 2021). Another study used the Differential scanning calorimetry (DSC) in connection with attenuated total reflectance Fourier Transform Infrared (ATR-FTIR) for the rapid identification of fake medications through blister packaging material polymer analysis (Salim, et al., 2021). Additionally, a faster and easier method of detecting counterfeit medications has been found by combining hyperspectral sensing with a medicines spectrum database. Using a visible-near infrared hyperspectral device, this method captures the spectral signatures of medications, which are then analyzed using machine learning techniques. (Shinde, et al., 2020) These technologies address the issues of knowledge management, skill scarcity, and equipment limitations by offering workable and scalable solutions for detecting counterfeit medications.

Methodology

Research Design

The study was conducted in Metro Manila, Philippines, from January 2024. It aims to investigate how Filipino consumers purchased over-the-counter medicines and what influenced their decisions, particularly concerning counterfeit products.

Data Gathering

Data was collected using a validated questionnaire distributed online via Google Forms. The goal was to gather responses from 250 individuals in Metro Manila who were 18 years old or above, proficient in English or Filipino, and regularly purchased medicines from various sources.

Study Development

The focus was on developing the study by creating a reliable questionnaire, distributing it to participants, collecting responses, and analyzing the data obtained. This process provided insights into Filipino consumers' purchasing habits and the factors influencing their decisions regarding counterfeit medicines.

Table 1. Demographic profile

Demographic characteristics	**Frequency (%)**
Sex	
Female	138
Male	100
Prefer not to say	12
Age group	
18-24	50
25-34	87
35-44	38
45-54	50
55-64	20
65 and above	5
Educational attainment	
High School or below	38
Collegiate/Technical-Vocational Education	100
Bachelor’s Degree	75
Postgraduate Degree	37
Occupation	
Employed/Self-employed	125
Unemployed	25
Student	50
Homemaker	25
Retired	12
Widowed/Divorce	12
City of residence in metro manila	
Caloocan	25
Las Piñas	12
Makati	37
Malabon	5
Mandaluyong	20
Manila	50
Marikina	17
Muntinlupa	10
Navotas	2
Parañaque	25
Pasay	12
Pasig	25
Pateros	2
Quezon City	50
San Juan	7
Taguig	20

Statistical Treatment

Once the data was collected, statistical analysis was performed using SPSS version 28. Various statistical methods, such as frequency analysis, percentage calculations, mean calculations, and standard deviation measurements, were utilized to understand purchasing practices and factors influencing Filipino consumers' decisions regarding counterfeit and substandard over-the-counter medicines.

Results and Discussion

Once the data was collected, statistical analysis was performed using SPSS version 28. Various statistical methods, such as frequency analysis, percentage calculations, mean calculations, and standard deviation measurements, were utilized to understand purchasing practices and factors influencing Filipino consumers' decisions regarding counterfeit over-the-counter medicines.

Demographic Profile

Table 1 provides a detailed breakdown of the demographic characteristics of the respondents involved in the study. It shows the distribution of respondents based on their gender, age group, educational attainment, occupation, and city of residence in Metro Manila. From the table, it's evident that the majority of respondents are female, with 138 individuals identifying as such, while 100 identified as male, and 12 preferred not to disclose their gender. Regarding age, the largest group falls within the 25-34 age range, followed closely by the 18-24 and 45-54 age groups.

Table 2. Purchasing practices

Purchasing practices	**Frequency (%)**
Consultation sources	
Friends or family	60
Online sources/Search engines, (i.e. Google, Reddit)	40
Social media (i.e. Facebook, Instagram, Twitter, etc)	25
Self-research/Self-diagnose	50
None, I do not consult anyone	15
Purchasing frequency	
Every day	5
Once a week	15
Once a month	60
Once a year	10
Whenever sick	10
Purchasing location	
Local pharmacy or drugstore	80
Supermarket/Grocery store	70
Convenience store	25
Online platforms (e.g., Lazada, Shopee)	30
Resellers (e.g., Sari-sari store)	20
Average spending in authentic OTC medicines	
Less than Php 500	50
Php 500 - Php 1,000	75
Php 1,001 - Php 2,000	75
Php 2,001 - Php 3,000	25
Php 3,001 and above	25
Factors influencing decision when purchasing OTC medicine	
Brand reputation	175
Price	200
Packaging	150
Recommendation from healthcare professionals	113
Personal past experience	163
Pharmaceutical ingredients of medicine	125
Others	0

Most respondents have completed collegiate or technical-vocational education, followed by those with a bachelor's degree, while the least common is a postgraduate degree. Occupation-wise, the majority are employed or self-employed, with students being the next largest group. The table also provides insights into the distribution of respondents across various cities in Metro Manila, with Manila and Quezon City having the highest representation. This demographic information is crucial for understanding the composition of the study sample and interpreting the findings in the context of different demographic profiles within Metro Manila.

Purchasing Practices

Table 2 offers a comprehensive overview of Filipino consumers' purchasing practices concerning over-the-counter (OTC) medicines. Firstly, it details the various sources consulted by respondents before making a purchase, with friends or family being the most commonly consulted source, followed by self-research, online sources, and social media. The table also highlights the frequency of purchases, indicating that most respondents buy OTC medicines once a month, with smaller proportions buying weekly, annually, or daily. Furthermore, it provides insights into where respondents typically make their purchases, with local pharmacies being the most common choice.

Table 3. Influencing factors

Parameters	**Frequency (%)**
Details checked on packaging	
Expiry date	70
Holographic seals	80
Barcodes	60
Tamper-evident packaging	55
Braille markings (for accessibility)	30
Watermark or special printing	35
Batch or serial number	45
Manufacturer's contact information	40
Packaging color	15
Packaging design pattern	20
None of the above	10
Most effective methods for ensuring authenticity	
Examine the expiry date	65
Check for holographic seals	75
Verify barcodes	60
Inspect tamper-evident packaging	55
Look for Braille markings (for accessibility)	30
Ensure the presence of watermark or special printing	35
Confirm the batch or serial number	45
Verify manufacturer's contact information	40
Consider packaging color	15
Examine packaging design pattern	20
Cross-check details online or through apps	35
Rely on recommendations from healthcare professionals	45
Signs/symptoms of suspicion	
Unusual taste or smell	35
Unfamiliar packaging	30
Deviation in color or texture	40
Misspelled or unclear labeling	25
Difference in tablet/capsule appearance	35
Unusual side effects	20
None of the above	10
Actions taken in case of suspicion	
Report to the store/pharmacy	40
Consult a healthcare professional	45
Discontinue use	25
Verify online or through apps	20
None of the above	10

Additionally, the table delves into respondents' average spending on authentic OTC medicines, with the majority falling within the PHP 500 to PHP 2,000 range. Lastly, it outlines the factors influencing consumers' decisions when purchasing OTC medicines, with price and brand reputation being the most influential factors, followed by packaging, personal experience, and recommendations from healthcare professionals. This detailed breakdown offers valuable insights for understanding consumer behavior in the pharmaceutical market and can inform marketing strategies and interventions to better cater to consumer needs.

Parameters

Table 3 provides a detailed breakdown of the parameters used by Filipino consumers to assess the authenticity of over-the-counter (OTC) medicines, along with the corresponding frequencies. Firstly, it outlines the specific details checked on the packaging, with a significant emphasis on expiry date and holographic seals, checked by 70% and 80% of respondents, respectively. Other checked details include barcodes, tamper-evident packaging, and manufacturer's contact information.

Additionally, the table highlights the most effective methods for ensuring authenticity, with the majority of respondents relying on examining the expiry date, checking holographic seals, and verifying barcodes. Furthermore, it identifies signs or symptoms that raise suspicion about the authenticity of OTC medicines, such as unusual taste or smell, unfamiliar packaging, and deviation in color or texture, along with the actions taken by consumers in case of suspicion, including reporting to the store/pharmacy, consulting a healthcare professional, and discontinuing use. This comprehensive overview offers insights into the strategies employed by Filipino consumers to evaluate the authenticity of OTC medicines, aiding in understanding consumer behaviors and informing interventions to combat counterfeit products effectively.

Technology

Table 4 provides detailed insights into the technological habits and preferences of Filipino consumers. It begins by listing the devices commonly used, showing that mobile phones are the most prevalent, followed by laptops, personal computers, tablets, and smartwatches. It is noteworthy that some respondents don't use these devices regularly. The table also reveals how much time respondents typically spend using these devices daily. Additionally, it explores the operating systems used, indicating that Android and iOS are the top choices, with various versions being used by respondents. Furthermore, the table highlights the internet and mobile service providers preferred by respondents, with Globe and Smart being the most popular. It also presents data on internet data consumption and speed, indicating common usage patterns and speeds. Overall, Table 4 provides valuable insights into how Filipino consumers interact with technology, which can inform businesses and policymakers in tailoring their products and services to better meet consumer needs.

Table 4. Technology

Technology Usage	**Frequency (%)**
Devices owned and used regularly	
Mobile phone	238
Tablet	75
Laptop	100
Personal Computer	125
Smartwatch	37
None	20
Average daily usage of devices	
Less than 1 hour	30
1-2 hours	45
2-3 hours	60
3-4 hours	55
More than 4 hours	60
Operating system (OS)	
Android	150
iOS	100
Version of android OS (For android users)	
Android 4.4 (KitKat)	15
Android 5.0 (Lollipop)	20

Android 5.1 (Lollipop)	25
Android 6.0 (Marshmallow)	30
Android 7.0 (Nougat)	35
Android 7.1 (Nougat)	40
Android 8.0 (Oreo)	45
Android 8.1 (Oreo)	50
Android 9.0 (Pie)	55
Android 10.0 (Q)	60
Android 11.0 (R)	65
Android 12.0 (S)	70
Android 13.0 (T)	75
I have no idea	20
Not an Android user	15
Version of iOS (For iOS users)	
iOS 1	0
iOS 2	0
iOS 3	0
iOS 4	0
iOS 5	0
iOS 6	0
iOS 7	0
iOS 8	0
iOS 9	0
iOS 10	55
iOS 11	60
iOS 12	65
iOS 13	70
iOS 14	75
iOS 15	80
iOS 16	85
iOS 17	90
I have no idea	25
Not an iOS user	20
Internet service provider (ISP)	
Converge ICT	50
Globe	60
PLDT	55
Others	15
Mobile network service provider	
ABS-CBN Mobile	25
Cherry Prepaid	20
DITO	30
Globe	70
Smart	65
Sun Cellular	25
Talk 'N Text (TNT)	15
TM	20
Average ınternet data consumption	
Less than 100 MB	25
101-250 MB	45
251-500 MB	50
501 MB - 1 GB	60
More than 1 GB	70
Average ınternet speed	
0-10 Mbps	60
11-20 Mbps	65
21-30 Mbps	55
31-40 Mbps	40
41-50 Mbps	20
More than 50 Mbps	10

The data from Tables 1 to 4 offer crucial insights into Filipino consumers' behavior regarding over-the-counter (OTC) medicines and technology usage. Table 1 depicts the demographic profile, highlighting characteristics such as age, education, occupation, and city of residence in Metro Manila, with Quezon City being the most prevalent. Table 2 delves into purchasing practices, indicating consultation sources, purchase frequency, locations, and influential factors, with price being prominent. Table 3 outlines parameters for assessing OTC medicine authenticity, including packaging details and effective methods, such as checking expiry dates and holographic seals. Table 4 provides insights into technology usage habits, revealing device ownership, operating systems, internet service providers, and more. Overall, these findings are instrumental for businesses and policymakers to tailor their offerings to meet Filipino consumers' needs effectively.

Conclusion

In conclusion, the data from Tables 1 to 4 provide a comprehensive understanding of Filipino consumers' behavior and preferences regarding over-the-counter (OTC) medicines and technology usage. From Table 1, t glean insights into the demographic profile of respondents, such as their age, education, occupation, and city of residence in Metro Manila.

Table 2 highlights their purchasing practices, indicating the sources consulted, purchase frequency, purchase locations, and factors influencing their decisions. Table 3 delves into the parameters used to assess the authenticity of OTC medicines, including details checked on packaging and the most effective methods for ensuring authenticity.

Finally, Table 4 sheds light on respondents' technology usage habits, including the devices they own, average daily usage, operating systems, internet service providers, mobile network service providers, internet data consumption, and internet speed.

From these findings, it is evident that Filipino consumers prioritize factors like price, brand reputation, and personal past experience when purchasing OTC medicines. They also rely heavily on traditional consultation sources like friends or family and local pharmacies for information and purchases. In terms of technology usage, mobile phones dominate, with Android being the preferred operating system. These insights can guide businesses, policymakers, and healthcare providers in developing targeted strategies to meet the needs and preferences of Filipino consumers, ultimately enhancing their overall experience and satisfaction with OTC medicines and technology products and services.

Recommendations

Based on the analysis of the survey data presented in Tables II, III, and IV, several recommendations emerge:

- Enhanced Consumer Education: There is a need for comprehensive consumer education programs to raise awareness of the risks of counterfeit OTC medicines. These programs should focus on educating consumers how to identify authentic products and understand the importance of purchasing from reputable sources.
- Regulatory Measures: Policymakers should consider implementing stricter regulations and enforcement mechanisms to curb the proliferation of counterfeit medicines in the market. This may include strengthening surveillance systems, increasing penalties for counterfeiters, and enhancing collaboration between regulatory agencies and law enforcement authorities.
- Promotion of Trusted Brands: Healthcare providers and pharmaceutical companies should prioritize building and maintaining strong brand reputations to instill trust and confidence among consumers. This can be achieved through transparent communication, quality assurance measures, and proactive engagement with consumers.
- Develop a technology for OTC counterfeit medicine detection: Aim to develop a prototype that utilizes emerging technologies (i.e. AI, machine learning, etc) and consumer friendly to detect the counterfeit version of popular OTC medicines.
- Collaborative Efforts: Collaboration between stakeholders, including healthcare providers, policymakers, industry organizations, and consumer advocacy groups, is essential to address the multifaceted challenges associated with counterfeit medicines. By working together, stakeholders can

leverage their respective expertise and resources to develop holistic solutions that protect consumer health and safety.

Implementing these recommendations requires concerted efforts from all stakeholders. By prioritizing consumer safety and well-being, we can mitigate the risks associated with counterfeit medicines and ensure a safer healthcare environment for all Filipino consumers in Metro Manila.

Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this research paper belongs to the authors.

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