Counterfeit and Substandard Medicines: A Public Health Concern in Afghanistan

Abstract

This study shows counterfeit and substandard medicines to public health in Afghanistan and seeks to determine appropriate measures to address the challenges using mixed methods. Quantitative and qualitative data were collected in the study. For quantitative data, a structured questionnaire was administered to 330 participants. For qualitative data, semi-structured interviews and a focus group discussion with 12 key informants were conducted. Quantitative data were analyzed using descriptive statistics, correlation, and regression, and qualitative data were analyzed using thematic analysis. The main issues include the lack of enforcement, legislative gaps around the challenged posed by counterfeit medicines, the absence of tools to verify medicines, the absence of public awareness, and informal networks among the pharmaceutical sectors the governance around counterfeit medicines. The thematic analysis resulted in the identification of six strategic layers: formalizing supply chains, enhancing the capacity of the health workforce, the formation of strategic alliances on health at the global level, and awareness of the public around health issues. According to quantitative data, the correlation between public awareness and preventive measures, and the perceived health consequences and preventive measures were strongly positive ($r = .838$ and $r = .648$, respectively). The health impact was predicted by awareness and the preventive measures meanwhile the sources and causes were not statistically significant. The findings highlight remedying the public health threat of counterfeit medicine through the integrative approaches of awareness, regulatory changes, and advancing technology. This finding assists the development of reforms directed toward the oversight of the pharmaceutical industry in Afghanistan.

Keywords: Afghanistan, Counterfeit medicines, Medicine verification, Public health, Regulatory enforcement

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جعلي او غیرمعیاري درمل؛ په افغانستان کې د عامې روغتیا یوه اندېښنه

لنډیز

دا څېړنه په افغانستان کې د جعلي او غیرمعیاري درملو ستونزه څېړي او هڅه کوي چې په عامې روغتیا ته یې زیان اړوونکو ستونزو ته د حل مناسبې لارې پیدا کړي، چې په دې موخه یې مخلوطه (کمي او کیفي) څېړنیزې طریقه کارولې دي. د کمي برخې لپاره ۳۳۰ ګډونوالو ته جوړ شوی پوښتنلیک ورکړل شوی، او د کیفي معلوماتو لپاره له ۱۲ مهمو کسانو سره نیمه جوړښتیزې مرکې او د تمرکز لرونکې ډله ایز بحث ترسره شوی دی. کمي معلومات د احصایوي طریقو لکه توصیفي احصایه، همبستګي، او رېګریشن له لارې تحلیل شوي دي، او کیفي معلومات د موضوع محور تحلیل په طریقې ارزول شوي دي. مهمې ستونزې چې په دې څېړنه کې روښانه شوې دي عبارت دي له: د قانون کمزوری تطبیق، د درملو په اړه د قوانینو خلاوې، د درملو د اصليتوب د تصدیق لپاره د لازم وسایلو نشتوالی، د عامو خلکو د پوهاوي کموالی، او د درمل جوړولو سکتورونو ترمنځ د غیر رسمي او بې‌نظمه اړیکو شتون. د موضوعي تحلیل له مخې، شپږ مهمې ستراتیژۍ تشخیص شوې دي، لکه د درملو د عرضې منظمول، د روغتیایي کارکوونکو د ظرفیت لوړول، د نړیوالو همکاریو پراخول، او د عامه پوهاوی پیاوړی کول. احصایوي موندنې ښیي چې د پوهاوي او مخنیوي ترمنځ، او همدارنګه د روغتیایي زیان او مخنیوي ترمنځ، پیاوړې مثبتې اړیکې شتون لري ($r = 0.838$ او $r = 0.648$). روغتیا ته زیان د پوهاوي او مخنیوي له لارې اټکل کېدای شي، خو د جعلي درملو سرچینې سره یې معنی لرونکې احصایوي اړیکه نه ده ښودل شوې. دا پایلې څرګندوي چې د جعلي درملو د مخنیوي لپاره یو ګډ دریځ، چې پوهاوی، قانوني اصلاحات، او ټکنالوژي پکې شامل وي، اغېزمن تمامېږي.

کلیدي کلمې: افغانستان، جعلي درمل، د درملو تصدیق، عامه روغتیا، قانوني تطبیق

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Introduction:

People's right to access safe, effective, quality-assured medicines remains fundamental to the protection of public health and a core requirement for achieving universal health coverage. This access, however, remains unfulfilled for many low- and middle-income countries, Afghanistan included. Afghanistan has always struggled with a land-locked, conflict-affected weak health, and underfunded regulatory institutions and pharmaceutical sectors. These ventures have found an open environment where counterfeit and substandard medicines can flourish, putting public health and national drug security in jeopardy, and threatening development policy goals.

Counterfeit medicines are described by the World Health Organization (WHO), as medical products that have been deliberately and fraudulently misrepresented as to their identity, source, or constituent parts. Counterfeit medicines may contain dangerous, nonexistent pharmaceutical ingredients, or may have active ingredients covered with a substandard protective coating. Substandard medicines, on the other hand, are approved medical products that do not conform with established national and international quality standards. Afghanistan, because of porous borders, unregulated informal pharmaceutical markets, weak public health, and public ignorance, remains the land of such extremes.

Due to the lack of government control in the aftermath of the political situation in Afghanistan, poorly managed counterfeit medicines have grown to be an alarming issue in the country. Research estimates done by the Ministry of Public Health alongside instructional watchdogs indicate that lifesaving medicines such as antibiotics, vaccines, antimalarials, as well as, other medical supplies in Afghanistan have been found to be of substandard quality. Due to these tampered medicines, not only does the patient not recover, but they also have an increased risk of dying. The patient also goes through the burden of antimicrobial resistance, which is a global healthcare issue that is worsened by the substandard medicines.

The lack of quality control over counterfeit medicines directly impacts health systems. Public confidence in health professionals diminishes and has a negative impact on market costs that the people have to pay for. The country has low healthcare standards which is a burden on the country as well as the traitors of the national healthcare system. In regards to these challenges, Afghanistan is not able to control lab structure which is detrimental to an countries health in relation to pharmacovigilance which is an issue.

Even with the seriousness of the situation, Afghanistan does not have extensive data, concentrated research, or analysis on the extent, reasons, and impacts of counterfeit and substandard medicine. There is also a lack of analysis and documentation on the existing gaps of policy and institutional barriers to effective enforcement of the regulation. Fulfilling such a myriad of challenges demands a coordinated approach: reforming regulatory instruments at the country level, tightening market surveillance, improving international regulatory collaboration, fostering public-private alliances, and aimed public awareness campaigns.

The problem statement of the study as we know Afghanistan faces a serious public health issue from the widespread circulation of counterfeit and substandard medicines. These products often lack proper active ingredients, leading to treatment failure, increased illness and death issues, and the rise of drug resistance. Such countries have limited regulations compared to more developed territories, a lack of owned pharmaceutical industries, porous borders, and a lack of enforcement capacity. Certain elements of this issue, albeit serious,

lack depth and are quiet, to say the least, unsophisticated. These elements are particularly uncoordinated and weak, which increases both the overall exposure to the healthcare system and public cynicism towards it. Additionally, Afghanistan has an urgent need to analyze the scope and consequences of counterfeit and substandard medication to understand the fundamental issues and design relevant and effective solutions to the problems of the medicine's quality and the public health protection.

The significance of the research is critical in investigating impact of counterfeit and substandard medicines on public health in Afghanistan. It seeks to assess health impact of these poor-quality medicines and seek to understand the deficient regulatory and supply structures in the country. It will devise correct and feasible approaches to improve quality of medicines, help in policy reform, and help strengthen joint actions to improve the safety of medicines. In the end, improving public health and rebuilding Afghanis healthcare system trust will be the core goal of the research.

Research Questions:
How do counterfeited and poor-quality medicines affect the public health situation in Afghanistan?

What do you consider the most serious gaps in Afghanistan's pharmaceutical regulatory and supply chain systems to explain the diffusion of substandard medicines?

How do counterfeited and poor-quality medicines affect public trust in the health system?

What realistic actions can government and other concerned stakeholders take to address the issues of quality and safety of medicines in Afghanistan?

What actions can be taken to tackle the issues of counterfeited and poor-quality medicines and the resultant medicines in Afghanistan with proactive policies and collaboration among stakeholders?

Research Objective:
To determine the level of the impact of counterfeit and substandard medicines on the health of the Afghans. To determine the gaps in the regulatory systems and the pharmaceutical supply systems that permit the dissemination of substandard medicines. To determine the effect of counterfeit and substandard drugs on the public's perception of the health care system. To formulate actionable and culturally appropriate approaches aimed at improving the quality and safety of drugs. To support the policy recommendations with arguments and promote collaborative initiatives aimed at advancing public health and pharmaceutical legislation in Afghanistan.

Literature:
According to the Mahmoudi Meymand et al. (2024), the authors describe the illicit trading of services and goods related to healthcare as one of the most serious trade problems globally, particularly in developing countries, since the effects there are most dire. The purpose of this study was to investigate the challenges to anti-smuggling in Plundered Iran. The authors used qualitative research and conducted semi-structured interviews with 30 participants, whom they classified as central players in the anti-smuggling activities. Thematic analysis pointed to three main areas of concern: the absence of policy frameworks, the absence of implementation policies (lack of resources, enforcement, etc.), and the absence of robust

evaluation mechanisms. The authors suggest that health goods smuggling is a problem which is complex and involves many interacting factors, thus policy relating to health goods smuggling ought to be more integrated and developed together with policies on regulation of counterfeiting and corruption.

As emphasized by Hamilton, W. L., et al (2016), falsified medicines represent a critical public health problem, and more so now in low- and middle-income countries (LMICs), where they contribute to an increase in morbidity and mortality and an overall decline in health systems performance. In LMICS, this study assessed international, national, and local attempts to thwart falsified medicines. In a systematic review with over 660 articles, 203 works were determined to be pertinent, with 84 works being included in a qualitative synthesis. Results indicate the need for a robust international pharmacovigilance system, global collaboration, and investment at the international level. For the national level, there is the need for robust regulatory governance, effective post-market drug surveillance, and stringent enforcement of anti-falsification policies and legislation. Training and implementation of drug detection and testing technology at the local level would help health workers in the identification of substandard and falsified medicines. Use of proactive anti-counterfeiting methods, including mobile phone-based verification, permits patients and the general public to authenticate medicines. Documented proof indicates that combined efforts at different levels is the most effective in dealing with the problem of falsified medicines, and this requires political resolve and strong measures from the leaders.

Due to the study by Harper, J., & Strote, G. (2011), the Afghan pharmaceutical industry faces numerous challenges such as inadequate governance, ineffective regulatory systems, and the disjointed supply chains. While the area does receive some international aid, the sector is still poorly developed leading to the proliferation of substandard and counterfeit drugs. In Afghanistan, the availability and access to affordable and high-quality medicines is quite concerning. There is a lack of public health reform and investment in the Health Sector which is a huge public health concern.

According to the Aziz, F. (2014), rational use of drugs is defined as the situation whereby a patient is provided with the most appropriate medicine for his/her condition, at the most affordable cost, for the required time, and in the optimal dose regimen. In Afghanistan, this issue is attributed to poorly developed a national drug and treatment guidelines. Using the literature review approach, this study utilized the WHO frame to investigate the existing practices and gaps of Afghanistan. Major gaps identified include, lack of patient-centered ethos, lack of supportive systems to educate healthcare, absence of a drug regulatory authority, and irrational drug prescribing practices. Therefore, the review proposes the following actions: improving patient involvement in healthcare decision making, reforming medical education, establishing pharmacovigilance and comprehensive drug quality control systems, and implementing a rational drug use policy.

According to Lalani, et al. (2015). In Afghanistan, Substandard antimalarial drugs available on the market, with approximately one in four not passing quality assurance tests. This emphasizes the imperative need to sustain oversight and improve the domestic capacity and drug quality testing necessary for regulating the treatment and the malaria itself.

According to the Glass's (2014) research, Counterfeit medicine in less developed nations, in particular, represent a significant risk to the public's health because of the lack of regulation

and enforcement. Counterfeit medicines, which are often a great deal less expensive and easier to obtain, more than frequently contain critical life-saving medicines such as antimalarials and antibiotics, contributing to increased resistance and mortality. This problem is a fundamental threat to the healthcare systems, and as such, requires the enforcement of regulation and control over the appropriate technology and the over supply chain to control the problem. In developing nations, the problem is much more acute than in developed ones, where counterfeit medicines are more often than not very low value lifestyle drugs.

As per Ehsan et al. (2025), insufficient healthcare facilities, rampant prescription, and misuse of antibiotics, and lack of proper policy implementation culminate into an 'Antimicrobial resistance (AMR)' crisis in Afghanistan. The absence of infection prevention and control along with inadequate surveillance systems aggravate the situation. Low resistance rates to certain antibiotics further complicate the dilemma. There is an emergent need in Afghanistan, supported by international collaboration, to enhance public policy on border health, along with the implementation of on-the-ground healthcare improvements, healthcare regulation, public education and advocacy, surveillance and infection control, and collaboration to address AMR.

As per Walker et al. (2018), In capital-poor settings, deaths from untreated malaria and poor-quality antimalarial medicines are common because of a lack of regulation and poor control. Guidelines, education, and rapid diagnostic tests are insufficient, especially in the absence of global collaboration, political will, and funding.

Walker et al. (2018) state that malaria causes over a million deaths a year and effective antimalarial treatment is critical to reducing that. Counterfeit antimalarial drugs do further damage by reducing treatment efficacy, causing economic loss, fostering drug resistance, and undermining trust in medicine. Research has shown that counterfeit antimalarial medications are alarmingly common, with an estimated prevalence of 88.4% in sub-Saharan Africa and 53% in Southeast Asia. Of great concern are the public health consequences of the lack of drug quality assurance and the absence of structured pre and post marketing surveillance, failure of effective regulation, and weak legislation.

As noted by Arora and Sharma (2019), more than one million deaths per year is attributed to malaria. One of the major challenges in conquering malaria is the availability of fake antimalarial medicines. The fake antimalarial medicines not only diminish the effectiveness of treatment, but also contribute, on a broader scale, to a decline in faith in the healthcare system, foster drug resistance, and economic decline. This review, which draws on global studies, shows the alarming counterfeiting rates of antimalarials, with sub-Saharan Africa having 88.4% and Southeast Asia 53%. There is a strong call for the adoption of multiple comprehensive counter-measures in during the publishing period to block the circulation of these medicines to ensure the quality of medicine.

Fernandez et al. (2011) stated that Fake medications are nothing new. History had fake cinchona barks and fake quinine. The situation has gotten worse, particularly for patients that order medications from Internet pharmacies. This paper examines the difficulties associated with counterfeiting medications, focusing on the counterfeits and the analytical methodologies and processes necessary to tell genuine from mere substandard, degraded, and counterfeit medicines. Mackey et al. (2015) stated that the medicines lacking the appropriate documentation and licensing are a growing concern. The Pharmaceutical Security Institute

reports from 2009 to 2011 showed about a quarter of counterfeiting incidents reported had to do with China. The bulk of these reports came from health institutions and public health departments in Asia, Latin America, and middle-income countries. What is troubling is that 64.8% of those monitored reported no involvement in the legitmate supply chain. This suggests a serious lapse in monitoring. There is a great need for enhanced reporting to counteract the counterfeiting of medications. There is a clear need for more sophisticated counterfeiting of medications.

According to the Meek, L. A. (2024). In Tanzania, powerful pharmaceuticals are widely accessible, often criticized by global health policymakers as dangerous due to supposed misuse rooted in local ignorance. However, ethnographic research shows that practitioners and patients use embodied knowledge "fugitive science" to assess drug quality and identify substandard medicines. This local expertise is ignored by global health policies like the WHO's National Action Plan, which blames antimicrobial resistance on ignorance and hygiene issues while masking deeper structural inequalities. The study argues that such health surveillance uses war-like logics that frame Global South populations as threats. Fugitive science thus serves as a subtle form of resistance against these militarized health frameworks.

According to the Steingrüber & Gadanya. (2021). Corruption affects medical product quality across manufacturing, distribution, regulation, procurement, governance, and the health workforce. The COVID-19 outbreak has intensified the dispersal of counterfeit medical products. In all of these, corruption is the most elusive. It has three focuses: Prevention, Detection, and Response.

According to the Roien et al. (2022). Afghanistan, affected by ongoing conflict and lacking established pharmaceutical quality standards, struggles to provide quality medicines. A study assessed GMP compliance of 25 pharmaceutical companies in Kabul using WHO guidelines and found overall adherence was low—only 38.33% compliance. Personnel and materials standards were relatively better met, but critical areas like product recall, quality assurance, and quality control labs showed very poor compliance. The study concludes that none of the companies fully comply with GMP and urgent improvements in quality control and assurance are needed.

According to the Villacorta-Linaza. (2009). Access to essential medicines is a major challenge in developing countries, especially in disaster- and conflict-affected areas. This paper, based on fieldwork in Pakistan and Afghanistan with the NGO Merlin, analyzes the Drug Supply Cycle Selection, Procurement, Distribution, use and highlights the critical role of pharmacists in managing these systems after emergencies. Effective management support is key to ensuring consistent drug supply in NGO-run health programs.

According to the Reynolds & McKee. (2010). Afghanistan faces major challenges in providing quality healthcare and medicines due to ongoing conflict and a lack of pharmaceutical standards. This study assessed WHO Good Manufacturing Practice (GMP) compliance in 25 pharmaceutical companies in Kabul. Results showed poor overall compliance (38.33%), with highest adherence in personnel (66.67%) and materials (58.67%), and lowest in product recall (12.98%) and quality assurance (16.44%). The study concludes that none of the companies fully meet GMP standards, and urgent improvements in quality control and assurance are needed.

Research Methodology:

Research Design

This study adopts a mixed, descriptive cross-sectional research design to investigate the impact of counterfeit and substandard medicines on public health in Afghanistan and to explore effective strategies for prevention. The research uses a structured questionnaire as the primary data collection instrument, incorporating closed and open-ended questions.

Moreover a qualitative, interpretivist approach used for thematic analysis to explore the complex, multilayered issue of counterfeit and substandard medicines in Afghanistan. By engaging with diverse participants which included pharmacists, healthcare professionals, public health officials, patients, and pharmaceutical distributors, in spite this research uncovered recurring patterns and perceptions about the root causes of the proliferation of fake medicines and potential preventive strategies.

The semi-structured interviews conducted as well facilitated open and candid discussions, allowing participants to narrate their personal experiences and community observations. After that data were transcribed, coded, and thematically categorized to develop a nuanced understanding of the issue.

Study Population and Sampling

The target population includes individuals across different stakeholder groups in Afghanistan's healthcare system, such as:

- Health workers (including nurses and midwives)
- Pharmacists
- Medical doctors
- Government health officials
- Members of the general public

A stratified purposive and snowballing sampling method are used to ensure representation from each stakeholder group, followed by convenience sampling within each stratum to select participants who are accessible and willing to respond.

Sample size:

A minimum of 366 respondents is targeted to ensure statistical significance and representativeness across regions and professional roles, moreover 12th experts were selected through snowballing techniques for prevention strategies.

Data Collection Methods:

Data collected through a self-administered questionnaire, available in both online and paper formats (depending on region and internet accessibility) along with this used semi structure questionnaire for focus group discussion to this study as well.

Data Analysis

Quantitative Data:

Descriptive statistics (frequencies, means, and standard deviations) are used to summarize responses.

Qualitative Data:

This study employed a qualitative, interpretivist approach used thematic analysis to explore the complex, multilayered issue of counterfeit and substandard medicines in Afghanistan.

Validity and Reliability

Are used to ensure content validity, the questionnaire was developed and A pilot test conducted with a small sample (10–15 respondents) to check for clarity, consistency, and comprehensibility. Reliability tested used Cronbach's Alpha to determine the internal consistency of Likert-scale items.

Results:

The below Results derived from Qualitative and Quantitative approach:

The below strategies for prevention emerged directly from the thematic analysis of participant narrations.

Strengthening Regulatory Frameworks and Enforcement Capacity

The most of participants narrated that "Regulatory vacuum and weak enforcement allow fake medicines to flood the market." Few Participants repeatedly highlighted "the absence of stringent pharmaceutical regulation and the limited capacity of existing regulatory bodies to monitor drug quality across borders and within local markets". Many interviewees of them "expressed frustration at the lack of inspections in rural areas and the ease with which counterfeit products enter through porous borders".

According to the focus group discussion expert derived some strategies which narrated that "First Rebuild and empower Afghanistan's national drug regulatory authority". Second "Train and deploy mobile inspection units, particularly in provinces with weak infrastructure". third, "Collaborate with regional neighbors for cross-border tracking and enforcement" to achieve the above them.

Implementing Technological Solutions for Medicine Verification

The most of participants stated that the "Patients are vulnerable because they have no way to distinguish between real and fake drugs." Narratives from both patients and pharmacists emphasized the "confusion around identifying authentic medicines". Several participants suggested that the "introduction of digital tools for product verification will be beneficial".

According to the focus group discussion expert derived some strategies which narrated that "First Introduce mobile-based verification systems (SMS code or QR scan) allowing consumers and pharmacists to verify authenticity". Second "Partner with international pharmaceutical companies to implement track-and-trace technologies at the point of manufacturing and importation". Third "Promote low-tech visual markers (e.g., tamper-proof seals) in regions with limited digital access" to achieve the above them.

Enhancing Public Awareness and Community Education

some of the participants state that the "Most people don't know what a genuine medicine looks like or where to find it." Many participants linked that "the spread of counterfeit medicines to low public health literacy and misinformation". This theme is particularly prominent in rural areas, where people often rely on informal sellers.

According to the focus group discussion expert derived some strategies which narrated that First “Launch nationwide public awareness campaigns in which should be used radio, TV, and social media in local languages”. Second “Involve community health workers, local elders, and religious leaders in spreading messages about the dangers of substandard drugs”. Third “Develop simple, illustrated guides on identifying and purchasing genuine medicines” to achieve the above them.

Formalizing and Monitoring the Pharmaceutical Supply Chain

The most of participants narrated that "The lack of a centralized system allows unregulated drugs to reach pharmacies unchecked." Moreover, several distributors and pharmacists stated that “the absence of a centralized procurement or tracking system, making it easy for illicit medicines to mix into legitimate supply chains”.

According to the focus group discussion expert derived some strategies which narrated that First “Create a centralized, government-monitored pharmaceutical supply registry”. Second “Require all pharmacies and distributors to register and obtain licenses tied to regular compliance checks”.

Third “Ban informal street vendors from selling medical products without regulation” to achieve the above them.

Capacity Building and Training for Health Professionals

The most participants narrated that the “Even some pharmacists can’t always tell which medicines are counterfeit." Among of them some pharmacists stated that, “especially in remote districts, revealed a lack of training in detecting substandard products or understanding import documentation”. According to the focus group discussion expert derived some strategies which narrated that First “Integrate drug-quality identification and pharmacovigilance into medical and pharmacy curricula”. Second “Offer periodic training and certification programs for health professionals”. Third “Establish a confidential reporting mechanism for pharmacists to flag suspected counterfeit products” to achieve the above them.

Promoting International Collaboration and Donor Engagement

The most participants stated that "We need support from outside to deal with this issue, Afghanistan cannot do it alone." Moreover, the participants acknowledged that “rebuilding Afghanistan’s pharmaceutical regulatory systems would require international assistance and expertise, particularly in post-conflict reconstruction”. According to the focus group discussion expert derived some strategies which narrated that First “Collaborate with the World Health Organization (WHO) and regional partners (e.g., Iran, Pakistan) to share intelligence and best practices”. Second “Secure technical and financial support from global health donors to rebuild pharmaceutical labs and regulatory infrastructure”. Third “Join global networks like the Medi crime Convention to enable transnational legal action against counterfeiters” to achieve the above them.

The below tables are showing the quantitative analysis:

Table 1: *Descriptive Statistics*

Descriptive Statistics

	Mean	Std. Deviation	N
Health Impact of Counterfeit/ Substandard Medicines	22.1455	3.56486	330
Awareness and Perception of Counterfeit and Substandard Medicines	20.8273	3.57004	330
Causes and Sources of Counterfeit Medicines	20.6727	2.92180	330
Strategies for Prevention and Control	22.2273	2.64515	330

The above table show that the The four constructs—Health Impact, Awareness and Perception, Causes and Sources, and Strategies for Prevention and Control—demonstrate similar overall levels, with average scores in the low 20s on the same scale. ‘‘Health Impact’’ is the greatest on average (mean ≈ 22.15) and comes with moderate variability (SD ≈ 3.56). This suggests that respondents perceive a significant level of health risks, with some differences in how strong that perception is. Awareness and Perception go next (mean ≈ 20.83, SD ≈ 3.57) and show considerable awareness, but that awareness is a bit less than what is directed towards the health impact. The next two constructs, Causes and Sources, presents the lowest mean (≈ 20.67) and shows a bit tighter of a SD than the other constructs (SD ≈ 2.92), which suggests that the respondents view the underlying causes as less salient, or more predictable. In contrast, Strategies for Prevention and Control has the highest mean (≈ 22.23) and the smallest SD (≈ 2.65), which suggests that the respondents have strong consensus, or confidence in the preventive and control measures.

Respondents tend to feel the most confident about the prevention strategies, and the least about the causes and sources. They have consistent views on health impact and awareness. This endorses a need to prioritize efforts to highlight and address the underlying causes, while also continuing to strengthen and implement the proven preventive strategies.

Table 2: *Correlations*

Correlations

		Health Impact of Counterfeit/Substandard Medicines	Awareness and Perception of Counterfeit and Substandard Medicines	Causes and Sources of Counterfeit Medicines	Strategies for Prevention and Control
Pearson Correlation	Health Impact of Counterfeit/Substandard Medicines	1.000	.838	.713	.648
	Awareness and Perception of Counterfeit and Substandard Medicines	.838	1.000	.804	.600
	Causes and Sources of Counterfeit Medicines	.713	.804	1.000	.661
	Strategies for Prevention and Control	.648	.600	.661	1.000
Sig. (1-tailed)	Health Impact of Counterfeit/Substandard Medicines	.	.000	.000	.000
	Awareness and Perception of Counterfeit and Substandard Medicines	.000	.	.000	.000
	Causes and Sources of Counterfeit Medicines	.000	.000	.	.000

	Strategies for Prevention and Control	.000	.000	.000	.
N	Health Impact of Counterfeit/Substandard Medicines	330	330	330	330
	Awareness and Perception of Counterfeit and Substandard Medicines	330	330	330	330
	Causes and Sources of Counterfeit Medicines	330	330	330	330
	Strategies for Prevention and Control	330	330	330	330

Table 2 mentioned the correlation analysis of a sample of 330 respondents. Their focus was to study the key variables associated with counterfeit and substandard medicines in Afghanistan. Such variables include the health effect of such medicines, and the public's awareness and perception of them, the causes and sources, and the strategies for prevention and control to substandard and counterfeit medicines.

The analysis showed that all variables had a positive correlation and significance at $p < .001$ which indicates a positive relationship among the variables. In particular, the correlation of the public's awareness and perception of the health impact of counterfeit and substandard medicines was very strong ($r = .838$). This indicates that the more knowledgeable one is about the issue, the better one understands the health problems associated with it. Furthermore, the health impact was also strongly correlated with the perceived causes and sources of counterfeit medicines ($r = .713$), and was moderates strong correlated to strategies for prevention and control ($r = .648$). These results emphasize that the understanding of the origin of counterfeit drugs and the methods to control them is concerned with the perceived risk they impose to public health.

In this case, like the other cases, the correlation between awareness and perception and the causes and sources of counterfeit medicines was very high ($r = .804$). The awareness and prevention strategies correlation was, however, moderate ($r = .600$). The causes and sources variable also showed a moderate to strong relationship with prevention strategies ($r = .661$), reinforcing the centrality of the elements.

The conclusion is that the analysis indicates that the awareness and concern about the counterfeit and substandard medicine and the concern about the health consequences and the

support for the prevention efforts is positive. These findings highlight the need for awareness campaigns, sophisticated regulatory mechanisms, and partnerships in medicine quality and safety improvement in Afghanistan.

Table 3: *Model Summary*

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.858[a]	.735	.733	1.84182	.735	302.166	3	326	.000

a. Predictors: (Constant), Strategies for Prevention and Control, Awareness and Perception of Counterfeit and Substandard Medicines, Causes and Sources of Counterfeit Medicines

b. Dependent Variable: Health Impact of Counterfeit/Substandard Medicines

Table 3 shows that the model stated a very strong relationship and a high overall fit. The multiple correlation is R = 0.858, and about R^2 = 0.735 (roughly 73.5%) of the variance in Health Impact is explained by the three predictors. After adjusting for the number of predictors, the adjusted R^2 remains virtually the same at about 0.733, indicating robustness to adding more predictors. The standard error of the estimate is 1.84, meaning that, on average, observed Health Impact scores deviate from the predicted scores by about 1.84 units. The model change statistics show an F value of 302.17 with df = 3 and 326, and a significance level $p < .001$, confirming that the predictors collectively have a statistically significant association with Health Impact.

To put it more simply, the blend of strategies, the level of understanding of the causes, and the reasons and sources goes a long way in explaining how the respondents view the health effects of counterfeit and substandard medicines. For understanding these predictors deeply, the next logical step would be to analyze the individual contributions and determine the most dominant factor from the coefficients and p-values which has the strongest unique influence.

Table 4: *Coefficients*

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	.763	.885		.863	.389	-.978	2.505		
	Awareness and Perception of Counterfeit and Substandard Medicines	.704	.048	.705	14.546	.000	.609	.799	.345	2.897
	Causes and Sources of Counterfeit Medicines	-.007	.063	-.005	-.104	.917	-.131	.117	.304	3.293
	Strategies for Prevention and Control	.308	.052	.229	5.954	.000	.206	.410	.550	1.819

Coefficients[a]

a. Dependent Variable: Health Impact of Counterfeit/Substandard Medicines

Table 4 show the entire model presents standardized and unstandardized coefficients alongside their respective standard errors, t-values, and p-values.

Predictors: Strategies for Prevention and Control: positive unstandardized B = 0.308 (SE = .052), standardized Beta = .229, t = 5.95, $p < .001$, noted positive and significant Health Impact. Awareness and Perception: B = .704 (SE = .048), Beta = .705, t = 14.55, $p < .001$, extremely strong positive. Causes and Sources: B = -.007 (SE = .063), Beta = -.005, t = -.104, p = .917, not significant predictor. The VIF intervals and the confidence gaps do not indicate severe multicollinearity issues. VIF values hover close to 1 for the predictors. The model

reveals that improvements in the Strategies for Prevention and Control, and Awareness/Perception, are linked to greater Health Impact/Health Impact. The Causes and Sources are devoid of any meaningful impact

Discussion:

In this study, the focus was on the public health consequences of counterfeit and substandard medicines, and the possible ways to prevent these through surveys and interviews with key stakeholders. The results show that the lower the perceived health risk, the lower the preventative action and the public health awareness. Understanding the source of counterfeit medicines, however, did not affect the health risk perception. These results support previously conducted global studies which highlighted the need for education, regulation, and the adoption of practical verification methods, such as mobile applications, alongside abuse-proof packaging. Proposed policies involve the strengthening of regulation and oversight of drug supply chains, awareness campaigns, the development of context-specific verification methods, the education of health workers, and global health diplomacy. Public awareness, education, and verification methods will also support the proposed policies. These results also support global studies which highlighted the need for education, regulation, and the adoption of practical verification methods such as mobile applications with abuse-proof packaging evidence. The study's cross-sectional design and self-reported data weakens the conclusions that can be made. More research on the long-term impact of the proposed interventions and the effectiveness of verification tools is needed, as well as policy analysis on the informal market to inform interventions.

Conclusion:

The finding shows that the key strategies to prevent counterfeit medicines in Afghanistan, which including strengthening regulatory systems, introducing digital verification tools, raising public awareness, formalizing the supply chain, training health professionals, and enhancing international collaboration. Moreover, the quantitative results are clear that Health Impact is most strongly correlated with two constructs: Perception and Awareness, and Strategies for Prevention and Control. Both have strong positive impacts and gains much support from respondents, meaning that higher awareness and stronger preventive strategies are associated with greater health impact perceptions. In comparison, Causes and Sources have no significant impact on Health Impact in this model. Taken together, the predictors account for approximately 73.5% of the Health Impact variance, meaning a considerable proportion of the outcome is derived from these factors. The model shows low multicollinearity, having almost zero tolerance for the overlap of predictors. It demonstrates low overall fit with high overall multicollinearity, and p-values less than .001 signify statistical significance. These outcomes suggest that enhanced public awareness of and strong preventive strategies to lower health risk perceptions on counterfeit and substandard medicines would have a significant impact. The assumption is that the more advanced the public policy, the more averted the health risk, while more thoroughly investigating the role of causes and sources will be less beneficial in this scenario.

Recommendation:

In order to effectively prevent counterfeit and substandard medicines in Afghanistan, a multi-faceted approach will need to be adopted as the qualitative narratives and quantitative data suggest. First, build the national drug regulatory authorities while reinforcing the mobile inspection units and border control to provide cross-border enforcement. Second, the implementation of technology-driven verification system such as SMS and QR codes should be adopted, particularly in resource constrained contexts. Third, broaden the public education and awareness initiatives designed to help people identify authentic medicines, amplified through local media and trusted community figures. Fourth, formalize the licensing of vendors to construct a consolidated control pharmaceutical supply chain. Fifth, build the capacity of the report and curriculum integrated confidential pharmacist training. Finally, cross-border counterfeit trade requires regulatory collaboration through the infrastructure of cross-border trade and legal action alongside the WHO, regional collaborators, and stakeholders. These quantitative findings on awareness and prevention as primary rational predictors correlate strongly, while source and cause remain weak predictors to public health, thus indicating the need to focus on awareness, technology, regulation, and international collaboration as they will provide the greatest public health impact.

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