

Knowledge, attitudes, and perceptions of healthcare workers on adverse drug reaction reporting in a government hospital in Botswana

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Abstract

Background: Adverse Drug Reactions (ADRs) are a significant concern in health care, affecting patient safety and healthcare costs. Active surveillance through spontaneous reporting (SR) by healthcare professionals (HCPs) is essential for identifying and managing ADRs. This study aimed to assess the knowledge, attitudes, and perceptions of HCPs at a government hospital in Botswana regarding ADR reporting.

Method: A cross-sectional study was conducted using stratified random sampling. Knowledge was operationalised as prior use of an ADR reporting form, chosen as a practical indicator of familiarity with reporting procedures. Attitudes and perceptions were measured using Likert-scale items, with internal consistency assessed using Cronbach's α . Data analysis included descriptive statistics and Pearson Chi-square test.

Results: Of the 260 distributed questionnaires, 133 were completed (51% response rate). Response rates varied across strata, with pharmacy staff accounting for a smaller proportion of respondents. While 26.3% of participants reported prior training, 39.8% had used an ADR reporting form. A significant association was observed between encountering an ADR and reporting it ($\chi^2 = 42.62$, $df = 1$, $p < 0.0001$). ADR reporting was rated as highly important ($M = 4.67$, $SD = 0.63$), and perceptions reflected moderate agreement with positive views of reporting ($M = 3.07$, $SD = 1.17$). Workload (21.8%) and poor communication (5.3%) were cited as barriers, and 22.8% supported regular workshops to improve reporting.

Conclusion: The study revealed a lack of knowledge on ADR reporting among HCPs, leading to underreporting. Despite positive attitudes, factors like workload and communication challenges hinder reporting. Continuous training and workshops are recommended to improve HCPs' reporting skills and promote pharmacovigilance. Integrating digital tools could simplify ADR reporting, reduce barriers, and improve communication among HCPs and regulators.

Keywords: adverse drug reaction, healthcare professional, medication, spontaneous reporting

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Introduction

An adverse drug reaction (ADR) is an inherent risk associated with medication use and can occur at normal doses prescribed for the treatment of diseases.^{1,2} The key to reducing or eliminating ADRs lies in the reporting of suspected cases by healthcare professionals (HCPs) through spontaneous reporting (SR).^{1,3,4} It is regarded as the most practical and cost-effective method for the on-going surveillance of medication safety.^{1,3,4} It aids in the identification of unexpected ADRs that may have gone undetected during clinical trials and highlights new aspects of known ADRs that could continue to pose a risk to the public if not identified.^{3,4,5} In clinical practice, unlike in clinical trials, medications are administered to patients with co- or poly-morbidities, those on multiple medications that may interact, as well as to children and the elderly, who are typically excluded from clinical studies, and for off-label uses.³

Effective pharmacovigilance (PV) systems and thorough ADR reporting are vital for enhancing public safety by monitoring drug safety.⁶ However, underreporting of ADRs remains a significant global challenge,^{5,7} contributing to morbidity and mortality

worldwide.^{3,7,8} ADRs have a negative impact on both individuals and health systems, resulting in longer hospital stays and increased costs for patient care.^{5,9,10} In the United States, the annual expense associated with managing ADRs is estimated to be around \$30.1 billion. The costs can vary by hospital ward, with inpatient care in the intensive care unit (ICU) averaging approximately \$19,685, while non-intensive care costs are \$13,994.¹¹ These figures highlight the urgent need for improved awareness and reporting of ADRs to reduce their adverse effects on health outcomes and healthcare expenditures.

Underreporting of ADRs remains a significant challenge in Botswana, particularly given the growing pharmaceutical market. A study conducted in 2011 aimed at assessing PV in sub-Saharan Africa classified Botswana as having basic PV structures in place but lacked the capacity for SR to generate signals and assess risks.¹² Between 2014 and 2019, the average number of Individual Case Safety Reports (ICSRs) submitted to *Vigibase* from Botswana ranged from 5 to 50 per million inhabitants per year.¹³ This figure is notably low compared to Namibia and South Africa, which reported between 50 and 100 ICSRs per million inhabitants

annually. In comparison, developed countries such as the United States of America (USA) and Australia submitted over 500 ICSRs to Vigibase during the same period.¹³

The HCPs play a crucial role in ensuring medication safety through their active involvement in post-marketing surveillance.^{1,3,5} The outcomes of clinical trials may not reflect the results experienced by the general public, underscoring the need for diligent monitoring to ensure public safety.² Studies have identified several factors that hinder HCPs from reporting ADRs, including ignorance, lack of interest or time, lethargy, indifference, and complacency.^{7,14} Some studies have suggested integrating PV into the curricula at institutions of higher education to raise awareness among HCPs regarding the importance of reporting ADRs.^{15,16,17} Adjaude et al. (2017) indicated that HCPs who possess the ability and knowledge to identify ADRs are more motivated to engage in reporting.⁷ Additionally, a study by Olsson et al. (2015) on PV in low to middle-income countries (LMIC) highlighted that training HCPs on PV could help establish and sustain effective PV systems.¹⁷

Notably, there have been no hospital level studies in Botswana examining the knowledge, attitudes, and perceptions (KAP) of HCPs toward ADR reporting. This gap is particularly significant given the central role of pharmacy staff, who serve at primary collection points for ADR reporting forms before forwarding them to the Botswana Medicines Regulatory Authority (BOMRA).¹⁸ Without hospital level evidence, BOMRA cannot design targeted interventions to improve reporting or strengthen digital PV workflows. Addressing this gap is critical to improving Botswana's ADR reporting rates and aligning with UMC's measurable outcomes.¹⁹

This study therefore aimed to investigate the knowledge, attitudes, and perceptions of HCPs at a government hospital in Botswana regarding ADR reporting, with explicit inclusion of pharmacy staff. By identifying gaps and barriers, the findings can inform BOMRA's strategies to enhance hospital level reporting, support integration into national PV systems, and contribute toward achieving international reporting benchmarks.

Methodology

Study design and participants: A cross-sectional quantitative research design with a qualitative component was conducted at a government hospital in Gaborone, Botswana. This hospital serves as a referral centre with a bed capacity of 530 and offers various

specialty services, including oncology and urology. Participants in the study included general practitioners, medical specialists, pharmacists, pharmacy technicians, and nurses from various wards, including surgical, medical, and pharmacy departments.

Sampling strategy: Staff establishment information was restricted from disclosure to third parties. Consequently, to ascertain the sample size for this study, the total number of HCPs at the hospital was estimated based on a study conducted by Ngidi.²⁰ At the time of that study, the distribution of personnel included general practitioners ($n = 126$), medical specialists ($n = 15$), nurses ($n = 561$), and pharmacy personnel ($n = 43$). Yamane's formula was utilised to calculate an appropriate sample size of 260.

$$n = \frac{N}{1 + N(e)^2}$$

Whereby:

- N the population size
- E is the acceptable margin of error
- n is the sample size

$$n = \frac{745}{1 + 745(0.05)^2}$$

$$n = 260$$

A stratified random sampling method was utilised to ensure proportional representation from all healthcare groups. Based on Ngidi (2015), proportional stratification would have allocated 44 general practitioners, 5 medical specialists, 196 nurses, 5 pharmacists, and 10 pharmacy technicians. However, the achieved distribution departed from this proportional allocation, with 133 questionnaires ultimately distributed and completed across strata: 20 general practitioners, 7 medical specialists, 98 nurses, 2 pharmacists, and 6 pharmacy technicians, as indicated in Table I. This departure from strict proportional stratification arose from practical constraints in accessing certain groups but ensured representation across all professional categories.

Inclusion criteria: The study included only healthcare professionals such as medical practitioners from various specialties, pharmacists, pharmacy technicians, and nurses who provided their consent to participate.

Exclusion criteria: Healthcare professionals in the identified groups who expressed a reluctance to participate were excluded

Table I: Invitations and responses by professional stratum ($N = 260$ invited: $n = 133$ respondents)

| Professional group | Population (Ngidi 2015) | Targeted invitations | Completed questionnaires (Responses) | Response rate (%) |
|-----------------------|-------------------------|----------------------|--------------------------------------|-------------------|
| General practitioners | 126 | 44 | 20 | 45.5 |
| Medical specialists | 15 | 5 | 7 | 140 |
| Nurses | 561 | 196 | 98 | 50 |
| Pharmacists | 15 | 5 | 2 | 40 |
| Pharmacy technicians | 28 | 10 | 6 | 60 |
| Total | 745 | 260 | 133 | 51.2 |

from the study. Additionally, interns were not considered for inclusion.

Data collection instrument: A self-administered questionnaire, featuring both closed and open-ended questions, was employed to collect data from participants. This questionnaire was adapted from previous studies conducted by Khan et al.¹⁶ and Gordhon & Padayachee,²¹ with necessary modifications made to better fit the context of this research. It comprised 21 questions, organised into the following categories: five questions pertaining to participant demographics, seven questions assessing knowledge of ADR reporting, one question evaluating healthcare professionals' attitudes toward ADR reporting, seven questions regarding perceptions of ADR reporting, and one question focused on potential future improvements. In the current study, knowledge was operationalised as familiarity with ADR reporting processes and recognition of ADRs.

Data collection: The researcher presented the study to the heads of departments in some wards and direct participants in others, including at the pharmacy. The hard copies of the questionnaires were distributed at the hospital in May 2023 for participants to complete and were collected by the researcher in June 2023. To facilitate access, the questionnaires were left at the nursing station in the wards and in the responsible pharmacist's office in the pharmacy. Completed questionnaires were collected anonymously and securely stored for analysis, with retention and disposal procedure detailed under Ethical considerations.

Data analysis: Spreadsheets of data were generated using Microsoft Excel™. The data from these spreadsheets was imported into Statistical Package for Social Sciences (SPSS) 29.0 for analysis. Continuous variables were characterised as Means with Standard Deviations (SD), while categorical variables were presented as frequencies with percentages. A bivariate analysis was conducted on the categorical variables, applying the Pearson Chi-square test with a 95% confidence interval and a *p-value* threshold of 0.05 to identify any statistically significant association between the variables.

Responses to open-ended questions were coded with words or phrases that closely addressed the questions posed in the questionnaire. Spreadsheets of all coded responses from participants were assembled in Microsoft Excel™, and content analysis was conducted accordingly. Descriptive statistics, including frequency tables, were employed for data presentation.

Knowledge construct

Knowledge of ADR reporting was assessed using a single indicator: the percentage of participants who had previously used an ADR reporting form. This operationalisation was chosen because prior use of the form represents a practical and observable measure of familiarity with the reporting procedure.

Attitudes and perceptions constructs

Attitudes and perceptions were treated as distinct constructs based on behavioural science frameworks such as the Theory of Planned Behaviour.²² Attitudes were anchored on normative beliefs, including the perceived importance of ADR reporting and recognition of professional obligation. Perceptions, in contrast, were anchored on self assessment of capability, awareness, and experience, such as confidence in reporting, familiarity with ADR forms, and interpretation of prior encounters with ADRs. This separation reflects the distinction between motivational orientation (attitudes) and subjective interpretation of personal ability or exposure (perceptions).

Item scoring was performed on questions measuring attitudes and perceptions, using a five-point Likert scale.

Attitudes were measured using importance anchors (1 = Not Important, 2 = Slightly Important, 3 = Important, 4 = Fairly Important, 5 = Very Important). To ensure that the Likert items yielded an interval level measurement, responses were summarised as weighted means. This approach follows Pimentel,²³ who recommends treating Likert-type items as interval data for quantitative analysis. Weighted mean scores were then interpreted according to classification intervals, allowing attitudes to be categorised into distinct levels of importance.

Perceptions were measured using agreement anchors (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree).

Table II: Anchor types and interpretation of weighted mean scores for attitudes and perceptions

| Construct | Anchor wording (Likert scale) | Weighted mean interval | Interpretation category |
|-------------|-------------------------------|------------------------|---|
| Attitudes | 1 = Not Important | 1.00–1.80 | Not Important |
| | 2 = Slightly Important | 1.81–2.60 | Slightly Important |
| | 3 = Important | 2.61–3.40 | Important |
| | 4 = Fairly Important | 3.41–4.20 | Fairly Important |
| | 5 = Very Important | 4.21–5.00 | Very Important |
| Perceptions | 1 = Strongly Disagree | | Weighted mean scores interpreted in line with agreement anchors: higher scores = more positive perception; lower scores = negative perception; ~3 = neutral |
| | 2 = Disagree | | |
| | 3 = Neutral | | |
| | 4 = Agree | | |
| | 5 = Strongly Agree | | |

Weighted mean scores were also calculated for perception items; however, unlike attitudes, these were interpreted directionally rather than categorically. Higher scores indicated more positive perceptions (greater agreement with supportive statements about ADR reporting), lower scores indicated negative perceptions (disagreement), and values around 3 reflected neutrality.

Ethical consideration: Approval to conduct this study was obtained from the Botswana Health Research Unit. Ethical clearance was granted by the University of the Witwatersrand Human Research Ethics Committee (Medical) (No. M210835).

Anonymity and confidentiality were maintained throughout, with no personal or identifiable information requested. Completed questionnaires were securely stored in password protected electronic files and locked cabinets. In accordance with institutional policy, data will be retained for five years and then securely disposed of through permanent deletion of electronic files and shredding of paper records. Access was restricted to the research team and the principal investigator, with the University's Human Research Ethics Committee entitled to audit if required. Participation was entirely voluntary, and respondents were informed that they could decline or withdraw at any stage without penalty or consequence.

Validity: The face validity of the research instrument was established by assessing its relevance, practicality, clarity, and unambiguity in relation to the intended audience.

Content validity was verified by administering the research instrument to five panellists comprising two doctors, two nurses, and one pharmacist, and all of which did not take part in the study. This was for scoring the items within each domain based on their relevance to the variables being measured. The item scores contributed to the calculation of the Content Validity Ratio (CVR), which was then used to derive the Content Validity Index (CVI). A favourable CVI (0.99) result indicated a consensus among the panellists regarding the appropriateness of the items in the designated domains. To enhance the response rate among panellists, a face-to-face approach was employed during the content validation process.

Reliability

Internal consistency: The calculated Cronbach's Alpha (for the attitude block – importance and obligation) was 0.80. This indicates that the research instrument used in this study is anticipated to exhibit consistency, stability, and repeatability of results when implemented in similar studies exploring the knowledge, attitudes, and perceptions of HCPs, even under varying circumstances.

Results

Socio-demographics

A total of 260 questionnaires were distributed to all healthcare professionals applicable to this study. Of these, 133 were fully

Table III: Socio-demographics and background characteristics of the participants (N = 133)

| | Variable | Frequency | Percentage (%) |
|------------------|------------------------|-----------|----------------|
| Profession | General practitioner | 20 | 15.0 |
| | Medical specialist | 7 | 5.3 |
| | Nurse | 98 | 73.7 |
| | Pharmacist | 2 | 1.5 |
| | Pharmacy technician | 6 | 4.5 |
| Gender | Male | 44 | 33.1 |
| | Female | 89 | 66.9 |
| Age | 18–24 | 14 | 10.5 |
| | 25–36 | 62 | 46.6 |
| | 37–49 | 44 | 33.1 |
| | 50–64 | 13 | 9.8 |
| Ward/ Department | Accident and Emergency | 30 | 22.6 |
| | Renal | 19 | 14.3 |
| | ICU | 22 | 16.5 |
| | Orthopaedic | 26 | 19.5 |
| | Dentistry | 7 | 5.3 |
| | Pharmacy | 8 | 6.0 |
| | Surgical | 21 | 15.8 |
| Experience | Less than 5 years | 43 | 32.3 |
| | 5 to 10 years | 29 | 21.8 |
| | More than 10 years | 61 | 45.9 |

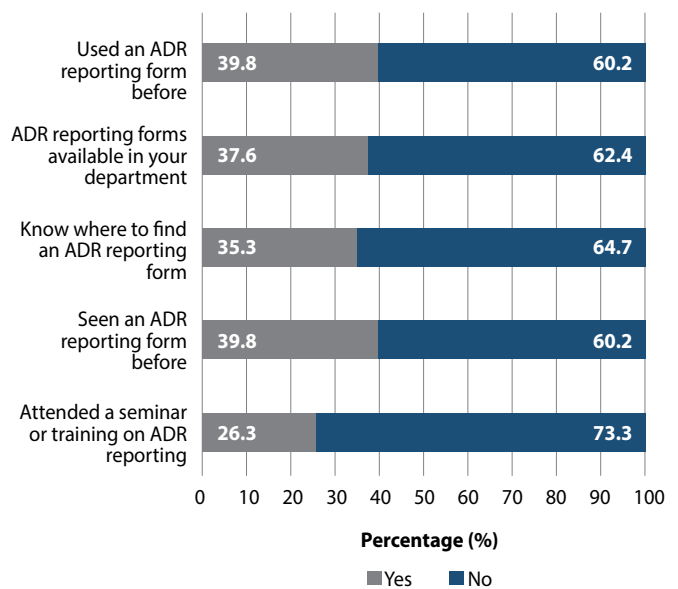


Figure 1: Knowledge on ADR reporting among participants

completed yielding a response rate of 51% and are depicted in Table III.

Knowledge of participants on ADR reporting

Overall, 26.3% of participants reported having attended a seminar or training on ADR reporting, while 39.8% indicated they had previously used an ADR reporting form. However, 64.7%

Table IV: Knowledge on having used an ADR reporting form before versus professional category (N = 133)

| Professional category | Have you ever used an ADR reporting form before? | | Total |
|-----------------------|--|------------|------------|
| | Yes | No | |
| General practitioner | 11 (20.8%) | 9 (11.3%) | 20 (15%) |
| Medical specialist | 4 (7.5%) | 3 (3.8%) | 7 (5.3%) |
| Nurse | 35 (66%) | 63 (78.8%) | 98 (73.7%) |
| Pharmacist | 0 (0%) | 2 (2.5%) | 2 (1.5%) |
| Pharmacy technician | 3 (5.7%) | 3 (3.8%) | 6 (4.5%) |
| Total | 53 (100%) | 80 (100%) | 133 (100%) |

χ^2 (df = 4) = 5.07, $p = 0.28$

were unaware of the location of ADR reporting forms in their department, and 62.4% stated that forms were not available (Figure 1).

Among those who had used an ADR reporting form, nurses accounted for the largest proportion ($n = 35$), while no pharmacists reported prior use. A Pearson Chi-square test showed no significant association between professional category and prior use of ADR reporting forms ($\chi^2 = 5.07$, $df = 4$, $p = 0.28$) in Table IV.

Knowledge varied by years of experience, as indicated in Table V. Two-thirds of participants with more than 10 years of experience had attended ADR reporting training (68.6%, $p < 0.0001$) and 71.7% had previously seen an ADR reporting form ($p < 0.0001$). In contrast, fewer than 20% of those with less than five years of experience had seen a form (9.4%) or knew where to locate one (10.6%), with both measures showing highly significant differences ($p < 0.0001$).

Attitudes of participants on ADR reporting

Participants rated ADR reporting as highly important, in Table VI. The highest mean score was observed for "improving patient safety" ($M = 4.88$, $SD = 0.44$), followed by "identifying safe drugs" ($M = 4.79$, $SD = 0.49$). The overall mean score for attitudes toward ADR reporting was 4.67 ($SD = 0.63$), indicating strong consensus on its importance.

Approximately three quarters of participants ($n = 76$) reported that they had neither encountered nor submitted an ADR. To assess whether encountering ADRs influenced reporting, a Pearson Chi-square test was conducted. The analysis revealed a statistically significant association between encountering and reporting ADRs ($p = 0.00$) as illustrated in Table VII.

Perceptions of participants on ADR reporting

Perceptions varied across items in Table VII. Most participants disagreed with the statement "I have received sufficient ADR reporting training" ($M = 1.76$, $SD = 1.19$), while more than two-thirds strongly agreed that they would like additional training ($M = 4.59$, $SD = 0.81$). The overall mean perception score was 3.07 ($SD = 1.17$), reflecting mixed views. Notably, participants strongly agreed that ADR reporting is a professional obligation ($M = 4.44$, $SD = 0.85$), but many felt unprepared to complete reporting forms ($M = 2.29$, $SD = 1.43$). Certain items originally grouped under perceptions were conceptually re-classified as knowledge, with numerical results unchanged (see explanatory note in Table VIII).

Barriers to ADR reporting

More than half of HCPs (54.9%) reported no discouragement from ADR reporting, while 21.8% cited workload and administrative

Table V: Knowledge on ADR reporting according to years of experience (N = 133)

| Knowledge Indicator | Years of Experience (%) | | | χ^2 | p-value |
|---|-------------------------|---------------|---------------|----------|----------|
| | < 5 (n = 43) | 5–10 (n = 29) | > 10 (n = 61) | | |
| Attended a seminar or training on ADR reporting | 14.3 | 17.1 | 68.6 | 39.62 | < 0.0001 |
| Seen an ADR reporting form before | 9.4 | 18.9 | 71.7 | 49.44 | < 0.0001 |
| Know where to find an ADR reporting form | 10.6 | 14.9 | 74.5 | 51.44 | < 0.0001 |
| ADR reporting forms available for practice | 20.0 | 30.0 | 50.0 | 9.14 | 0.0104 |
| Used an ADR reporting form before | 37.7 | 32.1 | 30.2 | 0.71 | 0.7004 |

Table VI: Significance of reporting ADR (N = 133)

| Attitude statement | 1 | 2 | 3 | 4 | 5 | M | SD |
|--|---------|----|----|----|-----|------|-------|
| To identify new ADR | 1 | 3 | 8 | 21 | 100 | 4.62 | 0.765 |
| To improve patient safety | 1 | 30 | 60 | 12 | 30 | 4.88 | 0.444 |
| To measure the incidence of ADR | 10 | 10 | 6 | 27 | 80 | 4.71 | 0.547 |
| To share information about ADR with colleagues | 0 | 0 | 7 | 38 | 88 | 4.61 | 0.588 |
| To identify safe drugs | 10 | 11 | 2 | 21 | 89 | 4.79 | 0.493 |
| It is a requirement | 5 | 2 | 8 | 35 | 83 | 4.42 | 0.955 |
| | Average | | | | | 4.67 | 0.63 |

Table VII: Encountered versus reported ADRs (N = 133)

| Have you ever encountered an ADR before? | Have you ever reported an ADR that you encountered? | | Total |
|--|---|------------|------------|
| | Yes | No | |
| Yes | 29 (93.5%) | 26 (25.5%) | 55 (41.4%) |
| No | 2 (6.5%) | 76 (74.5%) | 78 (58.6%) |
| Total | 31 (100%) | 102 (100%) | 133 (100%) |

χ^2 (df = 1) = 45.37, p < 0.0001

issues, 18% noted lack of knowledge and information, and 5.3% mentioned limited feedback or communication on previous reports as discouraging factors (Figure 2).

Strategies to improve ADR reporting

Participants identified several strategies for enhancing ADR reporting. The most favoured was the implementation of work-shops and seminars (22.8%), followed by teaching pharmacovigilance programmes to undergraduates, post-graduates, and interns (20.3%), and monthly meetings on rare ADRs (16.6%) (Figure 3).

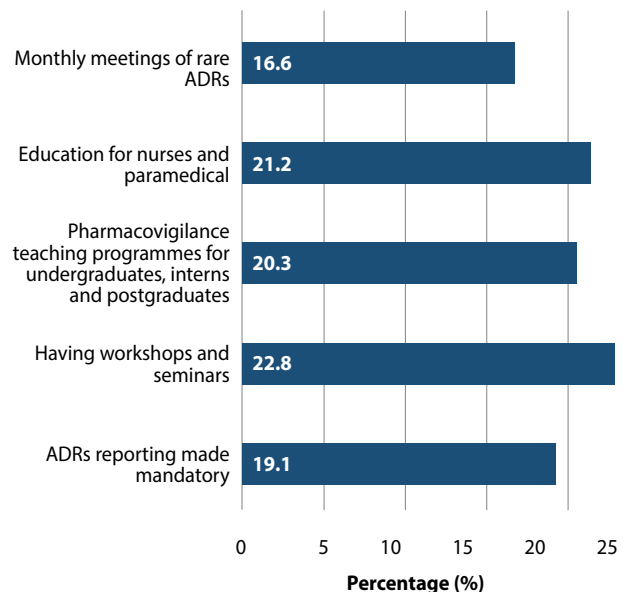


Figure 3: Strategies to improve ADR reporting

Table VIII: Perceptions of HCP on ADR reporting (N = 133)

| Perception statement | 1 | 2 | 3 | 4 | 5 | M | SD |
|---|----|----|----|----|----|------|-------|
| ADRs reporting is a professional obligation | 1 | 1 | 22 | 23 | 86 | 4.44 | 0.85 |
| I know how to report an ADR | 39 | 23 | 23 | 32 | 16 | 2.72 | 1.426 |
| I have received sufficient ADRs reporting training | 84 | 19 | 16 | 6 | 8 | 1.76 | 1.19 |
| I know how to fill in an ADR reporting form | 60 | 21 | 19 | 19 | 14 | 2.29 | 1.43 |
| ADRs reporting adds up to unnecessary workload | 70 | 25 | 22 | 6 | 10 | 1.95 | 1.25 |
| An allergic reaction to a medicine is an ADR | 7 | 4 | 24 | 33 | 65 | 4.09 | 1.13 |
| I always check the patient's allergies before I give them any medicines | 4 | 6 | 18 | 36 | 69 | 4.20 | 1.04 |
| I would like to receive more training on ADRs reporting | 4 | 0 | 3 | 32 | 94 | 4.59 | 0.81 |
| I have seen a patient experience an ADR | 34 | 16 | 15 | 29 | 39 | 3.17 | 1.59 |
| Nobody really benefits if I report an ADR | 10 | 16 | 11 | 4 | 93 | 1.45 | 1.02 |
| Average | | | | | | 3.07 | 1.17 |

1 = Strongly Disagree, 2= Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree, M = Mean, SD = Standard deviation

Items initially grouped under perceptions were conceptually re-classified to better reflect their constructs. Specifically, "An allergic reaction to a medicine is an ADR", was reclassified under Knowledge as well as "I know how to report an ADR."

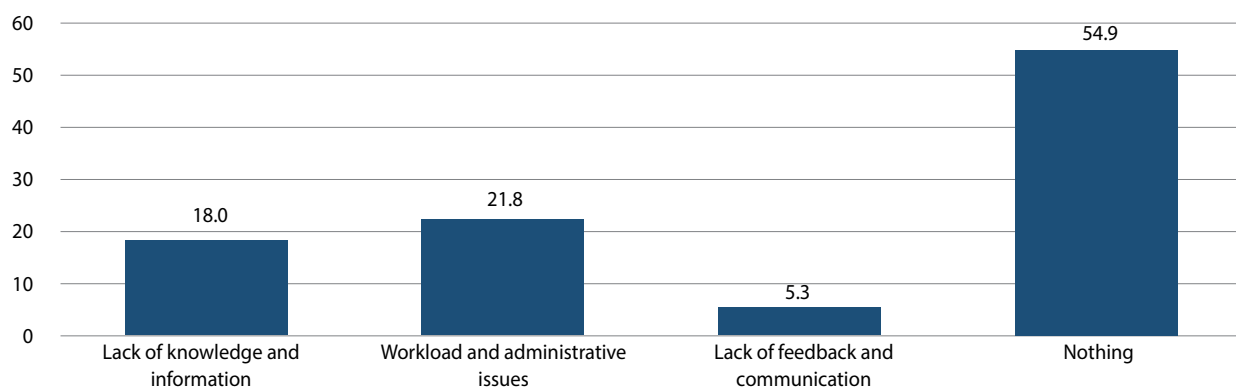


Figure 2: Barriers to ADR reporting

Discussion

The current study's 51% response rate is consistent with similar research: 59% in Nigeria (Fadare et al.),²⁴ 54.3% in Portugal (Herdeiro et al.)¹⁴ and 47% in the Netherlands (Passier et al.).²⁵ Nurses constituted the majority of participants (73.7%), comparable to studies in Pakistan²⁶ (56.9%) and Uganda⁸ (52.9%). This reflects the central role of nurses in healthcare systems and their greater representation relative to other HCP categories.

Only 26.3% of participants reported prior attendance at seminars or training sessions, while 22.8% supported regular workshops to improve ADR reporting. These findings mirror studies in India¹⁶ (25%) and Ghana²⁷ (27.4%), underscoring the need for targeted training initiatives to strengthen pharmacovigilance knowledge and competency. Enhanced training is vital to address underreporting, as improved skills are likely to increase the volume and quality of ADR submissions.

Knowledge was operationalised using prior use of ADR forms as a proxy, since actual engagement with reporting tools reflects applied familiarity with pharmacovigilance processes.^{7,8} This approach clarifies the distinction between knowledge, attitudes, and perceptions: knowledge was interpreted as practical familiarity with reporting procedures,²⁷ attitudes as normative beliefs about importance and obligation,²² and perceptions as self assessments of confidence, awareness, and experience.²⁷ Framing the constructs in this way highlights that while many professionals value ADR reporting,^{3,26} gaps in applied knowledge and perceptions of capability remain barriers to consistent reporting.^{7,8,27}

This lack of familiarity may foster reluctance and impede HCPs' accountability in ensuring safe medication use, thereby compromising the integrity of spontaneous ADR reporting. Low reporting rates have been documented in other studies including Uganda⁸ (16.6%), India¹⁶ (19.1%), and Ghana²⁷ at 20%. Traditional methods such as the yellow card approach have shown limited efficacy in increasing report numbers, prompting calls for alternative strategies.⁷ In the current study, 39.8% of participants had seen an ADR reporting form, yet 64.7% were unaware of its location within their departments. Time constraints were also cited as barriers, echoing findings by Katusiime et al.⁸ that only 37.7% of HCPs were knowledgeable about ADR forms.

Despite these gaps, participants demonstrated positive attitudes toward ADR reporting ($M = 0.67$, $SD = 0.63$) and high scores for professional obligation, reflecting awareness of responsibilities in medication safety. Motivations for reporting included enhancing patient safety and identifying new drugs, consistent with findings from Abjaude et al.,⁷ Desai et al.,³ and Hussain et al.²⁶ Perceptions of importance ($M = 3.07$, $SD = 1.17$) further highlight the need for interventions that translate positive attitudes into consistent reporting behaviour.

Forward-looking recommendations

To strengthen pharmacovigilance systems, reliance on paper-based forms should be complemented by digital reporting

platforms. UMC's VigiFlow²⁸ and European Medicines Agency's (EMA) EudraVigilance²⁹ demonstrate how electronic ICSR submission improves timeliness, completeness, and global harmonisation. Integrating such platforms into Botswana's healthcare system would reduce delays, enhance data quality, and align national reporting with international standards. Embedding digital tools within hospital workflows and training HCPs in their use could also overcome barriers of time and accessibility. As Council for International Organizations of Medical Sciences (CIOMS) has noted, future pharmacovigilance systems may leverage artificial intelligence to support case processing and signal detection.³⁰ Adoption of these innovations, alongside targeted training, would ensure that positive attitudes and professional obligation translate into effective, sustained ADR reporting.

Conclusion

Despite healthcare professionals (HCPs) often demonstrating positive attitudes and perceptions towards adverse drug reaction (ADR) reporting, significant gaps in their knowledge and understanding of the reporting process remain. Limited understanding of ADR forms, uncertainty around causality assessment, and practical barriers such as time constraints contribute to underreporting. Strengthening pharmacovigilance will therefore require workplace-based educational programmes to build competence and accountability, alongside system improvements that make reporting more accessible and efficient. Adoption of digital platforms and integration of innovative tools can further ensure that positive attitudes and professional obligation translate into consistent, sustained reporting practices.

Limitations

Ethical considerations can present challenges when seeking feedback on a study. Participants may perceive bias or feel pressured, which can lead to reluctance to participate, ultimately resulting in a small sample size. This limitation complicates the interpretation of findings, as it may restrict generalisability and the ability to explore heterogeneity. This issue was evident in the current study. In addition, given the self-administered nature of the questionnaire, inconsistencies in participants' responses may have emerged due to the demands of their daily responsibilities. Furthermore, the level of participation in this study may have introduced bias, as the responses obtained could differ significantly from those of healthcare professionals who chose not to participate.

Nonresponse and selection bias were evident, with pharmacists and physicians underrepresented compared to nurses. This underrepresentation limits the generalisability of the findings and reduces the ability to compare perspectives across professional groups.

Conflict of interest

The authors declare no conflict of interest.

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None.

Ethical consideration

Approval to conduct this study was obtained from the Botswana Health Research Unit. Ethical Clearance was obtained from the University's Human Research Ethics Committee (Medical) (No. M210835).

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