# ASSESSMENT OF HEALTH PROFESSIONALS' PERCEPTIONS OF MEDICAL ERRORS IN PRIMARY CARE SETTINGS: A CROSS- SECTIONAL STUDY FROM ABHA, SAUDI ARABIA

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**Abstract.** Understanding perceptions and practices of medical errors in primary healthcare facilities is essential for enhancing patients' safety and fostering a culture of transparency. A descriptive cross-sectional study was conducted regarding frontline healthcare professionals' perceptions of the identification, reporting and outcome of medical errors within diverse clinical settings. The survey was carried out in Abha health sector, Asir region, Saudi Arabia. Respondents ($n$ = 223) were mainly physicians, nurses and clinical laboratory technicians. Significant associations were observed between biological gender and profession, as well as perceptions of medical errors ($p$-value <0.05). Female responders were mainly nurses, while male responders were physicians and technicians. Males perceived medical errors as being underreported and reporting procedures unclear and time-consuming, while females perceived a lower frequency of medical errors and less uncertainty about the reporting procedures. Stratification of perceptions of medical errors according to years of work experience revealed, interestingly, no significant differences, but stratification according to sociodemographic parameters showed low perception rating among female respondents and respondents working in rural regions. The findings highlighted the importance of designing target-based interventions in reducing medical errors and impediments to the reporting process.

**Keywords:** healthcare worker, medical error, perception, primary care, reporting procedure

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## INTRODUCTION

Basic healthcare services in Saudi Arabia face persistent challenges in illness patterns, population needs, systems, funding, and access. Nonetheless, primary health care has improved over the past four decades, resulting in a reduction in newborn mortality and prevalence of infectious diseases, as well as an increase in life expectancy (Almalki *et al*, 2011). By 2017, there were 2,325 public primary health care centers nationwide (Ministry of Health, 2017). The country is shifting its focus from secondary and tertiary care to restructuring primary health care to reduce reliance on secondary and tertiary services and improve access to preventive, community-based care (Almalki *et al*, 2011).

Worldwide, many patients are still harmed by medical care, which should be safe, and much of this harm is preventable. These adverse events occur across countries and income levels (Jha *et al*, 2013). In the Middle East, medication errors can occur at any step from prescribing to dispensing medication, often due to system gaps, missed communication and high health personnel workload (Thomas *et al*, 2019).

An adverse event is defined as injury, including death, disability or extended hospitalization, directly caused by medical intervention (Kohn *et al*, 2000; UC Davis PSNet Editorial Team, 2024). A "near miss" refers to a mistake that could have caused harm but is prevented by chance or interception (UC Davis PSNet Editorial Team, 2024). Common healthcare concerns include misdiagnosis, surgical error, fall of a patient, accidental burn, and mistaken identity (Leape, 1994). A medical error is an action or inaction during the planning or carrying out of a medical procedure that causes or may cause an unintended result (Kohn *et al*, 2000; Reason, 2000; Makary and Daniel, 2016). An error of omission arises when a certain act is not carried out according to standard procedure, such as forgetting to strap a patient into a wheelchair or to steady a

gurney before transferring a patient (Makary and Daniel, 2016).

In Saudi Arabia, cross-sectional studies reported significant numbers of medical errors in regional settings and a reluctance to report such incidents. This may be due to a culture of avoiding blame, anxiety of social disapproval or litigation and inadequate awareness of the reporting mechanism (Alsulami *et al*, 2019; Alyami *et al*, 2022). The current national data on safety-reporting indicated that under-reporting remains common among healthcare providers, with nearly 75% of healthcare practitioners reporting zero to two safety events annually, reflecting limited engagement with incident reporting systems (Alkahf and Alonazi, 2024), and underscoring the need for easier disclosure procedures and a more "just", non-punitive environment (Alkahf and Alonazi, 2024). Nurses tend to have higher awareness and more favorable attitudes toward reporting than dentists and interns, although fear of negative workplace consequences remains a key barrier (Al-zain and Althumairi, 2021). Additionally, a significant amount of attention has been placed on the problem of mistakes in prescribing drugs at hospitals. Recently, primary health care centers are also paying an increasing amount of attention to patients' safety (Aljadhey *et al*, 2016).

Saudi Arabia's Vision 2030 and the Health Sector Transformation Program place patient safety at the core of healthcare reform by addressing the systemic causes of preventable harm through governance, regulation, and cultural change. In alignment with these national priorities, the Saudi Patient Safety Center (SPSC) was established in 2017 as the first specialized national body in the region dedicated to patient safety. The SPSC translates strategic objectives into practice by developing national patient safety standards, promoting a culture of safety, and supporting healthcare organizations in reducing risks and improving patient outcomes (SPSC, 2025; KSA, 2016).

WHO (2020) introduced an incident report to formally document unexpected outcomes or deviations, which affect patients or healthcare staff. Its purpose is to learn from errors, not to assign blame, and to initiate a system-level investigative process and recommend improvements to existing protocols (Vincent, 2010). Medical errors ranging from wrong medication or misdiagnosis to procedural delays are influenced by both the system's complexity and staff experience. Barriers to reporting, such as time-consuming processes and a lack of feedback, discourage disclosure, particularly among junior staff (Aljabari and Kadhim, 2021). Furthermore, perceptions of the types of error and reporting behavior differ across clinical units and departments, highlighting the need for targeted interventions (Ghobadian *et al*, 2021). It is required that all occurrences be kept private and that only authorized personnel have access to the documents.

Adverse events largely result from systemic failures such as poor communication, weak leadership, inadequate training, and insufficient patient assessment. These risks are intensified by unclear policies and lines of authority. In Saudi Arabia, serious sentinel events include wrong-site surgery, severe medication-related harm, and critical equipment failures, highlighting the need for strong leadership, clear policies, and standardized patient safety systems (SPSC, 2025).

Medical professionals in Saudi hospitals often avoid reporting medical errors if patients are unharmed, mainly due to fear of repercussions (Aljadhey *et al*, 2016). Shifting from punitive approaches to educational, preventive frameworks has long been advocated (Vincent, 2010). Addressing these systemic gaps is vital for improving patient outcomes.

Research on medical errors has predominantly focused on hospital settings, with comparatively limited attention to primary care. However, evidence from Saudi Arabia indicates that primary care is also vulnerable

to patient safety risks, particularly medication-related errors, with prescription mistakes accounting for a substantial proportion of reported incidents. This highlights the need to extend patient safety standards and interventions beyond hospitals to primary care settings (SPSC, 2025).

It is equally important to examine how frontline health providers in primary care perceive medical errors, their response to such incidents, and reporting procedures. Understanding these perceptions and practices, the obstacles and enablers that shape them (Alsulami *et al*, 2019; Alyami *et al*, 2022; Alkahf and Alonazi, 2024), can inform the development of improved workplace policies and safety interventions at the primary care level.

Primary care facilities face patient safety risks comparable to hospitals, yet they receive far less research attention. This study explored how healthcare professionals in Abha's 24-hour primary health centers perceive and practice medical error reporting. Understanding their attitudes and behaviors provides essential insights for strengthening safety culture and improving reporting systems. These findings can guide practical recommendations that support national patient safety priorities and advance the goals of Vision 2030 and the Health Sector Transformation Program (SPSC, 2025).

## MATERIALS AND METHODS

### Study design and location

The study employed a descriptive cross-sectional study design. The study was conducted in Abha health sector, Asir region, Saudi Arabia (Fig 1). The General Directorate of Health Affairs of the Asir region oversees 19 health sectors, which contain 211 primary healthcare centers and 20 hospitals. The largest sector, Abha, contains 36 health centers; 9 in urban and 27 in rural areas. Urban centers consist of Abha, Almansak and Mdenat Sultan, while rural centers are Bani Maleek and Tamneah. Some facilities are open 24 hours
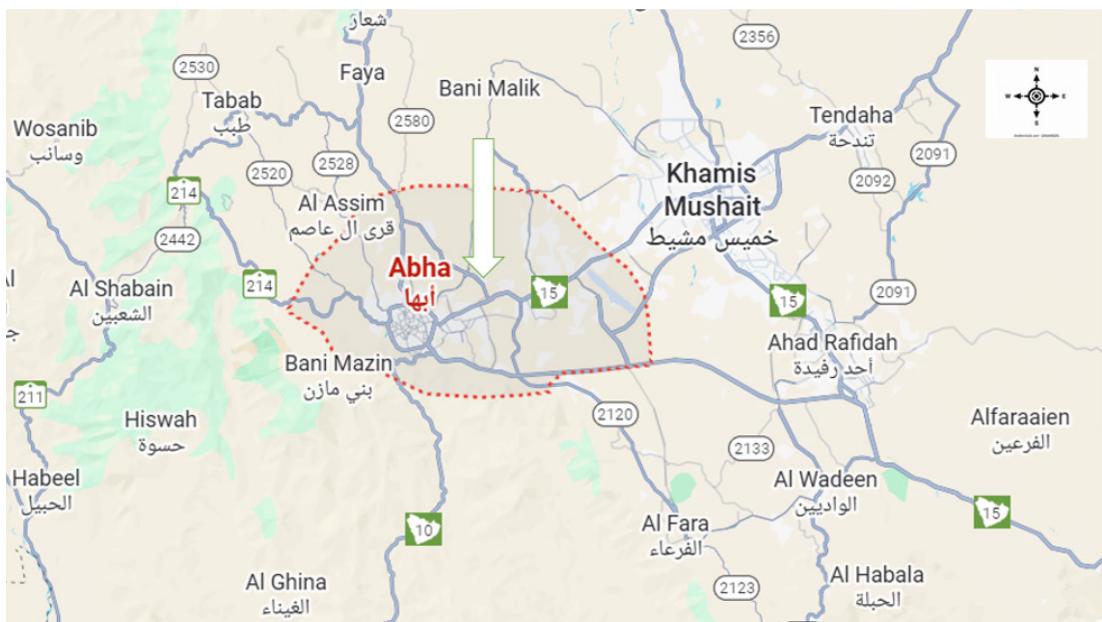
Fig 1 - Location of Abha health sector, Asir region, Saudi Arabia

The boundary of Abha health sector is marked by dotted red line. The white arrow indicates the location of Abha which represents the study area.

Source: Google Maps, accessed on 2025 Sep 10.

every day, while others offer service from 0800-1600 hours, Monday to Thursday, with an extended period from 1600-2300 hours from Thursday to Sunday (Ministry of Health, 2024). The study was carried out from July 2022 to March 2023, to allow sufficient time to recruit participants and gather meaningful data.

**Study population**

The study recruited medical professionals, such as physicians, dentists, nurses, and technicians (Clinical Laboratory and Radiology), who were employed in primary healthcare facilities in Abha. Inclusion criteria were: ≥18 years of age, both sexes, and working in Abha health centers under the

Ministry of Health, permanent or contract-based. Exclusion criteria were: working in non-clinical specialties like physiotherapy and health informatics, interns and students, and those on extended leave or hospitalized during the study period. The sample size was calculated using Thompson's equation for finite populations (Thompson, 2012); based on the known population of 537 healthcare professionals in the primary health centers, and assuming a 95% confidence level, a margin of error of 5% and a population proportion of 0.5 to ensure maximum variance; the calculated sample size was 221, and extended to 223 using the Epidemiological Information Version 7 (Epi Info 7) software (available at URL: https://www.cdc.gov/epiinfo/support/downloads.html). A total of 36 primary health care facilities were selected for the study, using a multistage sampling technique in four geographic zones: north, central, east, and west (Bhandari, 2023). The final selection was based on convenience sampling, whereby participants were recruited from each health facility until the assigned sample portion for that facility was reached.

**Data collection tool**

A self-administered online questionnaire, adapted from previously validated tools (Alsulami *et al*, 2019; Alyami *et al*, 2022), consisted of three sections: demographic details, perceptions of medical errors, and reporting practices. Replies were rated using a simple 3-point Likert scale: agree (3 points), neutral/do not know (2 points) and disagree (1 point). The questionnaire contained 13 questions on perceptions of medical errors, with a score >25 considered "good", 20-25 "neutral" and <20 "poor". The questionnaire was sent using a Google Form via WhatsApp and official email.

A pilot study was conducted with 15 participants to ensure clarity and improve the questionnaire's reliability and validity. Internal consistency of the questionnaire was assessed using Cronbach's $\alpha$, yielding a reliability coefficient of 0.87, indicating good reliability (Tavakol and Dennick, 2011).

**Data analysis**

Categorical variables were summarized using frequencies and percentages. Hypothesis testing was conducted using the chi-square test, with statistical significance accepted when a two-tailed *p*-value is <0.05 (McHugh, 2013). Data were calculated using the Statistical Package for the Social Sciences (SPSS), version 25 (IBM Corp, Armonk, NY).

**Ethical considerations**

The study protocols were approved by the Institutional Review Board of Asir Health Affairs (REC-10-5-2022) and King Khalid University (ECM#2022-1601). Prior signed online consent was received from each participant. Replies were anonymized before data analysis.

RESULTS

Respondents were composed of 109 females and 114 males (Table 1). Female respondents were mainly nurses (70%) and for males, mainly physicians (43%). No significant associations were observed between biological gender and other demographic variables, namely age, nationality, years of work experience, employer (public/

Table 1

Gender distribution across demographic characteristics of study healthcare professionals in primary healthcare facilities, Abha health sector, Asir region, Saudi Arabia, July 2022 - March 2023

| Demographic characteristic | Respondent, *n* (%) | | *p*-value* |
|---|---|---|---|
| | Female (N = 109) | Male (N = 114) | |
| Age | | | 0.482 |
| 20-30 years | 25 (23) | 26 (23) | |
| 31-40 years | 71 (65) | 68 (59) | |
| 41-50 years | 13 (12) | 20 (18) | |

Table 1 (cont)

| Demographic characteristic | Respondent, n (%) | | p-value* |
| --- | --- | --- | --- |
| | Female (N = 109) | Male (N = 114) | |
| Profession | | | 0.001 |
| Physician | 23 (21) | 49 (43) | |
| Nurse | 76 (70) | 26 (23) | |
| Pharmacist | 1 (1) | 13 (11) | |
| Technician | 9 (8) | 26 (23) | |
| Nationality | | | 0.700 |
| Non-Saudi | 6 (6) | 5 (4) | |
| Saudi | 103 (94) | 109 (96) | |
| Work experience | | | 0.662 |
| 1-5 years | 17 (16) | 21 (18) | |
| 6-10 years | 41 (37) | 34 (30) | |
| 11-20 years | 47 (43) | 55 (48) | |
| >20 years | 4 (4) | 4 (4) | |
| Employer | | | 0.840 |
| Government | 75 (69) | 77 (67) | |
| Private | 34 (31) | 37 (33) | |
| Locality | | | 0.863 |
| Rural | 51 (47) | 52 (46) | |
| Urban | 58 (53) | 62 (54) | |

*p-value <0.05 is considered statistically significant, comparing between groups using Chi-square test.

private), or locality of workplace.

The biological gender of respondents was significantly associated with certain perceptions of medical errors (Table 2). The majority (61%) of male participants agreed that there was a deficiency in the reporting procedures of medical errors, compared to 36% of females. A higher proportion of female respondents either disagreed (39%) or were uncertain (25%) about this issue compared to males (25 and 13% respectively). Perceptions regarding the impact of experience and training on medical errors also differed significantly, with 73% of male respondents agreeing that a lack of experience and training contributed to medical errors, while 60% of females held this view. This suggests a greater confidence of females in their training or a difference in interpretation of error causation. It is worth noting that the majority of female respondents were in the nursing profession, while males were medical practitioners.

Male participants were more likely to agree that the reporting process was unclear and complex (69%) or time-consuming (56%), compared to 51 and 39% respectively, of females (Table 2). Female respondents were more inclined than males to disagree or express uncertainty about these procedural barriers ($p$-values = 0.025 and 0.042 respectively). However, no statistically significant gender differences were observed in perceptions of medical errors resulting from workplace shortage and overload, poor communication, medication mistakes, misdiagnosis, or delayed medical intervention.

Taken together, the findings suggested that while gender influenced perceptions of the structural and procedural aspects of medical error reporting, it does not significantly affect perceptions of the clinical or systemic causes of medical errors.

When the respondents were stratified according to length of time (1-5, 6-10, 11-20, and >20 years) of work experience, no statistically significant associations were observed among the four groups and

Table 2

Gender-based difference in perceptions of medical errors among study healthcare professionals in primary healthcare facilities, Abha health sector, Asir region, Saudi Arabia, July 2022 - March 2023

| Perception regarding medical error | Respondent, $n$ (%) | | $p$-value* |
|---|---|---|---|
| | Female (N = 109) | Male (N = 114) | |
| Lack of reporting | | | 0.013 |
| Disagree | 43 (39) | 29 (25) | |
| Do not know | 27 (25) | 15 (14) | |
| Agree | 39 (36) | 70 (61) | |
| Shortage of personnel and work overload are causes | | | 0.991 |
| Disagree | 22 (20) | 23 (20) | |
| Do not know | 10 (9) | 11 (10) | |
| Agree | 77 (71) | 80 (70) | |
| Cause stems from lack of experience and training | | | 0.022 |
| Disagree | 35 (32) | 19 (17) | |
| Do not know | 9 (8) | 12 (10) | |
| Agree | 65 (60) | 83 (73) | |
| Cause stems from poor language and communication | | | 0.183 |
| Disagree | 47 (43) | 42 (37) | |
| Do not know | 13 (12) | 8 (7) | |
| Agree | 49 (45) | 64 (56) | |
| Reporting process not clearly described | | | 0.025 |
| Disagree | 32 (29) | 22 (19) | |
| Do not know | 21 (20) | 13 (12) | |
| Agree | 56 (51) | 79 (69) | |

Table 2 (cont)

| Perception regarding medical error | Respondent, $n$ (%) | | $p$-value* |
|---|---|---|---|
| | Female (N = 109) | Male (N = 114) | |
| Reporting process complex and time-consuming | | | 0.042 |
| Disagree | 44 (40) | 35 (31) | |
| Do not know | 22 (21) | 15 (13) | |
| Agree | 43 (39) | 64 (56) | |
| Impacts patient outcome | | | 0.560 |
| Disagree | 51 (47) | 61 (53) | |
| Do not know | 22 (20) | 22 (20) | |
| Agree | 36 (33) | 31 (27) | |
| Impacts accuracy and timeliness of disease diagnosis | | | 0.342 |
| Disagree | 42 (38) | 47 (41) | |
| Do not know | 33 (31) | 20 (18) | |
| Agree | 34 (31) | 47 (41) | |
| Cause of delay in medical intervention | | | 0.383 |
| Disagree | 49 (45) | 41 (36) | |
| Do not know | 28 (26) | 31 (27) | |
| Agree | 32 (29) | 42 (37) | |

*$p$-value <0.05 is considered statistically significant, comparing between groups using Chi-square test.

any of the considered perceptions on medical errors (Table 3). When the respondents were stratified according to sociodemographic parameters, only the biological gender of the respondents and the locality of their workplace showed a significant difference (*p*-values = 0.031 and 0.037 respectively) in the rating of perception on medical errors (Table 4). Female respondents and rural locality were associated with a poor perception rating.

## DISCUSSION

Understanding how healthcare professionals perceive and respond to medical errors is crucial for enhancing patient safety, particularly in frontline settings. Although many such studies have been undertaken in hospitals, fewer have been focused on primary care facilities (Bismark *et al*, 2013; WHO, 2025a). The survey was conducted among a selected number of primary care centers in Abha medical sector, Asir region, Saudi Arabia. An online self-answered questionnaire consisting of 13 perceptions on medical errors was sent to 537 healthcare personnel from July 2022 to March 2023, and 223 (41%) replies were received.

The majority of female respondents were nurses, while male respondents were mainly physicians and technicians. This gender distribution aligned with global and regional trends, where nursing remains a female-dominated profession and a medical/technical role is more commonly occupied by men (Statista, 2025; WHO, 2025a). One interesting finding was that no significant associations were found between biological gender and other sociodemographic parameters, such as age, nationality, years of work experience, public or private service, or locality. This supports the view that the biological gender of an employee is more strongly tied to a profession than to broader demographic factors (Bismark *et al*, 2013; WHO, 2025b).

The findings demonstrated that the biological gender of a healthcare personnel significantly influenced perceptions of medical errors,

Table 3

Association between work experience and perceptions of medical error among healthcare professionals in primary healthcare facilities, Abha health sector, Asir region, Saudi Arabia, July 2022 - March 2023

| Perception of medical error | Frequency based on work experience of the respondent, $n$ (%) | | | | $p$-value* |
|---|---|---|---|---|---|
| | 1-5 years (N = 38) | 6-10 years (N = 75) | 11-20 years (N = 102) | >20 years (N = 8) | |
| Reporting process complex and time-consuming | | | | | 0.782 |
| Disagree | 13 (34) | 28 (37) | 36 (35) | 2 (25) | |
| Do not know | 6 (16) | 14 (19) | 15 (15) | 2 (25) | |
| Agree | 19 (50) | 33 (44) | 51 (50) | 4 (50) | |
| Involving medication | | | | | 0.523 |
| Disagree | 15 (39) | 39 (52) | 57 (56) | 1 (13) | |
| Do not know | 12 (32) | 15 (20) | 15 (15) | 2 (25) | |
| Agree | 11 (29) | 21 (28) | 30 (29) | 5 (62) | |
| Involving diagnosis | | | | | 0.561 |
| Disagree | 11 (29) | 27 (36) | 47 (46) | 4 (50) | |
| Do not know | 12 (32) | 23 (31) | 17 (17) | 1 (13) | |
| Agree | 15 (39) | 25 (33) | 38 (37) | 3 (37) | |
| Causing delayed medical intervention | | | | | 0.683 |
| Disagree | 17 (45) | 29 (39) | 42 (41) | 2 (25) | |
| Do not know | 12 (31) | 24 (32) | 22 (22) | 1 (13) | |
| Agree | 9 (24) | 22 (29) | 38 (37) | 5 (62) | |

Table 3 (cont)

| Perception of medical error | Frequency based on work experience of the respondent, $n$ (%) | | | | $p$-value* |
|---|---|---|---|---|---|
| | 1-5 years (N = 38) | 6-10 years (N = 75) | 11-20 years (N = 102) | >20 years (N = 8) | |
| Stems from error in laboratory report | | | | | 0.840 |
| Disagree | 22 (58) | 40 (53) | 51 (50) | 6 (76) | |
| Do not know | 9 (24) | 23 (31) | 32 (31) | 1 (12) | |
| Agree | 7 (18) | 12 (16) | 19 (19) | 1 (12) | |
| Involving surgical procedure (e.g., tooth extraction, dressing wound, suturing) | | | | | 0.423 |
| Disagree | 22 (58) | 47 (63) | 55 (54) | 5 (62) | |
| Do not know | 11 (29) | 15 (20) | 24 (24) | 0 (0) | |
| Agree | 5 (13) | 13 (17) | 23 (22) | 3 (38) | |
| Involving injection or IV fluid | | | | | 0.632 |
| Disagree | 20 (53) | 44 (59) | 52 (51) | 4 (50) | |
| Do not know | 5 (13) | 13 (17) | 13 (13) | 1 (12) | |
| Agree | 13 (34) | 18 (24) | 37 (36) | 3 (38) | |
| Involving fall of patient | | | | | 0.427 |
| Disagree | 27 (71) | 46 (61) | 69 (68) | 5 (63) | |
| Do not know | 7 (18) | 11 (15) | 14 (14) | 1 (12) | |
| Agree | 4 (11) | 18 (24) | 19 (18) | 2 (25) | |

*$p$-value <0.05 is considered statistically significant, comparing among groups using Fisher's Exact test.

IV: intravenous

Table 4

Association between sociodemographic characteristic and rating of perception regarding medical error among healthcare professionals in primary healthcare facilities, Abha health sector, Asir region, Saudi Arabia, July 2022 - March 2023

| Sociodemographic characteristic | Frequency based on the perception rating of the participant, $n$ (%) | | | $p$-value* |
|---|---|---|---|---|
| | Good (N = 138) | Neutral (N = 52) | Poor (N = 33) | |
| Sex | | | | 0.031 |
| Female | 61 (44) | 25 (48) | 23 (70) | |
| Male | 77 (56) | 27 (52) | 10 (30) | |
| Age | | | | 0.825 |
| 20-30 years | 32 (23) | 12 (23) | 7 (21) | |
| 31-40 years | 89 (64) | 30 (58) | 20 (61) | |
| 41-50 years | 16 (12) | 10 (19) | 6 (18) | |
| >50 years | 1 (1) | 0 (0) | 0 (0) | |
| Profession | | | | 0.754 |
| Physician | 44 (32) | 18 (35) | 10 (31) | |
| Nurse | 59 (43) | 25 (48) | 18 (54) | |
| Pharmacist | 11 (8) | 2 (4) | 1 (3) | |
| Technician | 24 (17) | 7 (13) | 4 (12) | |
| Nationality | | | | 0.482 |
| Non-Saudi | 6 (4) | 2 (4) | 3 (9) | |
| Saudi | 132 (98) | 50 (96) | 30 (91) | |
| Work experience | | | | 0.593 |
| 1-5 years | 26 (19) | 8 (15) | 4 (13) | |
| 6-10 years | 42 (30) | 18 (35) | 15 (45) | |
| 11-20 years | 65 (47) | 23 (44) | 14 (42) | |
| >20 years | 5 (4) | 3 (6) | 0 (0) | |

Table 4 (cont)

| Sociodemographic characteristic | Frequency based on the perception rating of the participant, $n$ (%) | | | $p$-value* |
|---|---|---|---|---|
| | Good (N = 138) | Neutral (N = 52) | Poor (N = 33) | |
| Employer | | | | 0.170 |
| Government | 88 (64) | 38 (73) | 26 (79) | |
| Private | 50 (36) | 14 (27) | 7 (21) | |
| Locality | | | | 0.037 |
| Rural | 58 (42) | 23 (44) | 22 (67) | |
| Urban | 80 (58) | 29 (56) | 11 (33) | |

Perception rating was based on a 13-item scale (maximum score = 39): scores >25 = good, 20-25 = neutral, <20 = poor.

*$p$-value <0.05 is considered statistically significant, comparing among groups using Fisher's Exact test.

particularly as regards reporting practices and perceived causes. Male participants were more likely to agree that medical errors were underreported, while a major proportion of female respondents disagreed. This difference in perception might be due to their respective profession, the majority of male respondents being physicians and female respondent nurses, but there are other possible explanations, *viz*, exposure to reporting systems or confidence in institutional transparency (Bismark *et al*, 2013). Male physicians showed greater concern than females about systemic barriers to reporting medical errors (Kaldjian *et al*, 2008; Vrbnjak *et al*, 2016).

Perceptions of lack of experience and training as causal factors of medical errors were reported by nearly two-thirds of males, while some 50% of females agreed. Bismark *et al* (2013) observed that 62% of female medical practitioners, compared to 49%

of males, report high readiness to perform their duties, indicating a sex-based difference in self-assessed competence.

Perceptions of the reporting procedures of medical errors emerged as another area of sex-based differences. A slightly higher proportion of male participants than females perceived the process as unclear, but twice as many males as females found the reporting procedure time-consuming. Lawton and Parker (2002) noted that men may be more sensitive to procedural inefficiencies, particularly in hierarchical or bureaucratic systems. Vrbnjak *et al* (2016) reported that 63% of male healthcare workers cite complexity and lack of clarity as barriers to incident reporting, compared to 46% of female staff.

Overall, the current study findings indicated that biological gender influenced perceptions on structural and procedural aspects of medical error reporting but not on clinical causal factors. Makary and Daniel (2016) reported

that clinical error recognition tends to be uniform across the sexes when standardized protocols and training are in place, with equal proportions (~50%) of male and female clinicians identifying diagnostic and medication errors as key contributors to patients' adverse outcomes.

Stratification of the current study findings according to years of work experience and to sociodemographic factors revealed only two significant associations with the respondents' rating of perceptions on medical errors: poor ratings were obtained from female respondents and respondents working in primary care centers located in rural regions of Abha medical sector. In an earlier study, Bismark *et al* (2013) pointed out that the gender-based differences in attitudes towards error reporting and system transparency. Urban healthcare centers have better access to training, resources, and reporting infrastructure (WHO, 2025a). These findings are in concordance with studies highlighting biological gender and geographic disparities

in healthcare attitudes (Alshammari *et al*, 2024).

The current study has several limitations. Firstly, its cross-sectional design restricted causal inference between demographic factors and perceptions of medical errors. Secondly, the use of self-reported data might also introduce response bias, particularly in sensitive areas such as medical error reporting and professional confidence. And thirdly, the participants were recruited from a specific geographic region with its particular population characteristics and norms, which would limit generalization across the nation.

In conclusion, the survey revealed that the influences affecting perceptions of medical errors by healthcare personnel at the primary care centers on issues such as awareness, frequency of occurrence and reporting procedures were multifactorial. Biological gender was a critical factor, with the majority of male respondents, who were mainly physicians, perceiving underreporting of medical errors and procedural barriers to the reporting, while the majority of female respondents, mostly nurses, did not perceive there was an abundance of medical errors or impediments to the reporting process. Interestingly, stratification according to years of work experience failed to reveal any significant differences in their perceptions. However, stratification according to sociodemographic parameters indicated a poor perception rating of female respondents and respondents working in rural regions. These findings underscore the need for targeted policies that promote gender equality in the choice of a career in the healthcare profession, locality-unbiased resource allocation and procedural clarity in reporting medical errors. The findings are in keeping with Saudi Arabia's Vision 2030 goals to improve healthcare quality and reduce preventable harm to patients.

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## CONFLICT OF INTEREST DISCLOSURE

The author declares no conflict of interest.

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