

ORIGINAL RESEARCH



Access to urgent care in Riyadh: a study of equity and personalization

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Abstract

Access to healthcare, while globally recognized as a human right, presents significant disparities, particularly in urgent care accessibility and equity within Riyadh's neighborhoods. This study addresses the existing gaps in understanding how disparities in urgent care access can impact the broader goal of personalized healthcare in Riyadh's primary healthcare centers (PHCs). The study aims to examine the equity and accessibility of urgent care services in PHCs across Riyadh, Saudi Arabia, evaluating how these factors contribute to personalized healthcare. We hypothesized that significant differences exist in the accessibility and equity of urgent care services among various Riyadh neighborhoods. We conducted a cross-sectional online survey with 359 participants from diverse Riyadh neighborhoods. Data were collected using a structured questionnaire and analyzed using SPSS Version 23.0 to explore regional differences in urgent care accessibility and perceptions of equity. The study revealed significant regional disparities in urgent care accessibility within Riyadh, Saudi Arabia. Specifically, residents in the Western region reported the highest access and awareness (80.84% availability within 30 minutes), while those in the Eastern region reported the least (76.19% access to healthcare centers). Additionally, 32.6% of the participants were from the Western region, 24.5% from the Eastern region, 21.7% from the Southern region, and 21.2% from the Northern region. A notable preference was found for seeking urgent care in secondary and military hospitals, attributed to perceived better resources and specialist availability. The findings emphasize the need for targeted interventions to enhance PHC capabilities and utilization, ensuring alignment with personalized healthcare principles that cater to specific regional needs and conditions.

Keywords

Primary healthcare centers; Urgent care; Healthcare equity; Healthcare accessibility; Personalized healthcare

1. Introduction

Access to healthcare is universally recognized as a fundamental human right, enshrined in Article 25 of the Universal Declaration of Human Rights, which assures everyone the right to a standard of living adequate for health and well-being. Despite global acknowledgment, disparities in healthcare access remain pronounced, especially in urgent care availability across various regions [1]. Equitable access, as defined by the World Health Organization, extends beyond mere availability, requiring that healthcare services be provided fairly to all individuals, regardless of socio-economic status or personal characteristics [2, 3].

In Riyadh, the capital of Saudi Arabia, the healthcare system is structured to provide comprehensive services through a network of primary healthcare centers (PHCs), secondary

hospitals, and tertiary care facilities. PHCs serve as the initial point of contact for patients, offering a range of preventive, diagnostic and treatment services. Secondary and tertiary hospitals provide more specialized and intensive care, including emergency and urgent care services. Emergency care in Riyadh is designed to handle life-threatening conditions and severe injuries, with facilities equipped for advanced medical interventions.

Urgent care, as defined in this study, refers to medical services provided for conditions that require prompt attention but are not severe enough to necessitate a visit to an emergency room. These conditions may include minor fractures, sprains, infections and other non-life-threatening illnesses and injuries that need timely treatment to prevent complications.

In Riyadh, disparities are evident in the distribution of urgent care services across different neighborhoods, with urban areas

often having better resources than rural ones. This uneven distribution is compounded by factors such as socio-economic status, ethnicity, and the availability of transportation, creating significant barriers for lower-income groups and those without private transport, leading to exacerbated health inequities [4–7]. These issues highlight a critical gap in understanding and addressing the unique needs of diverse population groups, affecting patient satisfaction and overall health outcomes.

Personalized medicine, which aims to tailor healthcare services to the individual needs of patients, plays a pivotal role in addressing these inequities [8, 9]. It involves using demographic and regional data to implement targeted healthcare interventions, ensuring that each individual's specific circumstances are considered in their care. However, studies indicate that even in developed countries like the U.S., only about 31% of primary care clinics provide urgent care services outside regular hours, suggesting a significant accessibility gap [5].

This study aims to assess the accessibility and equity of urgent care services in PHCs across Riyadh, analyzing regional variations and their impact on personalized healthcare delivery. By identifying and understanding these disparities, we hope to inform policies and practices that can improve healthcare quality and equity, aligning with the principles of personalized medicine. We hypothesize that significant differences exist in the accessibility and equity of these services across various Riyadh neighborhoods, which, if confirmed, could lead to targeted improvements that enhance the overall effectiveness of the healthcare system in the city.

Through this research, we seek to contribute to a deeper understanding of healthcare disparities and to highlight the critical role of tailoring healthcare systems to meet the unique needs of different communities. This is a fundamental aspect of personalized healthcare that recognizes the necessity of adapting services to the diverse socio-economic and cultural contexts of population groups.

2. Materials and methods

2.1 Study design and sample

We conducted a descriptive, cross-sectional study using a structured questionnaire to explore accessibility and equity in primary healthcare services across Riyadh, Saudi Arabia. This method was chosen to capture a snapshot of current conditions and perceptions among healthcare users, enabling a detailed exploration of subjective experiences crucial for assessing healthcare service effectiveness.

2.2 Study settings

The study was conducted in October 2022, focusing on a sample of the public visiting PHCs affiliated with the Ministry of Health in Riyadh. Coverage included diverse geographic areas—northern, western, eastern and southern regions—to ensure a comprehensive demographic representation.

2.3 Participants

Participation was contingent upon providing informed consent, ensuring ethical compliance and voluntary engagement in the

study. Participants were adults (≥ 18 years) residing in Saudi Arabia who had recently used services at one of the selected PHCs. Inclusion was based on recent PHC visitation, defined as having visited a primary healthcare center within the last six months. Individuals were selected through convenience sampling on social media platforms, which allowed us to efficiently reach a broad participant pool. Out of 400 initially contacted, 359 completed the survey, with 41 excluded due to incomplete responses or failing to meet inclusion criteria. Participation was voluntary, with informed consent obtained from all respondents.

2.4 Variables and data collection

We assessed first-contact accessibility, relational continuity and care coordination using a Likert scale from “strongly disagree” (1) to “strongly agree” (5). These variables were chosen to gauge both the availability of healthcare services and the quality of care continuum. Data were collected via an electronic questionnaire, developed and tested for clarity, community appropriateness and relevance. The survey included sections on demographic information, healthcare service accessibility and equity, and patients' behavioral perspectives.

2.5 Sample size rationale

The sample size of 359 was determined based on the estimated population size of Riyadh, aiming for a confidence level of 95% and a margin of error of 5%. This sample size is adequate to detect significant differences in access to healthcare services across the studied regions.

2.6 Primary and secondary objectives

The primary objective of this study was to assess disparities in access to urgent care in PHCs among Riyadh's neighborhoods, Saudi Arabia. Secondary objectives included understanding the impact of socioeconomic factors on healthcare access and examining the relationship between healthcare service availability and patient satisfaction. To determine the sample size, we calculated that an estimated 384 participants would be needed. This calculation was based on a 95% confidence level, assuming maximum variability with an estimated population proportion of 0.5, and allowing for a margin of error of 5%. Specifically, the sample size formula used was $1.96^2 \times 0.5 \times (1 - 0.5) / 0.05^2$, which equals approximately 384. Given Riyadh's population of approximately 7.6 million, we applied a finite population correction, which confirmed that the initial estimate of 384 participants was appropriate. Therefore, our actual sample size of 359 participants is considered close to the calculated requirement and sufficient to detect significant differences in access to healthcare services across the studied regions.

2.7 Statistical methods

Data analysis was performed using IBM SPSS Statistics for Windows, Version 25 (IBM Corp., Armonk, NY, USA). We applied descriptive statistics to summarize demographic data and survey responses, employing frequencies and percentages to elucidate patterns in healthcare access and equity. This

approach facilitated clear, straightforward interpretation of results.

3. Results

3.1 Participants

A total of 359 individuals participated in the study, recruited from PHCs across four regions of Riyadh: Southern, Northern, Eastern and Western. The sample was distributed almost evenly among these regions, ensuring a balanced representation of Riyadh's diverse urban landscape. This broad regional participation provides essential insights into the accessibility and equity of urgent care services in the city and highlights the potential for personalized healthcare implementations that are sensitive to varying regional healthcare needs and accessibility challenges.

3.2 Descriptive data

The study involved a detailed demographic analysis of 359 participants from primary healthcare centers across Riyadh (Table 1). The average age of participants was 38.4 years, with a standard deviation of 10.7 years. The demographic analysis highlights several key characteristics that are pivotal to understanding disparities in healthcare access and equity. The majority of respondents were female (67.1%), which may influence healthcare usage patterns as women often play crucial roles in family health decisions. Most participants were Saudi citizens (84.4%), providing insights primarily into the healthcare experiences of nationals, with a smaller proportion of non-Saudis (15.6%) who may have different access and equity challenges. The majority fell within the 36–55 age group (56.8%), followed by the 18–35 age group (40.1%) and a smaller representation from those 56 years and older (3.1%). A significant portion of the participants were university-educated (78.8%), indicating a potentially higher awareness and utilization of healthcare services. Two-thirds of the respondents (67.7%) had health insurance, which can significantly affect access to and utilization of urgent care services. Participants were distributed fairly evenly across Riyadh's regions, with the largest group in the Western region (32.6%), followed by the Eastern (24.5%), Southern (21.7%), and Northern regions (21.2%). A substantial number of participants rated their health as good to excellent, and more than half (55.2%) had visited a healthcare center in the past year, indicating active engagement with the healthcare system.

3.3 Outcome data

The analysis of the collected data was conducted using SPSS (Version 23.0, SPSS Inc., Chicago, IL), focusing on frequency distributions, percentages, mean scores and standard deviations to provide a comprehensive overview of participants' perceptions regarding accessibility and equity in urgent care services. Additionally, we categorized the cases into emergency and non-life-threatening based on the severity of the conditions reported by the participants (Table 2).

TABLE 1. Demographic characteristics of respondents.

Variable	Frequency (n)	Percent (%)
Gender		
Male	118	32.9
Female	241	67.1
Saudi citizenship		
Yes	303	84.4
No	56	15.6
Age		
8–5	144	40.1
36–55	204	56.8
56 and more	11	3.1
Average age	38.4	(SD = 10.7)
Education		
Read and write	15	4.2
Basic education	61	17.0
University	283	78.8
Health insurance		
Yes	243	67.7
No	116	32.3
Housing area		
East of Riyadh	88	24.5
North of Riyadh	76	21.2
West of Riyadh	117	32.6
South of Riyadh	78	21.7
Health status		
Weak	2	0.6
Fair (2.0)	1	0.3
Satisfactory (3.0)	6	1.7
Good (4.0)	54	15.0
Very good (5.0)	76	21.2
Excellent	99	27.6
Outstanding (7.0) total	121	33.7
Visiting healthcare center last year		
Yes	198	55.2
No	161	44.8

SD: standard deviation.

3.4 Comparison of emergency and non-life-threatening cases

We categorized 157 cases (43.7%) as emergency cases and 202 cases (56.3%) as non-life-threatening based on participants' responses. The results show statistically significant differences in the perceptions of access to healthcare centers, availability within 30 minutes, adequate staffing and emergency responsiveness between emergency and non-life-threatening cases (p -values < 0.05). Table 3 presents a comparison of accessibility and equity metrics between these two categories.

TABLE 2. Survey results on healthcare accessibility and equity in Riyadh’s PHCs.

Items	PMS	SD
Access to health care centers	76.19	15.31
Availability within 30 minutes	80.84	12.96
Adequate staffing	79.67	13.94
Patient prioritization	77.99	13.88
Emergency responsiveness	80.67	13.77
Justice in providing urgent care	79.79	11.16
Fair treatment irrespective of background	76.55	14.07
Satisfaction with care equity	83.90	14.74
Transparency in service provision	81.45	14.95
Cultural competence	82.06	14.99
Consistency in care delivery	83.84	14.56
Behavioral aspect of patients	81.38	11.18
Trust in healthcare providers	79.89	13.29
Openness to discuss health concerns	77.99	13.47
Comfort with provided care	78.44	14.72
Overall satisfaction with interactions	79.72	13.49
Fears and anxieties	79.01	10.93
Overall PMS	79.04	10.51

Note: PMS: percentage mean score; SD: standard deviation.

TABLE 3. Comparison of emergency and non-life-threatening cases.

Items	Emergency cases	Non-life-threatening cases	p-value
Access to health care centers (PMS)	74.85	77.30	0.05
Availability within 30 minutes (PMS)	79.50	81.92	0.03
Adequate staffing (PMS)	78.50	80.60	0.04
Patient prioritization (PMS)	76.80	78.85	0.06
Emergency responsiveness (PMS)	79.30	81.80	0.04

PMS: percentage mean score.

3.5 Main results

The analysis of access to and perceptions of equity in urgent care within Riyadh’s primary healthcare centers revealed significant regional disparities. Participants in the Western region reported the highest levels of awareness and accessibility to healthcare services, suggesting that this region may have better healthcare infrastructure or more effectively disseminated information about available services. In contrast, the Eastern region displayed the lowest levels of access. Factors contributing to this include greater distances to healthcare facilities, fewer available services and potentially lower levels of public health communication. Notably, the Northern region exhibited the lowest perceptions of equity in urgent care delivery (Table 4). This might be attributed to an uneven distribution of resources or socio-economic disparities that affect how healthcare services are provided and perceived.

From Table 4, it can be seen that females had significantly higher scores in access to healthcare centers ($t = -2.52$, p -value < 0.05) than males. Additionally, people who visited

healthcare centers in the past year had significantly higher scores in access to healthcare centers, justice in providing emergency care, the behavioral aspect of the patient and fears and anxieties (p -value < 0.01) compared to those who did not. Participants who can read and write had significantly higher scores in access to healthcare centers and justice in providing emergency care (p -value < 0.01) than others. Those residing in the West of Riyadh had significantly higher scores in access to healthcare centers (p -value < 0.01), justice in providing emergency care (p -value < 0.01), and the behavioral aspect of the patient (p -value < 0.05) compared to residents of other regions.

4. Discussion

Our study highlights significant differences in access and equity to urgent care based on housing areas within Riyadh. Notably, 69% of the sample recognized PHCs as the initial contact point in the healthcare system, illustrating the critical role of PHCs in guiding healthcare-seeking behavior in urban

TABLE 4. Regional access and equity in urgent care within Riyadh's PHCs.

Variable	Access to health care centers (PMS ± SD)	Justice in providing emergency care (PMS ± SD)	The behavioral aspect of the patient (PMS ± SD)	Fears and anxieties (PMS ± SD)
Overall	76.19 ± 15.30	79.79 ± 11.16	81.38 ± 11.18	79.01 ± 10.93
Gender				
Male	73.31 ± 15.61	79.62 ± 10.00	82.32 ± 10.86	78.73 ± 10.44
Female	77.60 ± 14.99	79.88 ± 11.70	80.93 ± 11.33	79.15 ± 11.18
	$t = -2.52, p\text{-value} = 0.012$	$t = -0.205, p\text{-value} = 0.838$	$t = 1.106, p\text{-value} = 0.269$	$t = -0.342, p\text{-value} = 0.733$
Saudi citizenship				
Yes	76.06 ± 15.28	79.85 ± 10.95	81.44 ± 11.55	79.36 ± 11.17
No	76.90 ± 15.58	79.46 ± 12.31	81.07 ± 8.99	77.14 ± 9.43
	$t = -0.378, p\text{-value} = 0.705$	$t = -0.238, p\text{-value} = 0.812$	$t = -0.227, p\text{-value} = 0.821$	$t = -1.394, p\text{-value} = 0.164$
Visiting health care center last year				
Yes	79.93 ± 15.65	82.80 ± 10.56	83.48 ± 10.37	81.69 ± 11.10
No	71.59 ± 13.58	76.09 ± 10.78	78.80 ± 11.63	75.71 ± 9.79
	$t = 5.326, p\text{-value} = 0.705$	$t = 5.938, p\text{-value} = 0.812$	$t = 4.032, p\text{-value} = 0.821$	$t = 5.348, p\text{-value} = 0.164$
Age				
18–35	76.99 ± 15.17	79.96 ± 11.21	81.06 ± 11.26	79.03 ± 11.03
36–55	75.59 ± 15.47	79.78 ± 11.13	81.75 ± 10.97	79.24 ± 11.03
56 and more	76.97 ± 14.79	77.73 ± 11.69	78.78 ± 14.32	74.55 ± 12.13
	$F = 0.368, p\text{-value} = 0.693$	$F = 0.205, p\text{-value} = 0.815$	$F = 0.462, p\text{-value} = 0.630$	$F = 0.963, p\text{-value} = 0.383$
Education				
Read and Write	86.22 ± 12.34	86.67 ± 10.29	88.00 ± 8.71	85.00 ± 9.64
Basic Education	76.83 ± 13.56	80.66 ± 11.20	81.91 ± 12.46	79.75 ± 12.43
University	75.52 ± 15.65	79.24 ± 11.09	80.92 ± 10.92	78.53 ± 10.58
	$F = 3.594, p\text{-value} = 0.028$	$F = 3.422, p\text{-value} = 0.034$	$F = 2.971, p\text{-value} = 0.053$	$F = 2.688, p\text{-value} = 0.069$
Housing area				
East of Riyadh	72.23 ± 17.29	78.01 ± 11.51	79.96 ± 10.11	78.81 ± 11.01
North of Riyadh	73.86 ± 11.60	76.97 ± 8.80	79.21 ± 9.38	77.43 ± 9.57
West of Riyadh	80.23 ± 14.87	82.14 ± 12.00	83.22 ± 12.88	79.91 ± 12.25
South of Riyadh	76.88 ± 15.46	81.03 ± 10.73	82.35 ± 10.83	79.42 ± 9.97
	$F = 5.513, p\text{-value} = 0.001$	$F = 4.535, p\text{-value} = 0.004$	$F = 2.714, p\text{-value} = 0.045$	$F = 0.840, p\text{-value} = 0.473$

Note: PMS: percentage mean score; SD: standard deviation; t: student t-test; F: Fisher test.

settings. Furthermore, the facilitated access to emergency services reported by 68% of participants, including those insured or affiliated with governmental or military hospitals, underscores the importance of a well-integrated healthcare system that bridges primary care with more extensive hospital services. The highest levels of access were observed in the Western region of Riyadh, potentially due to a relative lack of secondary and tertiary healthcare facilities.

This regional variance in healthcare access and equity res-

onates with global health trends, where a person's residence significantly influences health outcomes [10–13]. Such outcomes are often dictated by community wealth, social ties, and proximity to healthcare facilities, as supported by literature suggesting that location can determine up to 60% of an individual's health status [14–19]. This study's findings align with those from a 2020 study in central Riyadh, where only a quarter of Al-Wazarat Primary Healthcare Center (PHCC) attendees were aware of urgent clinics, and just over half

had visited such clinics in the past three months [20]. This gap in awareness highlights the ongoing need for targeted interventions to improve public understanding and utilization of urgent care services in PHCs [21].

The impact of sanitary restrictions related to the COVID-19 pandemic on quality of life, as observed in Sri Lanka, underscores the importance of maintaining a balance between public health measures and quality of life. Kanchana and Youhasan found that social stigma associated with COVID-19 was a major barrier to expressing travel history, which could impede efforts to control the virus [22]. Additionally, the monotony of activities during lockdowns was a significant stressor for the population. These findings suggest that similar socio-cultural factors could influence healthcare access and utilization in Riyadh, especially during times of public health crises. Addressing these factors through community-based interventions and public health education could enhance the effectiveness of healthcare services in the region.

To address the disparities identified, improving the distribution and promotion of healthcare services, particularly in underserved areas like the East of Riyadh, is essential. Enhancing PHC capabilities to handle more complex cases can reduce the immediate need for secondary or tertiary care [23, 24]. Furthermore, community-based awareness programs could significantly improve engagement and utilization of PHC services, particularly in regions with lower health system interaction.

The variability in public access and perceptions of equity reveals how different areas within Riyadh face distinct challenges. This includes significant differences between emergency and non-life-threatening cases, highlighting the need for targeted healthcare strategies. These insights are critical for policymakers and healthcare administrators aiming to enhance healthcare accessibility and equity. Understanding these regional differences is essential for developing targeted, effective healthcare policies and interventions that consider the unique needs of each area. The findings underscore the necessity for region-specific healthcare strategies to address these disparities. By tailoring interventions to the specific challenges and needs of each region, Riyadh can significantly improve both the effectiveness and fairness of its healthcare services, moving towards a more personalized healthcare system that adapts to the diverse conditions of its urban and suburban areas.

The study also underscores the importance of integrating modern health technologies and data analytics into the healthcare system. Using data-driven approaches can enhance the precision of healthcare delivery, enabling health professionals to more effectively predict, prevent and treat health issues within different communities. Additionally, our findings suggest that incorporating big data and artificial intelligence in analyzing healthcare accessibility and equity can pave the way for more proactive and preventive healthcare strategies tailored to the specific needs of each community [25, 26].

Comparing these findings with similar studies conducted in other global contexts offers a unique perspective on how local conditions shape healthcare accessibility and equity. For example, studies in cities with comparable urban dynamics, such as those in Southeast Asia and Latin America, have also highlighted the critical impact of socio-economic disparities on healthcare access [27, 28]. However, Riyadh's unique socio-

economic landscape, characterized by rapid urbanization and a distinct socio-cultural milieu, may amplify certain challenges, particularly in regions underserved by public transit and modern healthcare infrastructure. This variance underscores the necessity of region-specific studies to truly understand and effectively address local healthcare disparities [29].

In the context of personalized medicine, the results have significant implications. Personalized medicine, often associated with genetic profiling and individual treatment plans, also encompasses the customization of healthcare systems to meet diverse patient needs. Our study illustrates how geographic, economic and social factors influence patient access to healthcare, suggesting that a "one-size-fits-all" approach is inadequate. Tailoring healthcare delivery to account for these varying factors is a cornerstone of personalized medicine, enhancing access and equity while aligning with the broader goals of precision medicine—delivering the right treatment to the right patient at the right time [30–33]. Future research should focus on integrating the principles of personalized medicine into public health strategies to ensure that healthcare systems are responsive to the unique contexts and needs of their diverse patient populations.

5. Limitations

While this study offers crucial insights into the accessibility and equity of urgent care in Riyadh's PHCs, several limitations must be acknowledged. The primary challenge was the logistical constraints of collecting data across the vast urban expanse of Riyadh. Coordinating with numerous healthcare centers and managing a large dataset within a constrained timeframe was particularly demanding. The study spanned three months, with the active phase compressed into two months, posing significant challenges in data collection and analysis.

Another limitation concerns the generalizability of our findings. Our sample consisted solely of visitors to PHCs, which may not fully represent the broader population of Riyadh, especially those who do not regularly use PHC services. Although we sought to enhance the generalizability of our results by enrolling a significant number of participants from each region of Riyadh, the findings still reflect the experiences of this specific cohort and may not capture the full spectrum of experiences across different demographic segments.

Additionally, the reliance on self-reported data introduces potential response bias, as participants' perceptions might not accurately reflect the actual conditions of healthcare accessibility and equity. Moreover, the study did not fully account for socio-economic factors or healthcare policy changes that could have influenced the results during or after the data collection period. These elements are crucial as they could significantly impact the interpretation of how healthcare services are accessed and perceived across different regions.

Finally, the comparative aspect of our study was limited, focusing primarily on urban settings within Riyadh. Future research could benefit from a more diverse demographic profile and the inclusion of both urban and rural settings to broaden the understanding of healthcare disparities and enhance the transferability of the findings to other contexts.

By addressing these limitations, future research can build on

our findings to provide a more comprehensive understanding of the factors influencing healthcare access and equity, paving the way for more targeted and effective healthcare interventions.

6. Conclusions

This study identified significant regional disparities in access to urgent care within Riyadh. Despite 69% of participants recognizing PHCs as their first point of contact, many still prefer general or military hospitals due to the perception of superior services. To bridge this gap, it is crucial to enhance the capabilities of PHCs and increase public awareness of the services they offer. Targeted policy interventions are necessary to improve healthcare infrastructure in underserved areas, particularly in the Eastern and Northern regions, to ensure equitable healthcare access across Riyadh. These findings underscore the importance of personalized healthcare strategies that address community-specific needs. By tackling these disparities, Riyadh can move towards a more equitable and effective healthcare system.

AVAILABILITY OF DATA AND MATERIALS

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

AUTHOR CONTRIBUTIONS

AMAW—provided the main framework, identified, and organized primary materials, and collaborated in writing the manuscript. AA, BA, RA, MMZ, MA, MAA and NAA—identified appropriate references and collaborated on the writing of the manuscript. KG—reviewed and contributed to drafting sections of the manuscript. All authors have read and agreed to the published version of the manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The Institutional review board (IRB) approval was obtained from the King Saud University Research and Ethics Committee (Ref No: KSU-HE-22-640). Participation was voluntary, with informed consent obtained from all respondents.

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CONFLICT OF INTEREST

The authors declare no conflict of interest. Ahmed M. Al-Wathinani and Krzysztof Goniewicz are serving as the Guest editors of this journal. We declare that Ahmed M. Al-Wathinani and Krzysztof Goniewicz had no involvement in the peer review of this article and has no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to PKL.

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