OPEN ACCESS
ORIGINAL ARTICLE

EXPLORING SOCIAL RESPONSIBILITY IN MEDICAL AND DENTAL EDUCATION: A MULTICENTER ANALYSIS OF FACULTY PERSPECTIVES

[1]MALIK ZAIN UL ABIDEEN, [2]GUL MUHAMMAD SHEIKH, [3]ASMA MALIK, [4]AZEEM KHAN, [5]QURAT UL AIN MEHFOOZ, [6]JIA FATIMA, [7]AMMAR AHMED SIDDIQUI

ABSTRACT

Objective: *Social responsibility (SR) is the ethical obligation of healthcare institutions and professionals to contribute to the well-being of communities by addressing health disparities, promoting equity, and responding to social determinants of health. This study explores the current practices, challenges, and opportunities for SR integration in medical and dental education in South Punjab, Pakistan.*

Methodology: *A qualitative exploratory design using a constructivist paradigm was adopted. In-depth semi-structured interviews were conducted with 23 Heads of Departments from four PMDC-recognized public and private sector institutions. Participants were selected through purposive sampling. Data were transcribed, validated through member checking, and analyzed using Braun and Clarke's six-step inductive thematic analysis.*

Results: *Four major themes emerged 1) Awareness and Understanding: Faculty exhibited limited conceptual clarity and training related to SR. 2) Institutional Practices: Participants reported inadequate policies, weak cultural competency training, and limited structured programs. 3) Challenges and Barriers: Identified issues included resource scarcity, minimal institutional support, and lack of engagement. 4) Recommendations: Suggestions included policy development, capacity building, community partnerships, and evaluation mechanisms.*

Conclusion: *Despite a growing recognition of SR, institutional gaps hinder its integration. Clear regulatory guidance, structured training, and resource allocation are essential to embed SR into the educational fabric and foster community-responsive healthcare professionals.*

Keywords: *Dental and medical Education, Faculty, Health Equity, Health Policy, Healthcare Disparities, Leadership, Resource Allocation, Social Responsibility, Social accountability*

This article may be cited as: Abideen MZU, Sheikh GM, Malik A, Khan A, Mehfooz QUA, Fatima J, Siddiqui AA. Exploring Social Responsibility in Medical and Dental Education: A Multicenter-Analysis of Faculty Perspectives. Pak Oral Dent J 2025; 45(1):18-25.

[1] **Correspondence:** Malik Zain Ul Abideen, Assistant Professor, Department of Dental Education & Research, College of Dentistry, Bakhtawar Amin Medical and Dental College, Multan. Email: Zainmalik39@gmail.com, Cell: +923027993101

2.Department of Dental Education and Research, Shahida Islam Medical and Dental College, Lodhran. Email: shaikhgul25@gmail.com, Cell: +923332663614

3.Department of Medical Education, Foundation University School of Health Sciences, FUI, Islamabad. Email: amalikr333@gmail.com, Cell: +923332663503

4.Department of Oral Medicine, Bakhtawar Amin Medical and Dental College, Multan. Email: dr.azeemkhan@hotmail.com, Cell: +923216340265

5.Department of Medical Education, Bakhtawar Amin Medical and Dental College, Multan. Email: annie.mehfooz@yahoo.com, Cell: +92321188332

6.Department of Periodontology, Bakhtawar Amin Medical and Dental College, Multan. Email: jiafatima26@gmail.com, Cell: +923027993101

7.Department of Preventive Dental Sciences, College of Dentistry, University of Hail, Hail, Saudi Arabia. Email: Ammarqta2002@hotmail.com, Cell: +966553226295

Received for Publication: Apr 23, 2025
Revised: Jul 03, 2025
Approved: Jul 06, 2025

INTRODUCTION

The notion of social responsibility is quite versatile; it reflects the ethical obligations of individuals, institutions, and communities to assume responsibility by participating and acting in line with the initiatives that are beneficial to the local communities and the world at large[1]. This principle has its foundation on the concept that individuals are always required to carry out activities that are in the interest of society. These practices include corporate sustainability, employment policies and regulations, stakeholder and community engagement, and environmental management. Thus, by prioritising social responsibility, organisations can avoid negative attitudes, develop trust, improve the reputation, and contribute to the improvement of society and the world[2].

Social responsibility (SR) in healthcare refers to the

ethical and institutional commitment of medical and dental institutions to respond to the health needs of the communities they serve. This includes reducing health disparities, addressing social determinants of health, and contributing to the promotion of health equity through outreach, policy, and education initiatives, going beyond the medical model of healthcare delivery. It encompasses providing policies, resources, and educational campaigns for the underserved communities to encourage health promotion and equity[3,4].

Social responsibility has recently evolved in the past decade. Initially, the objectives of institutions and healthcare facilities were orientated on giving individual-orientated care and curing their illness[5]. However, with the concept of health equity and social determinants of health, a holistic approach is now being widely adopted. This broader view is not limited merely to the provision of healthcare services but also includes concepts of environment protection, public health, and health research[6]. In the past, social responsibility was ignored in healthcare; however, now a days it is one of the core values as far as healthcare delivery is concerned. Such a shift is due to the growing focus on community health, disease prevention, and interdisciplinary coordination in handling major health-related issues[7].

Worldwide healthcare institutions are integrating social responsibility into their curricula. The majority of medical and dental schools in developed nations work with their communities on outreach programs, needs assessment, health promotion, and collaboration of the local community with healthcare facilities. They are accompanied by policies and frameworks facilitating healthcare providers to undertake such social responsibilities. These measures of integrating social responsibility are considered the foundation of equitable health services for all[8].

Although often used interchangeably, social responsibility, social accountability, and health equity are conceptually distinct[9]. Social responsibility refers to the broader ethical stance of institutions to contribute to societal well-being. Social accountability refers to aligning educational, research, and service activities with the priority needs of the community[9]. Health equity is the intended outcome of these efforts: the elimination of unjust differences in health status among population groups[9].

In Pakistan, the healthcare department faces many problems, like poor facilities, scarce resources and infrastructure, and the escalating health inequalities in the south Punjab region[10]. Although the concept of social responsibility is gradually becoming prominent in the field of healthcare, even then there is a lack of comprehensive research on how social responsibility is perceived and practiced among healthcare institutions in South Punjab, Pakistan. There are activities like the community health programs and the free medical and dental camps for marginalised populations, but such measures are very limited[11]. Recently, medical and dental institutions in Pakistan have started to recognise the importance of social responsibility in their curricula and training programs. However, an organised effort is required to integrate the social responsibility component into the healthcare curriculum[12].

This study aims to explore the role of social responsibility in medical and dental institutions in south Punjab to help identify the barriers and opportunities for integrating it into medical and dental education. The findings can provide evidence-based recommendations for curriculum development and policy-making, aimed at enhancing the role of social responsibility in healthcare education.

The objectives of the study are:

To assess faculty awareness and understanding of social responsibility;

To explore institutional practices related to SR;

To identify perceived barriers and enabling factors.

METHODOLOGY

This study employed a qualitative exploratory design grounded in a constructivist epistemology, which recognizes the socially constructed nature of reality and prioritizes understanding participants' subjective perceptions and experiences of social responsibility in medical and dental institutions. The focus was on faculty members in leadership positions (Heads of Departments, HoDs), selected through purposive sampling from four public and private tertiary care institutions in South Punjab, Pakistan from July to October, 2024. Participants were stratified by gender, age, teaching experience, and institution type to capture diverse perspectives.

Data were collected through semi-structured interviews, chosen for their flexibility in exploring complex, context-dependent experiences. The interview guide was developed via an extensive literature review, validated by three qualitative research experts, and pilot-tested with two HoDs (excluded from the main study) to enhance clarity, flow, significance and contextual relevance.

The inclusion criteria comprised of:

- Medical and dental faculty members (head of departments both from basic and clinical side).
- Having valid Pakistan Medical and Dental Council (PMDC) registration and working in the position for at least 2 years.

- Willing to participate and be audio recorded

Exclusion criteria comprised of:

- Faculty members who were not affiliated with any PMDC-recognised institution in south Punjab.
- Institutions not recognized by PMDC or outside South Punjab
- Declined consent or audio recording
- Faculty members that are in the leadership role for less than 2 years.

Potential participants were contacted either through email or WhatsApp and were invited to take part in the study. A total of 60 potential participants contacted via email or WhatsApp, 32 agreed to participate, with 23 completed interviews.

Demographic data were collected through a secure online form during scheduling. Interviews were conducted in person by the principal investigator (PI) in private settings, lasting 30–45 minutes, and audio-recorded with participant consent. To ensure accuracy, transcripts generated via Otter.ai were cross-checked by the PI and a research assistant, and member checking was performed by sharing transcripts with participants via email/WhatsApp; all participants confirmed content accuracy. Two repeat interviews were conducted due to technical recording errors.

Data analysis followed Braun and Clarke's inductive thematic analysis framework, involving iterative familiarization with transcripts, manual coding, theme development, and refinement[13]. Two researchers independently coded transcripts achieving 85% inter-coder agreement, with discrepancies resolved through discussion. Emerging themes were reviewed regularly with the research team to minimize interpretive bias. Quotations were selected to illustrate and support themes and subthemes. The analysis aimed to describe patterns and identify broader applications of the data (Figure 1).

Ethical approval was obtained from Bakhtawar Amin Medical and Dental College (ERB: 1304-24/E.C/BAM&DC), with participants receiving detailed information about their rights, anonymization procedures, and data security. Identifiable data were replaced with codes and recordings were stored on password-protected devices. Trustworthiness was ensured through member checking, researcher triangulation, and adherence to the COREQ checklist[14].

RESULTS

The study comprised 23 faculty members in leadership roles (Heads of Departments) from medical and dental institutions across South Punjab, Pakistan. The sample reflected a balanced gender representation, with 12 male (52.2%) and 11 female (47.8%) participants. Age distribution highlighted a predominance of mid-career professionals: seven participants (30.4%) were aged 25–34 years, nine (39.1%) were 35–44 years, and seven (30.4%) were 45–54 years. Academic positions were distributed across seniority levels, including nine professors (39.1%), eight associate professors (34.8%), and six assistant professors (26.1%). Teaching experience varied, with four participants (17.4%) having (2–5 years), seven (30.4%) had (6–10 years), eight (34.8%) having (11–15 years), and four (17.4%) with over 15 years of experience. The sample included faculty from both public (13 participants, 56.5%) and private (10 participants, 43.5%) institutions, ensuring representation across institutional governance models (Table 1).

The study identified 4 major themes and 15 subthemes through the qualitative analysis of interviews with faculty members regarding social responsibility in medical and dental education. The first theme related to faculty members' awareness and understanding of social responsibility. Participants reported a limited understanding and awareness of social responsibility, with significant gaps in their educational training and a lack of clarity regarding its practical application, largely due to ambiguous regulatory policies (Figure 2).

The second theme was current institutional practices related to social accountability. Faculty members highlighted administrative barriers, particularly in public institutions with more resources that hinder the integration of social responsibility into curricula. While some programs like community health outreach exist, there was a noted deficiency in cultural competency training and other core areas. Additionally, participants pointed out the absence of defined policies or standards by the Pakistan Medical and Dental Council for implementing social responsibility.

The third theme was challenges and barriers to social responsibility in healthcare institutions. The insufficient allocation of resources, a lack of faculty training, minimal institutional support, and general limited opportunities of structured programs all hinder the proper execution of social responsibility initiatives.

Finally, the theme regarding recommendation for improvement included subthemes as follows: policy development, training and development, resource allocation, engagement of the community, and evaluation and feedback. Respondents suggested that the regulators, such as PMDC and HEC, should set up policies and standards, and the government should create awareness and educational programs regarding awareness and training of faculty regarding social responsibility. Moreover, institutions should allocate

funds, human resources, and infrastructure to implement social responsibility activities in medicine and dentistry (Table 2)

DISCUSSION

The main aim of the study was to explore social responsibility in medical and dental institutes in South

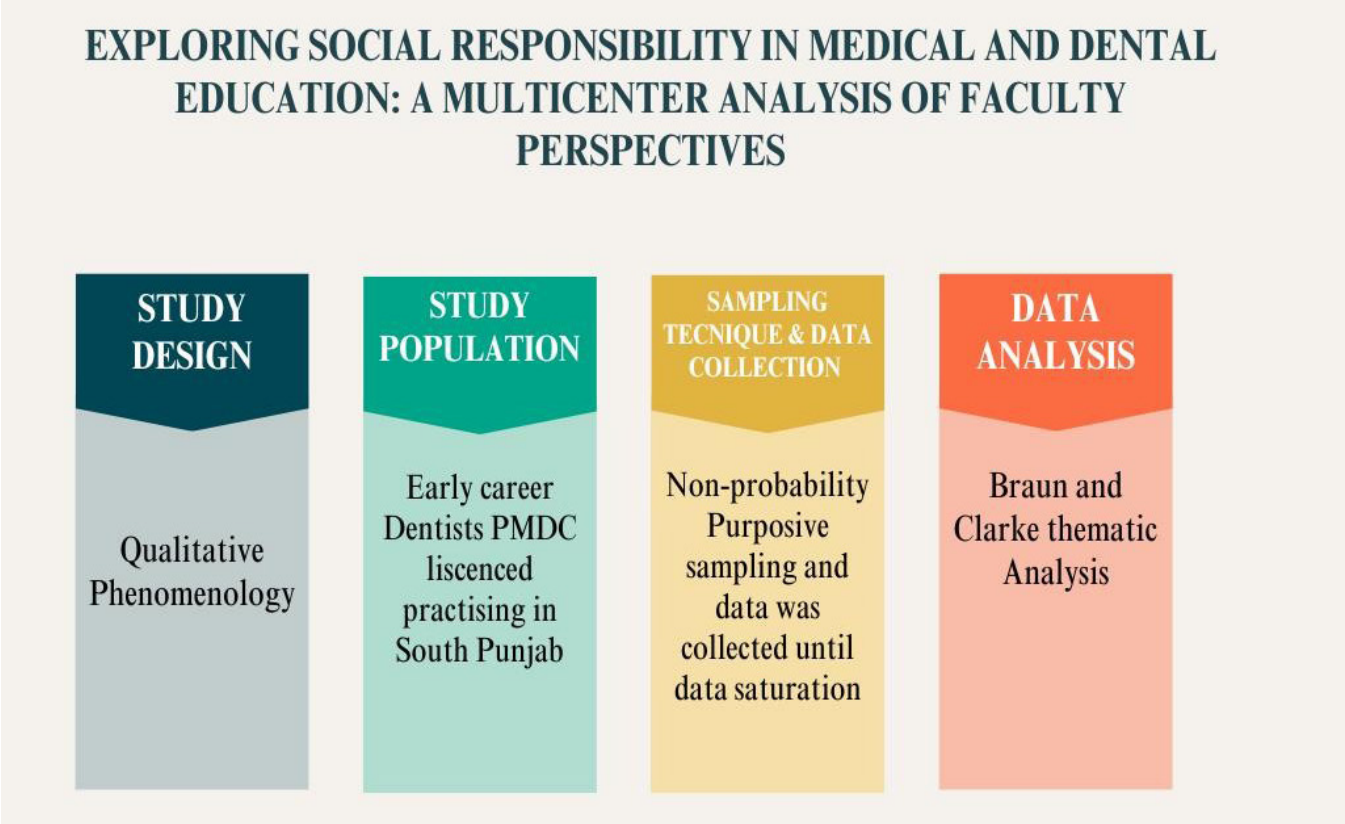

Fig 1: Methodology flowchart Media element by Equipo de Pronoia Studio via canva.com

TABLE 1: DEMOGRAPHIC CHARACTERISTICS OF THE PARTICIPANTS.

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	12	52.2
Female	11	47.8
Age Range (Years)		
25-34	7	30.4
35-44	9	39.1
45-54	7	30.4
Academic Position		
Professor	9	39.1
Associate Professor	8	34.8
Assistant Professor	6	26.1
Teaching Experience (Years)		
2-5 years	4	17.4
6-10 years	7	30.4
11-15 years	8	34.8
>15 years	4	17.4
Institution Type		
Public	13	56.5
Private	10	43.5

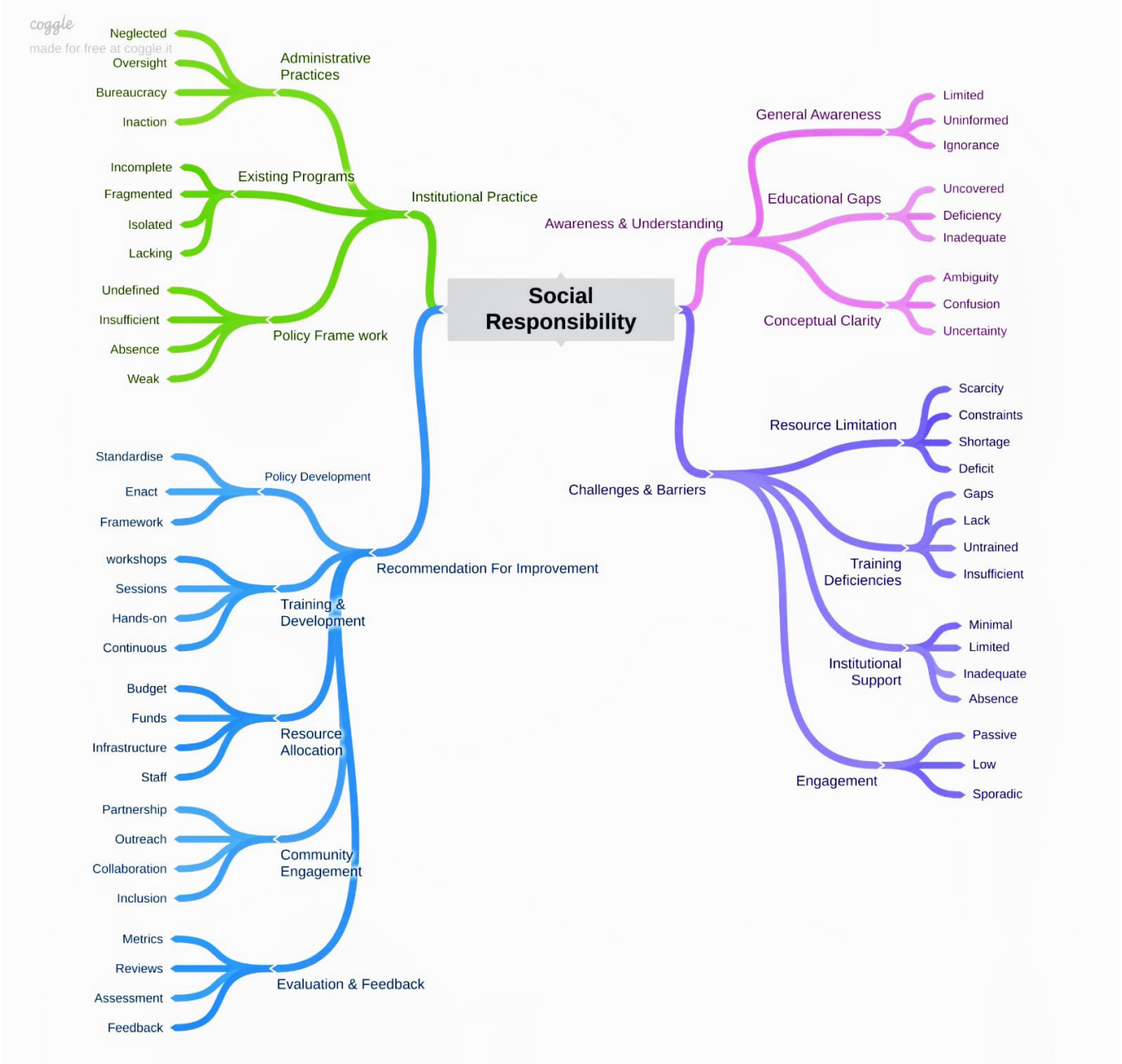

Fig 2: Qualitative results Media element by [coggle.it]

TABLE 2: FACULTY PERSPECTIVES ON SOCIAL RESPONSIBILITY IN MEDICAL AND DENTAL INSTITUTIONS

Themes	Subthemes	Representative Quotations
Awareness and Understanding	General Awareness	"There is limited understanding and awareness among healthcare faculty members." (M32PR11)
	Educational Gaps	"Our training did not cover social responsibility in depth, leaving us unsure about its application." (F37GR14)
	Conceptual Clarity	" Due to unclear regulatory policies, most healthcare professionals lack clarity regarding its practical implementation and integration into the curriculum. (M41GR20)

Institutional Practices	Administrative practices	" Administrative barriers ignore this area, despite the fact that public institutions have more resources than the private sector. (M47PR8)
	Existing Programs	" We offer community health and outreach programs, but we lack cultural competency training and other core issues related to social responsibility." (F37PR19)
	Policy Frameworks	" The Pakistan Medical and Dental Council (PMDC) has not defined policies or standards for implementing social responsibility." (F32GR11)
Challenges and Barriers	Resource Limitations	"We lack the necessary resources to effectively implement social responsibility programs." (M51GR17)
	Training Deficiencies	"There is a noticeable gap in training related to social responsibility." (F37PR13)
	Institutional Support	"In public institutions, initiatives are delayed by procedural hurdles, while in private setups, they complain about lack of long-term planning that weakens sustainability" (F41GR13)
	Engagement	" Faculty and students are involved in a few voluntary programs; however, there are no structured engagement opportunities. " (F42PR20)
Recommendations for Improvement	Policy Development	" Developing clear policies and guidelines by regulators on social responsibility would facilitate effective implementation by the institutions." (M33PR16)
	Training and Development	"Targeted training programs are needed to improve understanding and implementation." (F42PR15)
	Resource allocation	"Financial, infrastructure and human resource allocation is required to effectively implement social responsibility." (M49GR18)
	Community Engagement	"Enhancing community engagement and partnerships can address social determinants of health." (F31PR22)
	Evaluation and Feedback	"Implementing evaluation mechanisms for social responsibility initiatives measures would be beneficial." (M43GR23)

M: Male
F: Female
G: Government
P: Private
R: Respondent

Punjab, Pakistan. The research provided insights into social responsibility perceptions, practices, challenges, and areas for improvement.

The study revealed quite low levels of awareness and understanding regarding social responsibility in healthcare among faculty members. Despite recognising the importance of social responsibility in the healthcare sector, the participants were unclear on how it can be practically implemented in healthcare academics. The findings concur with another study of health professionals conducted in Jordan in 2017 that showed that the majority of health care professionals were unaware even about the concept of social responsibility in healthcare[15]. These findings necessitate the faculty's training and education programs.

A notable distinction was observed between public and private institutions. Faculty from public colleges commonly cited administrative rigidity, policy inertia, and resource mismanagement as key barriers. In contrast, faculty from private institutions highlighted lack of long-term planning and weaker institutional commitment to sustained community partnerships. These differences underscore the need for context-specific strategies in SR implementation. These challenges can be met with public-private partnership models based on community needs[16].

The study highlighted that administrative barriers hinder social responsibility initiatives. Moreover, despite the existence of community outreach programs, they fail to address the core components of social responsibility. The study's findings coincide with a 2018 study that found administrative obstacles hinder the implementation of social responsibility among marginalised groups[17]. Respondents also identified the absence

of policies or guidelines from regulators (PMDC) as a contributing factor to the lack of awareness about social responsibility in healthcare institutions. The findings are consistent with a 2023 study that emphasised the crucial role of regulators in enforcing standards and enhancing the quality of medical and dental education[18].

The current study revealed barriers and challenges, such as resource constraints, inadequate training, and a lack of institutional support. These issues have also been highlighted in the literature that emphasises the undertaking of social responsibility programs needs resources and adequate commitment from institutions[19]. Thus, the study underlines the requirement to initiate more specific developments, such as considerable allocation of resources and training programs, as well as leadership's commitment to social responsibility initiatives.

Gender-based variation also emerged: female faculty more frequently emphasized community engagement, outreach, and provision of equitable resources to underserved, whereas male faculty placed greater focus on frameworks, regulation and structural governance.

The study also highlighted areas for the incorporation of social responsibility among healthcare institutions. The participants believed that defining and providing clear policies and initiating structured training programs can foster social responsibility. The findings are supported by the literature that states clear policies and targeted training programs facilitate integration of social responsibility in healthcare[20]. Moreover, engagement and partnering with communities and other stakeholders can facilitate social determinants of health and improve the impact of initiatives related to social responsibility.

The role of evaluation and feedback on social responsibility measures was also highlighted by the study. Literature suggests that continuous feedback from stakeholders and evaluation of initiatives and programs can significantly improve the long-term outcomes and impact on consumers[21]. This study adds novel insights by examining how under-resourced, underserved settings present unique leadership tensions. This can help in addressing issues related to unequal distribution of resources and can promote health equity in developing areas like south Punjab.

The study explored social responsibility practices and perspectives in a unique sociocultural region with limited resources. The valuable finding provided insights from the context of diverse culturally underdeveloped areas. The unique nature of this study identified barriers and challenges in the under researched geographical area that may be the cornerstone for the development of the framework or policies for the implementation of SR in the region. Future improvements can be planned based on the potential strategies suggested by the study for effective implementation of SR in resource-constrained settings.

LIMITATIONS

The limitations of the study included that the sample may be reasonable for qualitative studies, but it may not represent all types of medical and dental institutions in South Punjab. This limitation hinders the generalisability of the results. Furthermore, focussing solely on faculty members in leadership positions may overlook the perspectives of other stakeholders (students, community) regarding social responsibility and limits triangulation. Given participants' leadership roles, social desirability bias may have influenced responses. Furthermore, the study was conducted in a specific region of interest; hence, its findings may not be applicable to other regions with different inclinations towards healthcare systems.

Future studies can include more diverse samples with the involvement of different stakeholder groups, utilising a mixed-methods design. Moreover, different regions can be included in future studies. Furthermore, longitudinal studies can also be conducted to observe the long-term impact of social responsibility.

CONCLUSION

The study highlighted the practices and awareness of social responsibility in healthcare institutions. The research revealed that healthcare professionals have a low level of understanding and awareness of social responsibility and its implementation in healthcare. Additionally, administrative complexities in the public sector make its implementation even more challenging. There are community health and outreach programs in place designated and implemented by institutions; however, healthcare organisations restrict social responsibility due to the absence of guidelines or a clear social responsibility policy by the regulator, like Pakistan Medical & Dental Council (PMDC). The study also revealed key challenges and constraints to the implementation of the social responsibility practices, which are inadequate financial and human resources, a lack of training programs, and institutional support. To address these challenges, PMDC must institutionalize SR through accreditation standards, while institutions should embed SR into strategic priorities via staff training, community partnerships, and equitable resource allocation. Policymakers could incentivize SR through equity-focused funding models. By transitioning from tokenistic efforts to systemic commitment, institutions can address healthcare disparities and foster accountability. This study provides a roadmap for culturally responsive SR practices, advancing equitable healthcare

delivery in underserved regions like South Punjab.

REFERENCES

1 Gogoladze N, Omanadze N: The social responsibility in a cross-cultural context. Econ. 2022, 105:140-48. 10.36962/ecs105/3/2022-140

2 Mutavdžija M, Globo□nik Žunac A, □anadi V, et al.: Quality through the prism of social responsibility. Qual. 2020, 21:163-72. 10.30657/hdmk.2020.11

3 Haddiya I, Janfi T, Guedira M, et al.: Application of the concepts of social responsibility, sustainability, and ethics to healthcare organizations. Risk Manag Healthc Policy. 2020, 13:1029-33. 10.2147/rmhp.s258984

4 Piryani RM, Piryani S: Social obligation of medical colleges and teaching medical students social responsibility to health. J Liaquat Univ Med Health Sci. 2023, 22:87-8. 10.22442/jlumhs.2023.01037

5 Roca, Alfonso TM, García Barbero M: La responsabilidad social de las facultades de Medicina. Una exigencia inaplazable para adaptarse a las necesidades de la población. Educ Med. 2021, 22:99-105. 10.1016/j.edumed.2020.10.003

6 Hall, Richard L, Jacobson PD: Examining Whether The Health-In-All-Policies Approach Promotes Health Equity. Health Aff. 2018, 37:364-70. 10.1377/hlthaff.2017.1292

7 Lucyk, Kelsey, McLaren L: Taking stock of the social determinants of health: A scoping review. PLoS ONE. 2017, 12:177306. 10.1371/journal.pone.0177306

8 Strange, Joshua, Shakoor A, et al.: Understanding inclusion health: a student-led curriculum innovation. Med Educ. 2018, 52:1195-6. 10.1111/medu.13713

9 Dandekar, S.; Rege, N.: Navigating the Global Landscape of Social Obligation in Medical Education: An Independent Comprehensive Exploration. Acta Med Iran. 2024, 62(2):[page-range]. 10.18502/acta.v62i2.17033

10 Khan, Salman J, Muhammad Asif, et al.: Pakistan's healthcare system: A review of major challenges and the first comprehensive universal health coverage initiative. Cureus. 2023, 10.7759/cureus.44641

11 Abideen MZU, Bushara NAA, Baig MN, et al.: Shining a Spotlight on Stigma: Exploring Its Impact on Oral Health-Seeking Behaviours Through the Lenses of Patients and Caregivers. Cureus. 2024, 16:1-15. 10.7759/cureus.63025.

12 Ali I, Ali M: University Students' Perceptions of Social Responsibility Initiatives by Universities in Pakistan. J Sustain Dev. 2016, 9:130. 10.5539/jsd.v9n5p130

13 Roseveare, Christine: Thematic Analysis: A Practical Guide, by Virginia Braun and Victoria Clarke. Can J Program Eval. 2023, 38:143-145. 10.3138/cjpe.76737

14 Booth, Andrew, Hannes k, et al.: "COREQ (Consolidated Criteria for Reporting Qualitative Studies)." . A Companion to Systematic Reviews in Education. J Educ Syst Rev. 2014, 87:214-226. 10.1002/9781118715598.ch21

15 Social Responsibility. https://coggle.it/diagram/ZrjB-XmAjga6sixe/t/social-responsibility/132d630999bda16ec254f97ccf348c8e38d32382c89c834c35...

16 Farakish, N.; Jaggars, S.; Fay, M.: Public Private Partnership: How and Why Six Community Colleges Loved and Left a For Profit Partner. Innov High Educ. 2020, 45:237–252. 10.1007/s10755-020-09500-2

17 Hammour K, El□Dahiyat F, Abu Farha R: Health care professionals' knowledge and perception of pharmacovigilance in a tertiary care teaching hospital in Amman, Jordan. J Eval Clin Pract. 2017, 23:608-613. 10.1111/jep.12683

18 Khan M, Ajmal M, Hussain M, et al.: Barriers to social sustainability in the health-care industry in the UAE. Int J Organ Anal. 2018, 26:450-469. 10.1108/ijoa-05-2017-1164

19 Seitkazina K, Burzakhanov M, Yumashev A, et al.: Ensuring the quality of healthcare services in medicine and dentistry: the role of medical education, regulatory requirements, and effective practices. J Complement Med Res. 2023, 14:229. 10.5455/jcmr.2023.14.03.37

20 Yeboah D, Tieder A, Durkin A: Health care anchors' responsibilities and approaches to achieving child health equity. Pediatr Clin North Am. 2023, 70:761-774. 10.1016/j.pcl.2023.04.002

21 Smithson R, Wicker C: Understanding complex interventions: Evaluating the impact of integrated care. Int J Integr Care. 2021, 20:1. 10.5334/ijic.s4001

22 Weiss D, Lillefjell M, Magnus E: Facilitators for the development and implementation of health-promoting policy and programs - a scoping review at the local community level. BMC Public Health. 2016, 16:1-15. 10.1186/s12889-016-2811-9

CONTRIBUTIONS BY AUTHORS

1 Malik Zain Ul Abideen:	Substantial contribution to conception/design. Data collection
2 Gul Muhammad Sheikh:	Contribution to the design & Data collection
3 Asma Malik:	Data analysis & Critical review
4 Azeem Khan:	Contribution to the design & Manuscript draft
5 Qurat ul Ain Mehfooz:	Data analysis & Critical review
6 Jia Fatima:	Manuscript draft & Data analysis
7 Ammar Ahmed Siddiqui:	Contribution to the design & Critical review Supervision