

A CROSS-SECTIONAL SURVEY ON THE PROFESSIONAL SCOPE OF SONOGRAPHERS IN PAKISTAN

Syed Muhammad Yousaf Farooq¹, Syed Amir Gilani², Yasmeen Niazi³, Muhammad Uzair¹, Zainab Haider¹, Muhammad Irshad-Ul-Haq³, Sohaib Khurram¹

1. Department of Radiography and Imaging Technology, Green International University, Lahore, Pakistan.
2. Department of Medical Diagnostic Imaging, College of Health Sciences, University of Sharjah, United Arab Emirates.
3. Office of Research Innovation and Commercialization, Green International University, Lahore, Pakistan.

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Corresponding author:

Syed Muhammad Yousaf Farooq
Head, Department of Radiography
and Imaging Technology, Green
International University, Lahore,
Pakistan

Email: yousafgelani@gmail.com

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ABSTRACT

Background: Sonographers play a critical role in diagnostic imaging, however, their scope of practice in Pakistan remains underexplored.

Objective: This study aimed to determine the scope of practice of sonographers in Pakistan and to evaluate whether their responsibilities correspond to globally recognized standards of sonography.

Methodology: A cross-sectional survey was done in this survey questionnaires were distributed among the practicing sonographers within the public and the private healthcare facilities in Pakistan. The duration of study was 6 months (June 3, 2025 till Dec 3, 2025). The participants had at least 1 years of clinical experience. The survey questions asked about the demographics, education, training background, certification status, specialties being practiced, job title, institutional policies, and indicators of scope of practice.

Results: A total of 206 responses were analyzed. The majority of participants were female (63.1%) and under the age of 35 (89.3%), indicating a young and predominantly female workforce. Most held either a Master's (44.7%) or Bachelor's degree (40.8%), and 66% identified as staff sonographers. The most frequently practiced specialties were abdominal (86.4%), obstetric (62.1%), and gynecologic (61.2%) sonography. Female sonographers were primarily engaged in women's health imaging, while male sonographers more often reported involvement in vascular (42.1%), musculoskeletal (36.8%), and procedural domains. Notably, 76.7% of respondents lacked formal credentials. Participants also reported performing a wide range of additional tasks, such as patient education, training students, and assisting with administrative duties. Common workplace challenges included inadequate pay, overbooked schedules, and limited time per patient. **Conclusion:** The findings highlight significant disparities in training, credentialing, and role distribution among sonographers in Pakistan. While sonographers contribute extensively to clinical care, many undertake responsibilities that extend beyond their official job descriptions, often without formal recognition or standardized training.

INTRODUCTION

Diagnostic medical sonography is a specialized discipline of the medical imaging specialty, which employs high-frequency sound waves in order to observe internal organs, tissues, and vascular structures with the aim of providing diagnosis and treatment ¹. A diagnostic medical sonographer is a medical worker with specific

education and training that provides critical fundamental clinical data to be used by the attending physicians in the diagnosis and the treatment of different conditions ².

There has been rapid expansion in the role of sonographers in Pakistan, as diagnostic imaging became an inseparable part of the health care in both the public and the private healthcare facilities. No nationally standardized systems of licensure or credentialing of sonographers exist, and educational routes to practice can be very different ³. This variation has resulted in creating the inconsistencies in practice standards, levels of patient care, and professional identity across the institutions and regions ⁴.

In comparison to most advanced countries where there are clear scopes of practice to follow or to take in order to achieve certification in the field such as the American Registry of Diagnostic Medical Sonography (ARDMS) or the Society of Diagnostic Medical Sonography (SDMS), there is a lack of a central regulatory body to monitor and control sonography as a profession in Pakistan ⁵. Therefore, many sonographers practice without having any proper certification or license, and they rely on the physician's directions or the institutional policy for guidance. This lack of standardization in the practice has evoked issues of diagnostic accuracy, patient safety, as well as the quality of sonographic services ⁶. Lack of continuing education and formal scope-of-practice statements create additional hindrances to the professional growth as well as the practice units in which sonographers work ⁷.

Sonographers need to make real time imaging decisions, apply independent judgment and work as a member of multidisciplinary teams as well in the complex clinical settings ⁸. However, due to the lack of formalized scopes and standards, these activities are not always acknowledged, resulting in the unrecognized responsibilities and underutilization of individual skills along with the professional burnout ⁹.

Given these issues, it becomes critical to investigate the current scope of practice of the sonographers in Pakistan. The current study aims to investigate the qualifications, roles, responsibilities, challenges, scope, and the professional practices of the sonographers practicing in Pakistan. It is crucial to better understand the professional landscape in order to improve diagnostic services, patient safety, and elevate the professional status of the nationwide sonographers.

MATERIALS and METHODS

Study Design: The study was done as a prospective observational cohort design.

Study Design: Cross-sectional survey

Setting and Duration: The study was done at the Department of Radiology and Imaging Technology at Green International University (GIU) in Lahore, Pakistan.

Sampling Technique: Non-probability consecutive sampling.

Sample Size: 200 participants from both public and private diagnostic centers and hospitals.

Selection Criteria

Inclusion Criteria: The study involved only those sonographers who are professionally registered or in practice with a minimum of one year of clinical practice experience.

Exclusion Criteria: Students and interns were not included in the research.

Data Collection Procedure: A structured questionnaire was used to collect data based on sonographers' roles, responsibilities, qualifications, work settings and challenges faced during the clinical practice. The Research and Ethical Committee of The Green International University reviewed and approved the study protocol. Before data collection the respondents signed a written informed consent and were assured about the confidentiality of their information.

Data Analysis Plan: The data were analyzed with the help of SPSS version 26. The demographic and professional characteristics of the participants were analyzed using the descriptive statistics. Descriptive statistics such as means and standard deviations were calculated for continuous variables. Qualitative data were expressed in the forms of frequencies and percentages. The p -value ≤ 0.05 was considered statistically significant.

RESULTS

A total of 206 responses were included in the final analysis. The majority of respondents were female (63.1%), and most participants were within the 18–24 (45.6%) and 25–34 (43.7%) year age groups, highlighting a relatively young workforce. Regarding educational attainment, 44.7% held a Master's degree, followed by 40.8% with a Bachelor's degree. Only 3.9% held an Associate's degree, while 10.7% reported having a Doctoral degree. In terms of professional roles, 66% of participants identified as staff sonographers, while smaller groups included senior sonographers (13.6%), clinical instructors (8.7%), supervisors or managers (6.8%), and lead sonographers (4.9%). When considering experience, the majority had less than two years (64.1%), while 20.4% had between 2–5 years of experience, indicating a largely early-career group. Participants reported practicing in a range of healthcare settings, including small community hospitals (25.2%), academic medical centers (24.3%), private physician offices (20.4%), and large urban hospitals (18.4%). Regarding specialties and certifications, most participants reported working in abdominal sonography (86.4%), followed by obstetric (62.1%) and gynecologic

(61.2%) specialties. Less commonly reported specialties included vascular (25.2%), musculoskeletal (20.4%), superficial structures (17.5%), and ultrasound-guided procedures (13.6%). Despite the range of specialties, 76.7% of participants reported having no formal credentials, while others held RDMS (11.7%), RVT (6.8%), and RT-S (5.8%) among others. In terms of preliminary impressions of sonographic findings, 44.7% reported providing written impressions, while others reported verbal (15.5%), digital/PACS only (11.7%), or combined formats (9.7%). When asked about daily patient volume, 36.9% reported performing 1–5 cases per day, 22.3% performed 6–10 cases, 18.4% performed 11–15 cases, and another 22.3% reported seeing 16 or more patients daily. In terms of time adequacy, 43.7% stated they always had enough time to examine all patients, while 35% indicated they often did. Workplace challenges included inadequate pay (35%), overbooked schedules (20.4%), communication issues (12.6%), and physical strain or lack of recognition (each 8.7%). Regarding job satisfaction, 40.8% of participants stated that their job was below expectations, 33% said it met expectations, 13.6% reported it exceeded expectations, and 12.6% felt it was far below expectations. The most common reason for choosing a career in sonography was an interest in medical imaging (71.8%), followed by helping patients (13.6%).

Finally, participants reported performing a variety of additional tasks. The most frequently reported included educating patients (55.3%), training sonography students (47.6%), providing report results to physicians (38.8%), scheduling patients (28.2%), and performing quality assurance (25.2%). These findings highlight the diverse responsibilities handled by sonographers in their clinical roles (Table 1). To assess gender-based involvement in various sonography specialties, the clinical practice areas were compared by gender. As shown in Table 2, abdominal sonography was the most commonly reported specialty across both male (89.5%) and female (84.6%) participants. A significant gender disparity was observed in obstetric and gynecologic sonography, with female practitioners reporting high involvement (98.4% and 96.9% respectively), compared to male practitioners (40.8% and 39.5%).

In contrast, male participants reported greater involvement in technically complex areas such as adult echocardiography (13.2%), vascular sonography (42.1%), and musculoskeletal sonography (36.8%), compared to their female counterparts. Furthermore, the most commonly practiced sonographic specialties among participants were analyzed, findings revealed that commonly practiced specialties included abdominal ($n = 178$), obstetric ($n = 128$), and gynecologic ($n = 126$) imaging, indicating a strong clinical demand in these areas. The most commonly reported workplace challenges included low pay ($n = 48$), overbooked schedules ($n = 39$), and uncooperative or unprepared patients ($n = 28$).

Table 1: Demographic Characteristics of the Study Sample ($n = 206$)

| Variable | Categories | f (%) |
|----------|------------|-----------|
| Gender | Male | 76 (36.9) |

| | | |
|--------------------------|-----------------------------|--------------|
| | Female | 130 (63.1) |
| Age | 18–34 Years | 184 (89.3) |
| | ≥35 Years | 22 (10.7) |
| Marital Status | Single | 152 (73.8) |
| | Married/Other | 54 (26.2) |
| Qualification | Bachelor's/Master's | 176 (85.5) |
| | Others | 30 (14.6) |
| Professional Role | Staff Sonographer | 136 (66) |
| | Others | 70 (34) |
| Experience | ≤5 years | 174 (84.5) |
| | >5 years | 32 (15.5) |
| Practice Setting | Hospitals | 140 (68) |
| | Others | 66 (32) |
| Major Specialties | Abdominal | 178 (86.4) |
| | Obstetric/Gynecologic | 254 (123.3)* |
| Credentials | None | 158 (76.7) |
| | Any certification | 48 (23.3) |
| Workload | ≤10 cases/day | 122 (59.2) |
| | >10 cases/day | 84 (40.8) |
| Time Adequacy | Always/Often | 162 (78.7) |
| | Others | 44 (21.3) |
| Job Satisfaction | Meets/Exceeds | 96 (46.6) |
| | Below | 110 (53.4) |
| Key Challenge | Inadequate pay | 72 (35) |
| Career Choice | Interest in medical imaging | 148 (71.8) |

Table 2: Clinical Specialties That Sonographers Reported Practicing, Based on Their Gender (n = 206)

| Clinical Specialty | Total responses | Male (n = 76) | Female (n = 130) |
|----------------------------|-----------------|---------------|------------------|
| Abdominal sonography | 178 | 68 (89.5%) | 110 (84.6%) |
| Obstetric sonography | 128 | 18 (23.7%) | 110 (84.6%) |
| Gynecologic sonography | 126 | 16 (21.1%) | 110 (84.6%) |
| Adult echocardiography | 12 | 10 (13.2%) | 2 (1.5%) |
| Pediatric echocardiography | 10 | 8 (10.5%) | 2 (1.5%) |
| Vascular sonography | 52 | 32 (42.1%) | 20 (15.4%) |
| Musculoskeletal sonography | 42 | 28 (36.8%) | 14 (10.8%) |

| | | | |
|-----------------------------------|----|------------|------------|
| Intraoperative sonography | 12 | 8 (10.5%) | 4 (3.1%) |
| Superficial structures sonography | 36 | 14 (18.4%) | 22 (16.9%) |
| Neuro-Sonography | 10 | 6 (7.9%) | 4 (3.1%) |
| Pediatric sonography | 20 | 6 (7.9%) | 14 (10.8%) |
| Ultrasound-guided procedures | 28 | 18 (23.7%) | 10 (7.7%) |

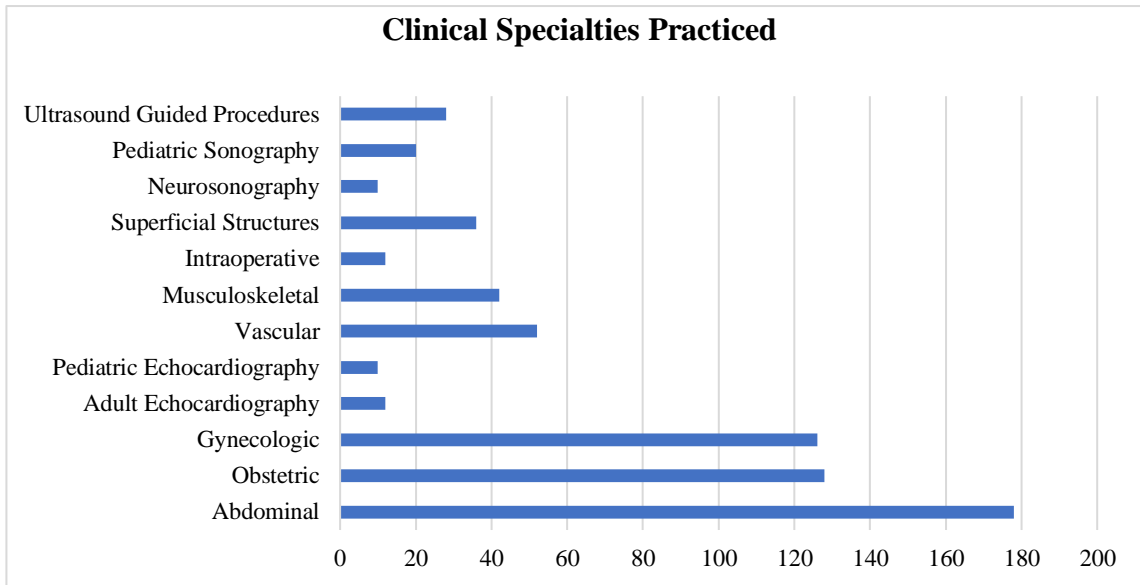


Figure 1: Distribution of Clinical Specialties Practiced by Sonographers in Pakistan (*N* = 206).

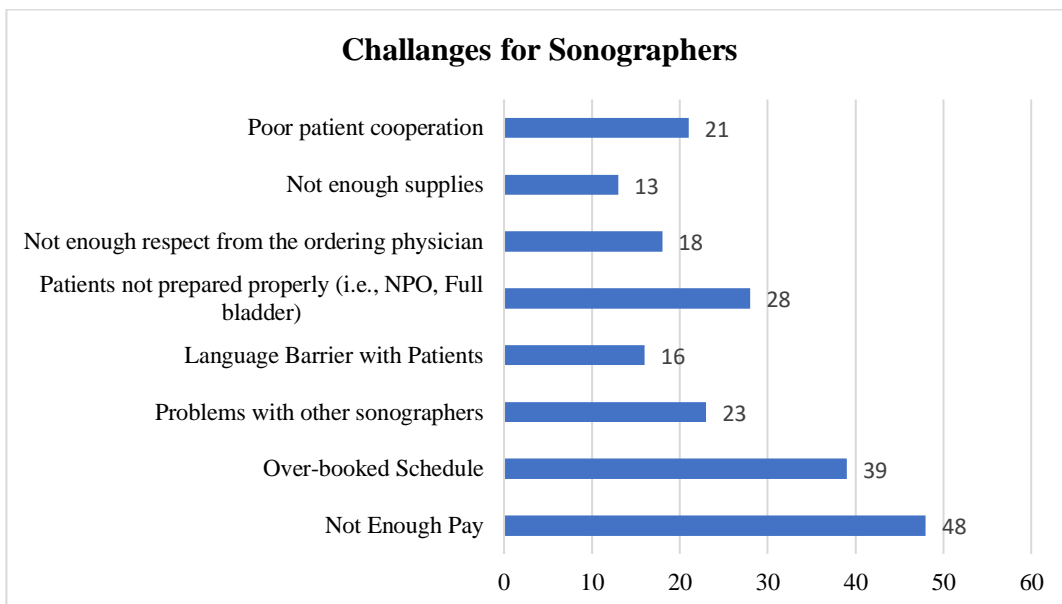


Figure 2: Reported Workplace Challenges Faced by Sonographers Across Pakistan ($N = 206$).

DISCUSSION

The present study provides an in-depth overview of the demographic, professional, and workplace characteristics of sonographers, revealing important patterns in workforce composition, clinical practice, and job satisfaction. The predominance of female respondents (63.1%) is consistent with global trends in sonography, where the profession is largely female-dominated due to its historical association with women's health services such as obstetric and gynecologic imaging¹⁰. The high concentration of participants in the 18–34 age group, coupled with the finding that 64.1% had less than two years of experience, suggests a rapidly growing and youthful workforce. This influx of early-career professionals may reflect increased educational opportunities, but also points to the need for robust mentorship and training systems⁹.

In terms of qualifications, the high proportion of sonographers with Master's and Bachelor's degrees reflects the increasing professionalization of diagnostic imaging roles. This is in line with international efforts to standardize training and improve the academic foundation of clinical practitioners¹¹. However, the observation that over three-quarters of respondents (76.7%) lacked formal credentialing, such as RDMS or RVT, raises concern about regulatory oversight and the potential variability in diagnostic quality. Similar concerns have been noted in studies conducted in India, Pakistan, and other regional settings across South Asia, where credentialing is not strictly enforced, highlighting a need for policy interventions to encourage and possibly mandate certification^{12, 13}.

The clinical specialties reported abdominal, obstetric, and gynecologic sonography are consistent with the global trends. These areas often represent core competencies in sonography training and respond to high patient volumes². However, underrepresentation in specialties such as pediatric echocardiography, neurosonography, and intraoperative imaging suggests either limited institutional resources or insufficient exposure during training. Previous research has highlighted that lack of hands-on experience and mentorship are barriers to entering specialized sonography fields¹⁴. Gender-based disparities in specialty involvement were notable, with women overwhelmingly engaged in obstetric and gynecologic imaging, while men were more active in vascular, musculoskeletal, and procedural specialties such as ultrasound-guided interventions. These patterns may reflect traditional role expectations, departmental allocations, or unequal access to procedural training¹⁵. A recent systematic review emphasized that such gendered distributions can reinforce occupational segregation and limit professional growth, especially for female practitioners. Addressing these disparities may require equitable distribution of training resources and intentional role diversification in

clinical settings¹⁶. The reported workload, where a significant proportion of participants performed 6-16+ cases per day, combined with the finding that nearly half felt they had adequate time for examinations, reflects both workload intensity and variable workflow efficiency across institutions. These findings align with previous literature, suggesting that high patient throughput often compromises diagnostic thoroughness and increases stress levels in imaging professionals¹⁷. Workplace challenges were also prominent, with inadequate pay (35%), overbooked schedules (20.4%), and communication breakdowns (12.6%) among the top issues. These concerns are consistent with findings from global workforce studies, which identify financial dissatisfaction, staff shortages, and administrative barriers as key contributors to burnout among sonographers¹⁸. In addition, the study found that a considerable portion of participants (40.8%) felt their jobs were below expectations, indicating a misalignment between professional aspirations and workplace realities¹⁶. Such dissatisfaction has been linked to higher turnover intentions, particularly in early-career staff lacking upward mobility or professional recognition⁸.

Despite these challenges, respondents reported contributing significantly to patient education (55.3%), training of students (47.6%), and diagnostic communication with physicians (38.8%). These expanded roles underscore the multifaceted contributions of sonographers beyond image acquisition. Recent literature has emphasized the evolving role of sonographers as clinical collaborators and educators, suggesting the need for institutional acknowledgment and support for these additional responsibilities¹⁹. Finally, participants' career motivations were largely intrinsic, with over 70% reporting an interest in medical imaging as their primary reason for choosing the field. However, relatively few cited salary or job security, possibly indicating that extrinsic incentives are lacking or secondary to vocational interest. These insights are critical for recruitment and retention strategies in the field, especially in developing healthcare systems. This study has some limitations. Its cross-sectional design restricts causal interpretations, and reliance on self-reported data may introduce response bias. The sample, composed mostly of early-career professionals, may not fully represent the broader sonography workforce. Additionally, since participants were self-selected, the findings might reflect the views of those more engaged or concerned with the issues explored. Regional and institutional differences were also not examined, limiting the generalizability of the results.

Conclusion

This study reveals that the sonography workforce is predominantly young, female, and early in their careers, with limited formal credentialing. Abdominal, obstetric, and gynecologic imaging were the most common specialties, while advanced areas were less practiced due to limited training opportunities. Gender disparities in specialty involvement and significant workplace challenges such as inadequate pay and overwork were

identified. Despite these issues, sonographers contribute extensively to patient care and education, highlighting the need for better institutional support and recognition.

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