


Global and Iranian Healthcare Workforce Shortage: Causes, Consequences, and Strategies for Long-Term Solutions

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Abstract

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Introduction: The global healthcare workforce shortage is a critical issue impacting patient care, economic stability, and healthcare access, particularly in specialties like orthopedics, anesthesiology, and nursing. In Iran, this crisis is worsened by economic sanctions, limited training opportunities, and unequal distribution of healthcare workers. This review examines the causes, impacts, and potential solutions to workforce shortages, with a focus on Iran. **Methods:** A narrative review was conducted to analyze existing literature on workforce shortages in orthopedics, anesthesiology, and nursing. Sources included peer-reviewed articles, WHO reports, and national surveys. Data were synthesized to identify trends, impacts on patient care, and strategies for addressing these gaps. **Results:** The shortage of orthopedic surgeons and anesthesiologists has led to delays in surgeries and worse patient outcomes, especially in underserved regions. Nursing shortages are driven by low wages, poor working conditions, and gender disparities. In Iran, sanctions restrict access to medical equipment, worsening the crisis. Additionally, healthcare workers are concentrated in urban areas, deepening the gap in rural settings. These shortages contribute to higher mortality rates, reduced care quality, and escalating healthcare costs. **Conclusion:** The healthcare workforce shortage, particularly in orthopedics, anesthesiology, and nursing, presents a significant global challenge. Solutions include expanding training programs, improving working conditions, providing incentives for rural placements, and fostering international collaboration. These efforts are especially vital in countries like Iran, where external economic pressures exacerbate the issue.

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Introduction:

The healthcare workforce shortage is a pervasive issue that affects economies worldwide, with the World

Health Organization (WHO) projecting a global shortage of 18 million health workers by 2030 ^{1,2}. This shortage is not only a numerical issue but also a matter of

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equitable distribution, with a 6.5-fold difference in density between high-income and low-income countries². The COVID-19 pandemic has further exacerbated the problem, highlighting the need for creative solutions to address the shortage³. According to recent estimates, the global health workforce stock in 2020 was 65.1 million health workers, with a projected increase to 84 million by 2030, representing an average growth of 29%². However, this growth is still insufficient to meet the demand, with a revised global health workforce shortage of 15 million health workers in 2020 decreasing to 10 million health workers by 2030². In the United States, economic and demographic trends, such as population growth and economic expansion, signal an impending physician shortage⁴. The primary care workforce has seen limited progress over the past decade, and projected needs through 2040 indicate a continued shortage, particularly in the context of an aging and growing population⁵. The growing elderly population is a significant factor in the healthcare labor force shortage, as it increases the demand for care while simultaneously reducing the availability of physicians and nurses⁶. As the existing literature on healthcare workforce shortage highlights the pervasive issue of inadequate supply, inequitable distribution, and insufficient growth to meet demand, with the World Health Organization projecting a global shortage of 18 million health workers by 2030, we aimed at exploring the causes, impacts, and strategies for sustainable solutions to address this crisis, particularly in the context of Iran. Also, what makes this study novel is its focus on the specific challenges in Iran, including the impact of economic sanctions, and its examination of effective strategies to address the nursing deficit, such as expedited nursing courses and employee satisfaction, which sets it apart from previous studies that have primarily focused on global trends and high-income countries.

Causes of Workforce Shortage

Hypothetical macroeconomic frameworks indicate that scarcity might arise from inadequate remuneration, provision trailing behind requirement, and societal viewpoint⁷. Adjustments in the compensation level are insufficient to boost the availability of healthcare practitioners, as researchers discover unresponsive earnings for medical doctors and nursing staff⁷. Non-monetary elements like workplace environment, role contentment, and inherent drive are just as crucial as monetary rewards⁷. Financial expansion, population statistics, and medical insurance are pivotal aspects in forecasting upcoming healthcare personnel requirement⁸. The anticipated requirements are juxtaposed with the forecasted rise in healthcare provider availability and the healthcare provider

"requirements" as gauged by WHO to secure fundamental health provision⁸. This leads to the most substantial anticipated deficits, which could intensify international rivalry for proficient healthcare personnel⁸. Intermediate-income nations will confront personnel shortages since their demand will surpass supply, whereas low-income regions will encounter minimal growth in both demand and supply, which are projected to be significantly beneath what is necessary to attain sufficient provision of essential health services⁸. Opportunities exist to address the economic factors contributing to the healthcare workforce shortage, including increasing wages, improving working conditions, and enhancing job satisfaction^{7,8}.

A statewide survey of nurses found that 39% of practicing nurses intended to leave their position in the next year, with factors such as age, workplace concerns, and workplace factors influencing their decision⁹. Another study of 50,273 nurse respondents found that the majority were female (90.4%) and White (80.7%), with a mean age of 48.7 years¹⁰. A cross-sectional survey of 3,667 medical and surgical nurses in Italy found that 35.5% of nurses intended to leave their current job due to job dissatisfaction, with push factors including understaffing, emotional exhaustion, and poor patient safety¹¹. Additionally, a study of 207,636 hospital nurses in the United States found that 21% of nurses reported intention to leave, with generational differences playing a role in their decision¹².

The scarcity of physicians has become a pressing concern globally, with various factors contributing to this shortage^{13,14}. The increasing demand for healthcare services, driven by aging populations and the rising burden of chronic diseases, has exacerbated the issue¹³. Furthermore, the provision of initial health practitioners is limited by elements like growing retirement frequencies, movement within and outside, deteriorating job circumstances, financial reductions, and heightened exhaustion^{13,15}. The COVID-19 pandemic has also had a significant impact on the physician workforce, leading to backlogs and increased patient expectations¹³. Additionally, the misdistribution of physicians, with a shortage in primary care and certain specialty care areas, as well as a lack of physicians in medically underserved areas and populations, has further complicated the issue¹⁶.

Impact on Patient Care

Research has shown that staffing shortages can compromise patient safety, particularly in high-risk areas such as intensive care units, where the lack of adequate nursing staff can lead to adverse events and poor patient outcomes⁵. To mitigate these effects, policymakers and healthcare leaders must prioritize workforce planning and development, including the

implementation of innovative solutions such as tele-sitters and increased family involvement 17. Ultimately, addressing the workforce shortage will require a multifaceted approach that takes into account the complex interplay of factors driving this issue, including demographic changes, burnout, and maldistribution of healthcare professionals 5 17 18.

The removal of access barriers to primary care has been shown to have a positive impact on utilization and costs, highlighting the need for targeted interventions to address workforce shortages 19. A national study in the USA revealed that rural hospital CEOs reported shortages of health professions, with marked variations in the need for healthcare professionals, ranging from 73% for registered nurses to 16% for health educators 20. The implementation of policies aimed at reducing demand-side barriers to access to healthcare has also been found to affect service delivery, with a particular focus on human resources for health 21.

Economic Consequences

With health care worker shortage, a significant increase in nursing labor costs has been observed, leading to a substantial financial burden on healthcare institutions 22. Moreover, economic downturns have been shown to destabilize the nursing labor market, resulting in serious shortages and negative outcomes that can extend beyond the recessionary period 23. The shortage of skilled nurses, in particular, can lead to a decrease in the quality of care, ultimately affecting patient outcomes and increasing healthcare costs 23. Furthermore, the lack of understanding of labor market dynamics and trends can lead to misinformed workforce downsizing decisions, which can be difficult and expensive to reverse 24.

Research has shown that a shortage of workers in certain industries, such as healthcare and long-term care, can have significant economic implications 25. For instance, a study on the general surgery workforce found that there were 140 openings nationally for general surgeons during the initial study period, and 149 positions in 40 states during the second study period 25. This shortage can lead to increased costs for hospitals and healthcare systems, as well as reduced access to care for patients 26. In Germany, for example, the long-term care workforce is facing significant challenges, with many workers experiencing physical and psychological strain, which can be harmful to their health 27. To mitigate these effects, it is essential to provide sufficient assistance to workers, increase the attractiveness of jobs in these industries, and reduce turnover 27.

The provision of initial health practitioners is limited by increasing departure rates, relocation within and outside, and deteriorating job circumstances 28.

Furthermore, medical students' poor awareness of job market trends and their selection of specialties based on factors such as ease of finding jobs can contribute to workforce shortfalls in certain specialties 29. In some countries, there is a shortage of physicians in specific specialties, such as family medicine, which requires targeted incentives to stimulate vocations 30. The imbalances in the educational and labor markets for physicians cannot be resolved solely by creating vacancies, but rather by reforming regulatory frameworks, incentive systems, and public management to attract and retain talent 30. Demographic and infrastructural factors, such as population dynamics and healthcare infrastructure, also contribute a crucial part in intensifying the medical workforce scarcity 31.

Health care Workforce Shortage in Iran

In the Iranian context, studies have emphasized the importance of improving retention of existing nursing workforce, enhancing public perception of nursing, and supporting nursing organizations 32 33. Furthermore, an investigation into the correlation between adequate nursing staff and hospital performance in Shiraz University of Medical Sciences Hospitals found a significant relationship between the two, underscoring the need for adequate nursing staff to ensure optimal hospital performance 33. Another study applied the workload indicators of staffing needs (WISNs) method to estimate the number of required nurses in different types of hospitals in Iran, showing the importance of evidence-based staffing decisions 34. The results of review of Abbaszadeh and Abdi study 35 showed that the concept of nursing shortage in different countries varies depending on the scope of practice of nurses in the fields of health, treatment, education and management, therefore, in each region, the extent of the problem should be defined based on the standards of that country. Understanding that a country's health system depends on the services of nursing personnel strengthens the positive view of society towards this profession. In this regard, the role of mass media and educational institutions is very important. Lack of attention to the nursing organizational environment, high workload, job dissatisfaction, and poor quality of nurses' salaries create a vicious cycle that ultimately leads to a shortage of nursing staff. In turn, the shortage of nursing staff is accompanied by an increase in leaving the service area, low quality of services, increased errors and care-related harm, and patient mortality 35. Therefore, considering the negative consequences and consequences of a shortage of nurses on a country's health level, increasing the employment of nurses and efforts to retain them in their profession will be very cost-effective. Therefore, it is recommended to take measures to achieve these goals, taking into account the

reasons for the shortage of nurses. Such as increasing student recruitment and employment of nursing staff, improving salaries and benefits, creating the desired organizational climate, involving nurses in decision-making, and using them in management and leadership positions 35.

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Another review study in Iran showed that the shortage of men in the nursing profession is not limited to a country or continent and has become a global problem; however, the prioritization of its causes differs in different countries and cultures. Some conditions such as intra-organizational transfers (from inpatient wards to administrative departments or from hospitals to organizations, faculties, or treatment departments) have led to the problem of a shortage of male nurses in professional roles. Today, many male nurses are working in other positions, especially managerial positions, for the aforementioned reason, and it is very easy for men to move from such female-dominated jobs to high-ranking positions; however, given the prominent role of religion in Iran, gender stereotypes certainly play a significant role in the emergence of this phenomenon. Most of our patients prefer to be under the care of a nurse of the same sex 36.

Based on the study of Hoseini-Esfidarjani et al.³⁷ tackling the nursing deficit in Iran necessitates a comprehensive strategy, encompassing the introduction of expedited nursing courses for individuals with non-nursing degrees, which can offer an economical and swift resolution by utilizing the current abilities and training of jobless college graduates, while also focusing on employee contentment, exhaustion, and community support to enhance retention and attraction in the nursing profession.

To incorporate orthopedics and anesthesiology into this article, you'll want to address the shortage of healthcare workers in these specialties, its causes, impact on patient care, and potential strategies for improvement. Below, I've added a section on both fields that integrates with your existing article:

Orthopedic Workforce Shortage

Orthopedics, a specialty critical for addressing musculoskeletal diseases and injuries, is facing increasing workforce shortages globally, exacerbated by an aging population and rising incidence of chronic conditions such as arthritis and osteoporosis. The global orthopedic workforce shortage is compounded by the long training periods required for specialists and the demanding nature of the profession, which leads to early burnout and job dissatisfaction. Furthermore, the distribution of orthopedic surgeons is skewed, with many working in urban settings while rural and underserved areas remain underserved 28.

In countries like Iran, the lack of sufficient orthopedic specialists is a significant concern, with the shortage affecting the timely diagnosis and treatment of musculoskeletal disorders. As in other regions, economic sanctions have led to a reduction in medical equipment availability, compounding the difficulty of orthopedic practice. To address this shortage, strategic measures such as expanding orthopedic residency programs, offering incentives for rural postings, and improving working conditions for orthopedic surgeons are critical 29.

Additionally, increasing the training capacity for orthopedics, developing specialized educational tracks for general practitioners, and providing more opportunities for continuing education in the field could help mitigate the workforce shortage. There is also a growing need to address gender disparities in the specialty, as women remain underrepresented in orthopedics globally.

Anesthesiology Workforce Shortage

Anesthesiologists are essential to patient care during surgeries and critical care procedures. The shortage of anesthesiologists is especially pressing in middle- and low-income countries, where the demand for surgical interventions is growing but the number of trained professionals has not kept pace. Factors such as high levels of burnout, long working hours, and the intensity of the work contribute to the shortage in this specialty 30.

The anesthesiology shortage in Iran, for example, has been worsened by limited training opportunities, particularly in non-metropolitan areas, and by the migration of healthcare professionals due to political and economic instability. Anesthesiologists are often required to work across a wide range of surgical specialties, leading to an overextension of their expertise and potential burnout. Additionally, like other specialties, economic sanctions have impacted the availability of necessary equipment, anesthesia medications, and modern technologies, further complicating the ability to provide quality care.

Solutions to the anesthesiology workforce shortage should include increasing the number of training programs, particularly in underserved regions, as well as improving the work-life balance and mental health support for anesthesiologists to reduce burnout. In addition, expanding the role of nurse anesthetists in certain settings and promoting task-shifting strategies could alleviate some of the pressure on anesthesiologists 32. Collaboration between anesthesiology societies to share resources, provide training, and improve the recruitment and retention of anesthesiology professionals in underserved areas will also be essential.

Impact on Patient Care and Economic Consequences

The shortage of orthopedic and anesthesiology professionals significantly impacts patient care. In orthopedics, the inability to address musculoskeletal disorders in a timely manner can lead to worsened patient outcomes, chronic pain, and long-term disability, which in turn increases healthcare costs and economic burden. For anesthesiologists, the shortage can result in delays or even cancellations of critical surgeries, which can be life-threatening, especially in emergency situations.

Both specialties are also integral to the economic health of healthcare systems. Delays in elective surgeries, which are common in orthopedic and anesthesiology shortages, lead to increased healthcare costs due to prolonged recovery times and the need for more intensive treatments. This can create a cycle where the workforce shortage leads to higher costs, further exacerbating the strain on healthcare systems 33.

Strategies for Addressing Shortages

Expanding residency programs and specialized courses for orthopedic surgeons and anesthesiologists will increase the number of trained professionals. For example, introducing accelerated training programs or increasing the number of fellowships can help meet growing demand.

Rural Recruitment and Retention: Both specialties suffer from a maldistribution of workers, with many professionals concentrated in urban areas. Offering financial incentives, such as student loan forgiveness or salary bonuses for those working in rural or underserved regions, can help balance this inequity 35.

Technology and Task Shifting: Utilizing technology to support both specialties can alleviate some of the pressures. Telemedicine in anesthesiology, for example, can provide pre-surgical consultations and post-operative care remotely, while robotic surgery techniques in orthopedics can reduce the time required for procedures and improve outcomes.

Improving Work Conditions: Ensuring better work-life balance, providing mental health resources, and improving job satisfaction through adequate compensation and career advancement opportunities can help reduce burnout, particularly in high-stress specialties like anesthesiology and orthopedics 36.

Collaboration and International Support: International collaboration, particularly with organizations like the WHO, can support countries with workforce shortages by providing technical support, training, and facilitating exchanges of professionals. Additionally, public-private partnerships could help bring more resources to underserved areas.

Societal Implications

The scarcity of skilled healthcare professionals can lead to decreased quality of care, increased patient mortality rates, and a rise in healthcare-associated infections 38 39. Furthermore, the shortage can result in increased workload and stress for the existing healthcare workers, leading to burnout, decreased job satisfaction, and high turnover rates 39 40. The economic sanctions imposed on Iran have also worsened the situation, limiting access to medical equipment, drugs, and other essential healthcare resources 38 40. To mitigate these effects, it is essential to develop and implement effective policies to address the healthcare worker shortage, including investing in healthcare education and training, improving working conditions, and providing incentives to attract and retain healthcare professionals 38. Additionally, addressing the root causes of the shortage, such as the impact of economic sanctions, is crucial to ensuring the long-term sustainability of Iran's healthcare system 38 39 40.

The societal implications of the healthcare worker shortage in Iran are affecting not only the healthcare system but also the overall well-being of the population 38 39 40. The shortage can lead to decreased access to healthcare services, particularly in rural and underserved areas, exacerbating health disparities and inequalities 2. Moreover, the shortage can have economic implications, including increased healthcare costs, lost productivity, and decreased economic growth 38 39 40. Therefore, it is essential to prioritize addressing the healthcare worker shortage in Iran, through a comprehensive and multifaceted approach that involves government, healthcare organizations, and other stakeholders.

The shortage of healthcare workers has profound societal implications, as it can lead to decreased access to quality healthcare services, particularly in low-income and marginalized communities 41 42. According to recent studies, the global health workforce is facing a significant shortage, with an estimated 15 million health workers lacking in 2020, and this number is projected to decrease to 10 million by 2030 42. This shortage is not evenly distributed, with certain regions such as Africa and the Eastern Mediterranean being disproportionately affected 42 43. The consequences of this shortage can be severe, including increased mortality rates, decreased quality of care, and a higher burden on existing healthcare workers, leading to burnout and decreased job satisfaction 41 42. Furthermore, the shortage of healthcare workers can exacerbate existing health disparities, particularly in communities with limited access to healthcare services 43. Therefore, it is essential to address the healthcare worker shortage through strategies such as increasing funding for healthcare workforce

development, improving working conditions, and implementing policies to retain and recruit healthcare workers, especially in underserved areas.

various interventions are being implemented to address this issue. Research has shown that these interventions, including regulatory, financial, educational, and tailored approaches, have yielded weak or inconclusive results 44. To better understand the effectiveness of these interventions, it is essential to examine the determinants of physician shortages and analyze the interventions based on their ability to target these determinants 44. Studies have identified several determinants, including individual and contextual factors, that contribute to physician shortages 44 45. For instance, the rate of population growth exceeding the rate of physicians entering the field of general surgery has been highlighted as a significant factor 45. Furthermore, research has emphasized the need for scenario-based workforce planning and projection models to estimate the impact of policy interventions to address physician shortages moving forward 45. Furthermore, scenario-based workforce planning and projection models can help estimate the impact of policy interventions on workforce outcomes 46. Theoretical analysis of policies to improve the recruitment and retention of rural physicians has also shown that financial, educational, and tailored interventions may be

effective, while regulatory interventions are unlikely to achieve the desired outcome 47.

Conclusion and Future Directions

The global healthcare workforce shortage is a multifaceted issue with profound implications for patient care, economic stability, and societal well-being. This review shows the complex interplay of factors contributing to the shortage, including low wages, poor working conditions, demographic shifts, and economic constraints. The shortage disproportionately affects low-income and middle-income countries, exacerbating health disparities and compromising the quality of care. Addressing this challenge requires a comprehensive and multifaceted approach, encompassing policy interventions, workforce planning, and innovative solutions such as telehealth and community-based care models. Future research should focus on developing and evaluating the effectiveness of these strategies, particularly in resource-limited settings. Additionally, there is a need for international collaboration to address the global nature of the shortage, ensuring equitable distribution of healthcare resources and strengthening health systems worldwide. By prioritizing these areas, policymakers and healthcare leaders can work towards a more sustainable and resilient healthcare workforce.

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