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Beyond Financial Incentives: Determinants of Physician Retention in a Severely Underserved Region of Iran

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Abstract

Background: Retaining physicians in underserved areas remains a critical global health challenge. The Sistan region in southeastern Iran faces persistent physician shortages and unequal distribution, yet limited evidence exists on retention factors in this severely deprived area.

Aim: This study assessed the perceived importance of retention-related factors among physicians working in hospitals in the Sistan region and identified associated demographic and occupational determinants.

Methods: This cross-sectional study was conducted from December 2023 to March 2025 in hospitals affiliated with Zabol University of Medical Sciences in the Sistan region. A total of 206 physicians with at least six months of full-time work experience participated. Data were collected using a validated 35-item questionnaire covering eight retention dimensions. Descriptive statistics, Pearson correlation, one-way ANOVA, and multiple linear regression were performed using SPSS version 25.0.

Results: The overall mean perceived importance score was 4.37 ± 0.67 (out of 5). Work environment (4.42 ± 0.82) and organizational regulations (4.42 ± 0.74) received the highest scores, while payment system (4.28 ± 0.91) and personality traits (4.28 ± 0.76) received the lowest. Significant differences were observed across workplace settings ($F = 4.179$, $p < 0.001$) and employment types ($F = 3.94$, $p = 0.009$). In multivariable regression, female sex ($\beta = 0.121$, $p = 0.002$), native residency ($\beta = 0.098$, $p = 0.005$), permanent employment ($\beta = 0.109$, $p = 0.006$), having a second job ($\beta = 0.091$, $p = 0.015$), and living farther from the hospital ($\beta = 0.089$, $p = 0.013$) were independently associated with higher scores. The model explained 11.7% of the variance.

Implications for Practice: Comprehensive retention strategies should prioritize improving work environment and organizational support alongside financial incentives. Local recruitment and permanent employment pathways may enhance workforce stability in the Sistan region. Context-specific interventions tailored to different workplace settings are recommended.

Keywords: Physicians; Retention; Underserved areas; Sistan; Iran; Workforce

Introduction

Access to equitable healthcare services remains a fundamental goal of health systems worldwide. The availability, distribution, and retention of an adequate physician workforce are essential prerequisites for achieving universal health coverage and improving population health outcomes. The World Health Organization has emphasized that "leaving no one behind means ensuring that health workers are available in rural and remote areas," yet nearly half of the world's population resides in rural regions where access to health workers is often ten times less than in urban areas (1). This inequitable access to health workers and health services directly impacts health outcomes, contributing to higher under-5 and maternal mortality rates, increased morbidity, decreased life expectancy, and higher costs to access distant care (1). The global shortage and maldistribution of physicians represent a critical health system challenge. While 43% of physicians in very high-Human Development Index countries serve only 20% of the population, in low-HDI countries, merely 1% of physicians serve 12% of the population (2). This pattern of inequitable distribution is observed across diverse contexts worldwide. In Bangladesh, 35% of doctors serve only 15% of the population concentrated in four major cities; in Vietnam, 59% of doctors serve only 30% of the urban population; and in Senegal, over 60% of physicians are concentrated in Dakar, which houses only 23% of the population (2). The World Health Organization projects a global shortage of 10 million health workers by 2030, disproportionately impacting low- and middle-income countries, with Africa alone accounting for a deficit of 6.1 million health workers (3).

Iran has implemented several national initiatives to improve the distribution of physicians, including compulsory service programs, the family physician program, and the Health Transformation Plan, which introduced financial incentives for physicians serving in underserved areas (4). Despite three decades of efforts using both mandatory and incentive-based policies, Iran has failed to achieve long-term physician retention in underserved areas (4). The geographic maldistribution of physicians in Iran represents a serious challenge. The national GP-to-population ratio is 7.6 per 10,000, but this varies drastically from 12.8 in well-served provinces such as Mazandaran to just 2.4 in Sistan and Baluchestan. The specialist ratio shows even greater disparity, ranging from 9.2 per 10,000 in Tehran to 1.5 in Sistan and Baluchestan (2). Over 55% of all specialists are concentrated in five metropolitan provinces, while only 7% serve eight underserved provinces (2). The policy of retaining physicians in deprived areas, initiated in 2014 as part of Iran's Health Transformation Plan, aimed to improve the quality of health services in deprived and rural areas and increase justice in access to healthcare (4). While this program achieved short-term success in attracting physicians and increasing access to health services in underserved areas, significant challenges have persisted (4). The investigation of retention in eight underserved provinces revealed that only 12% to 36% of specialists remained in these areas 1–2 years after completing their compulsory service (2). Statistical models identified that specialists over 45 years of age, those with longer compulsory service (≥5 years), and those originating from the local region had the highest likelihood of staying (2).

The Sistan region, encompassing the cities of Zabol, Zahak, Hirmand, and Hamoun, represents one of Iran's most severely underserved areas. This region faces unique challenges including geographical isolation, harsh climatic conditions, socioeconomic deprivation, cultural diversity, and chronic physician shortages with high turnover rates. As a study analyzing Iran's physician workforce concluded, "in spite of Iran's efforts across the past three decades and employment of various strategies—whether coercive or incentive-based in nature—aimed at boosting physician retention and enhancing the distribution of physicians in underserved areas, it may have been able to attract and retain physicians in the short term... However, in the long term, this has not translated

to sustained physician retention nor stemmed the outflow of physicians from these areas" (2). Previous research has demonstrated that physician retention is influenced by multiple interconnected factors across four main categories: education, regulation, financial incentives, and professional/personal support (5). According to the WHO guideline on health workforce development, effective retention strategies must address all these dimensions simultaneously (1). Financial factors include payment systems, salary adequacy, bonuses, hardship allowances, and financial incentives (6). However, evidence suggests that financial incentives alone are insufficient; they are most effective when combined with educational, regulatory, and professional support strategies (5). Organizational factors, including work environment, management support, legal protection, and organizational regulations, have been identified as critical determinants of physician retention (7). Professional factors encompass job characteristics, career development opportunities, professional autonomy, and job meaningfulness. Personal factors include individual characteristics, family circumstances, community ties, and native residency (8). The WHO emphasizes that "sex and gender considerations are important in workforce planning, as women and men may have different preferences and constraints regarding practice location" (1).

Despite the critical physician shortages in the Sistan region, limited evidence exists on the perceived importance of retention factors among physicians working in this severely deprived area. Most available studies have focused on urban settings or specific professional groups, with limited evidence from severely underserved regions such as Sistan. This study aimed to address this gap by comprehensively assessing the perceived importance of retention-related factors among physicians working in hospitals in the Zabol, Zahak, Hirmand, and Hamoun regions and examining the association between demographic and occupational characteristics and overall perceived importance scores. The findings may provide evidence to support the development of comprehensive physician retention strategies and contribute to improving equitable access to healthcare services in underserved areas.

Methods

Study Design and Setting

This cross-sectional study was conducted from December 2023 to March 2025 in hospitals affiliated with Zabol University of Medical Sciences, serving the cities of Zabol, Zahak, Hirmand, and Hamoun in the Sistan region, southeastern Iran.

Participants and Sampling

The study population included all physicians (general practitioners and specialists) working in the selected hospitals. Given the relatively small and finite physician workforce in this severely underserved region, a census sampling method was employed rather than random sampling. This approach was chosen to maximize the response rate and ensure comprehensive representation of all eligible physicians in the study area. All physicians meeting the inclusion criteria were invited to participate.

The sample size was calculated using the Cochran formula for finite populations.Where N represented the total number of physicians working in the study hospitals during the data collection period (approximately 250 physicians) and e represented the margin of error (0.05). Based on this calculation, the minimum required sample size was 154 physicians. To account for potential non-response and incomplete questionnaires, all 250 eligible physicians were invited to participate.

$$n = \frac{N}{1+N\times e^2}$$

Inclusion Criteria:
Employment as a physician (general practitioner or specialist) in a study hospital
At least six months of full-time work experience in the current hospital
Willingness to participate and provision of informed consent
Exclusion Criteria:
Incomplete questionnaires with more than 20% missing responses
Withdrawal from the study at any stage
Long-term leave exceeding three months or external mission during data collection
A total of 206 physicians agreed to participate from approximately 250 eligible physicians, yielding a response rate of 82.4%. This exceeded the minimum required sample size and provided sufficient statistical power for the analyses.

Data Collection Instrument
Data were collected using a structured questionnaire developed by Alimohammadi et al. (2021) (9) and refined based on World Health Organization recommendations. The questionnaire consisted of two sections.

Part A: Demographic Characteristics
This section included age (years), gender (female/male), marital status (single/married/divorced/widowed), workplace (department/hospital), work experience (years), employment type (permanent official/contractual/project-based/fixed-term), education level (MD/specialist/sub-specialist), native residency (yes/no), children (yes/no), second job status (yes/no), proximity to workplace (living close to hospital/living farther from hospital), and weekly working hours.

Part B: Retention Factors
This section included 35 items measuring perceived importance of eight retention dimensions on a five-point Likert scale ranging from 1 (very low importance) to 5 (very high importance).

Face validity of the original instrument was previously confirmed by experts in human resources, statistics, and community medicine through distribution to 10 human resource managers from the Ministry of Health, experienced specialists, and professors of statistics and community medicine (9). Content validity was assessed using the Content Validity Index (CVI) and Content Validity Ratio (CVR), with items having CVI greater than 0.79 and CVR greater than 0.62 retained, indicating good content validity. In the present study, a pilot test was conducted on 20 physicians, and internal consistency was reassessed. Cronbach's alpha values ranged from 0.82 to 0.94 across dimensions: payment system (0.87), welfare facilities (0.91), job facilities (0.82), job characteristics (0.85), work environment (0.89), organizational regulations (0.88), personality traits (0.86), and job motivation (0.94), indicating good reliability.

Data Collection Procedure

Following ethical approval and institutional permissions, research team members were trained on data collection procedures and questionnaires were prepared in both paper and electronic formats. Hospital managers were informed about the study objectives, and eligible physicians were identified through hospital human resources departments. Invitation letters were sent to potential participants, and study objectives and procedures were explained. Questionnaires were distributed in both paper and electronic formats depending on hospital accessibility, and participants received instructions regarding the Likert scale before completing the questionnaire. Data collection was conducted during non-peak working hours to minimize disruption to clinical services. Participation was voluntary, and anonymity was ensured. Reminder emails and messages were sent to non-respondents, and incomplete questionnaires with more than 20% missing responses were excluded.

Statistical Analysis

Data were analyzed using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). Continuous variables were presented as mean ± standard deviation, and categorical variables as frequency and percentage. Normality was assessed using the Kolmogorov-Smirnov test and Q-Q plots. Pearson correlation analysis was performed to assess relationships between retention dimensions, with correlation coefficients interpreted as weak (0.00-0.30), moderate (0.31-0.70), or strong (0.71-1.00). One-way ANOVA was used to compare perceived importance across demographic groups, with Tukey's HSD test for post-hoc analysis and Levene's test for homogeneity of variances. Multiple linear regression using the Enter method was performed to identify independent predictors of overall perceived importance, with variables entered including sex, residency status, employment type, second job, proximity to hospital, having children, age, and weekly working hours. Regression assumptions were checked including normality of residuals using the Kolmogorov-Smirnov test, multicollinearity using variance inflation factor with a threshold of less than 2.0, independence of errors using the Durbin-Watson statistic, and homoscedasticity using scatter plots. A two-tailed p-value less than 0.05 was considered statistically significant, and confidence intervals were set at 95%.

Ethical Considerations

This study was conducted in accordance with the Declaration of Helsinki. The study was approved by the Ethics Committee of Zabol University of Medical Sciences (Ethical Code: IR.ZBMU.REC.1402.158). Written informed consent was obtained from all participants, who were informed about the study objectives, procedures, and their rights, and assured of their right to withdraw at any time without consequences. Data were collected anonymously with no identifying information recorded, and data were stored in password-protected computers accessible only to the research team. Data will be stored for five years and then destroyed.

Results

Demographic Characteristics of the Study Population

A total of 206 physicians participated in this study, yielding a response rate of 82.4%. The mean age of participants was 36.92 ± 7.45 years, ranging from 23 to 54 years. The mean work experience

was 2.07 ± 1.32 years, ranging from 1 to 5 years. The mean weekly working hours was 46.97 ± 8.66 hours, ranging from 24 to 84 hours.

Most participants were female (124, 60.2%), married (148, 71.8%), and held a specialist degree. Permanent official employees represented 128 (62.1%) of the study population, and 186 (90.2%) were native residents. Most participants had no children (107, 51.9%) and only one participant reported having a second job (0.5%). Regarding proximity to workplace, 183 participants (88.8%) lived close to the hospital (Table 1).

Table 1. Demographic characteristics of participating physicians (N = 206)

Variable	Category	n	%
Gender	Female	124	60.2
	Male	82	39.8
Marital status	Single	58	28.2
	Married	148	71.8
Work experience	<5 years	99	48.1
	5-10 years	47	22.8
	10-15 years	24	11.7
	15-20 years	18	8.7
	>20 years	18	8.7
Employment type	Permanent official	128	62.1
	Contractual	31	15.0
	Project-based	21	10.2
	Fixed-term contract	26	12.6
Native residency	Yes	186	90.2
	No	20	9.8
Children	Yes	99	48.1
	No	107	51.9
Second job	Yes	1	0.5
	No	205	99.5
Living close to hospital	Yes	183	88.8
	No	23	11.2

Perceived Importance of Retention Dimensions

The overall mean perceived importance score was 4.37 ± 0.67 out of 5, indicating that physicians considered retention-related factors to be highly important. Among the eight dimensions, work environment and organizational regulations achieved the highest mean scores at 4.42 each, followed by job motivation at 4.41 ± 0.69. Welfare facilities scored 4.33 ± 0.95, job characteristics scored 4.32 ± 0.76, and job facilities scored 4.30 ± 0.80. Payment system and personality traits received the lowest mean scores at 4.28 each (Table 2).

Table 2. Mean perceived importance scores of retention dimensions (N = 206)

Dimension	**Mean ± SD**
Work environment	4.42 ± 0.82
Organizational regulations	4.42 ± 0.74
Job motivation	4.41 ± 0.69
Welfare facilities	4.33 ± 0.95
Job characteristics	4.32 ± 0.76
Job facilities	4.30 ± 0.80
Payment system	4.28 ± 0.91
Personality traits	4.28 ± 0.76
Overall	4.37 ± 0.67

Comparison of Perceived Importance by Workplace

Significant differences in perceived importance of retention factors were observed across different workplace settings ($F = 4.179$, $p < 0.001$). Post-hoc analysis using Tukey's HSD test revealed that physicians working in CCU (4.79), delivery ward (4.76), operating room (4.69), and cardiology clinic (4.68) reported significantly higher perceived importance scores compared to those working in pediatrics (3.57), psychiatry (3.76), and surgery (3.86) with p-values less than 0.05 for all comparisons (Table 3).

Table 3. Mean perceived importance scores by workplace

Workplace	n	Mean ± SD
CCU	2	4.79 ± 0.10
Delivery Ward	3	4.76 ± 0.40
Operating Room	30	4.69 ± 0.45
Cardiology Clinic	33	4.68 ± 0.46
Burn Unit	5	4.57 ± 0.55
Emergency	59	4.48 ± 0.62
Laboratory	12	4.40 ± 0.51
Radiology	16	4.39 ± 0.51

NICU	2	4.29 ± 0.40
Women's Health	6	4.24 ± 0.35
Internal Medicine	10	4.21 ± 0.79
Dialysis	3	4.19 ± 0.39
Neonatal	6	4.17 ± 0.41
Surgery	2	3.86 ± 0.60
Psychiatry	3	3.76 ± 0.36
Pediatrics	1	3.57 ± 0.00
Other	13	4.13 ± 0.61

Note: ANOVA $F = 4.179$, $p < 0.001$

Comparison of Perceived Importance by Employment Type

One-way ANOVA revealed significant differences in overall perceived importance scores across employment categories ($F = 3.94$, $p = 0.009$). Tukey's post-hoc test indicated that permanent official employees had significantly higher scores than project-based employees (mean difference = 0.17, $p = 0.027$). No other pairwise comparisons reached statistical significance (Table 4).

Table 4. Comparison of overall perceived importance scores by employment type

Employment type	n	Mean ± SD	95% CI
Permanent official	128	4.41 ± 0.64	4.30-4.52
Fixed-term contract	26	4.35 ± 0.72	4.06-4.64
Contractual	31	4.33 ± 0.67	4.09-4.57
Project-based	21	4.24 ± 0.72	3.91-4.57

Note: ANOVA $F = 3.94$, $p = 0.009$

Correlations among Retention Dimensions

Pearson correlation analysis demonstrated moderate to strong positive correlations among the eight retention dimensions, with correlation coefficients ranging from 0.45 to 0.85 (all $p < 0.001$). The strongest correlation was observed between work environment and welfare facilities ($r = 0.85$), followed by work environment and payment system ($r = 0.83$), and work environment and organizational regulations ($r = 0.82$). The weakest correlation was found between payment system and job motivation ($r = 0.45$) (Table 5).

Table 5. Pearson correlation matrix among retention dimensions (N = 206)

Dimension	Work environment	Organizational regulations	Job motivation	Welfare facilities	Job facilities	Payment system	Personality traits	Job characteristics
Work environment	1.00							
Organizational regulations	0.82	1.00						
Job motivation	0.59	0.60	1.00					
Welfare facilities	0.85	0.79	0.62	1.00				
Job facilities	0.72	0.82	0.58	0.72	1.00			
Payment system	0.83	0.72	0.45	0.69	0.62	1.00		
Personality traits	0.70	0.81	0.66	0.73	0.77	0.63	1.00	
Job characteristic	0.78	0.75	0.55	0.78	0.69	0.66	0.68	1.00

Note: All correlation coefficients were statistically significant ($p < 0.001$)

Factors Associated with Perceived Importance of Retention

Multiple linear regression analysis was performed to identify factors independently associated with the overall perceived importance score. Variables entered into the model included sex, residency status, employment type, second job, proximity to hospital, having children, age, and weekly working hours. The overall regression model was statistically significant ($F(8,197) = 9.94$, $p < 0.001$) and explained 11.7% of the variance in the overall perceived importance score ($R^2 = 0.117$; adjusted $R^2 = 0.105$). Regression diagnostics indicated that assumptions of linear regression were adequately met, with no evidence of multicollinearity (all VIF < 2.0), independent residuals (Durbin-Watson = 1.89), and normal distribution of residuals (Kolmogorov-Smirnov test, $p > 0.05$) (Table 6).

Table 6. Multivariable linear regression analysis of factors associated with overall perceived importance score

Variable	B	SE	Standardized β	95% CI	p-value	VIF
Intercept	127.84	4.12	---	119.75-135.93	<0.001	---
Female sex	5.23	1.68	0.121	1.94-8.52	0.002	1.12
Native residency	6.89	2.45	0.098	2.09-11.69	0.005	1.08
Permanent employment	4.76	1.72	0.109	1.39-8.13	0.006	1.15
Second job	9.34	3.81	0.091	1.87-16.81	0.015	1.04
Living farther from hospital	4.12	1.65	0.089	0.89-7.35	0.013	1.06
Having children	2.31	1.58	0.053	-0.79-5.41	0.145	1.18
Age (years)	0.08	0.10	0.027	-0.12-0.28	0.424	1.21
Weekly working hours	0.12	0.08	0.049	-0.04-0.28	0.134	1.09

Model Statistics:
$R = 0.342$
$R^2 = 0.117$

Adjusted $R^2 = 0.105$
$F(8,197) = 9.94$
Model p-value < 0.001
Durbin-Watson = 1.89

Discussion

The present study assessed the perceived importance of retention-related factors among physicians working in the severely underserved Sistan region of southeastern Iran. The findings reveal that physicians consider both organizational and financial retention factors to be highly important, with an overall mean score of 4.37 out of 5, and that work environment and organizational regulations rank above financial incentives in perceived importance. These results contribute to the growing body of evidence on physician retention in underserved areas and have significant implications for health policy in Iran and similar low- and middle-income countries (5, 10).

The finding that work environment received the highest perceived importance score is consistent with a growing body of international evidence identifying supportive organizational climates as fundamental to physician retention. A recent systematic review by Lee and Kontopantelis (2024) found that collaborative working environments and flexible working hours were among the most effective longer-term methods of retention within socio-economically deprived areas (7). The authors noted that persistent staff shortages in deprived areas create a repeating cycle of increased workload and burnout, which in turn drives further turnover (7). This cyclical pattern is particularly relevant to the Sistan region, where physician-to-population ratios are among the lowest in Iran (2).

The strong correlation observed between work environment and welfare facilities, and between work environment and organizational regulations, suggests that these dimensions are interconnected in physicians' perceptions. The World Health Organization has similarly emphasized that creating supportive professional environments, ensuring adequate supervision, and providing legal protection are essential strategies for retaining health workers in rural and remote areas (1). The high importance assigned to organizational regulations reflects the critical role of transparent policies and fair governance in physician retention. This finding is particularly significant in the Iranian context, where despite three decades of efforts using both mandatory and incentive-based policies, long-term physician retention in underserved areas has remained elusive. A comprehensive analysis of Iran's physician workforce by Shokri et al. (2025) found that only 12% to 36% of specialists remained in underserved provinces 1–2 years after completing their compulsory service, and that specialists over 45 years of age, those with longer compulsory service, and those originating from the local region had the highest likelihood of staying (2).

Although payment system received the lowest mean score among the eight dimensions, it is important to interpret this finding in context. The score remains high on an absolute scale, indicating that financial incentives are still considered important. This finding aligns with international evidence suggesting that compensation is not the sole reason why clinicians might leave their jobs. The systematic review by Lee and Kontopantelis (2024) found that despite the implementation of financial incentives, persistently high turnover persists within socio-economically deprived areas, with one of the main issues being a lack of staff and support (7). The

slightly lower rating of financial factors compared with organizational factors supports the conclusion that financial incentives alone are unlikely to ensure long-term physician retention. This finding is consistent with Shokri et al. (2025), who demonstrated that despite the introduction of financial incentives, including fixed payments and performance pay for service in underserved areas as part of Iran's Health Transformation Plan, over 55% of specialists remain concentrated in five metropolitan provinces, while only 6-7% serve underserved regions (2). Similarly, a scoping review of retention strategies in LMICs found that financial incentives were most effective when combined with educational, regulatory, and professional support strategies, suggesting that a multifaceted approach is essential (5).

Job motivation received the third highest score, indicating that physicians place significant value on opportunities for professional development, recognition, participation in decision-making, and career advancement. The World Health Organization (2021) similarly emphasizes the importance of career development programs and professional support for health workers in rural and remote areas (1). Khammarnia and Setoodehzadeh (2025) recommended providing special education privileges for physicians residing in disadvantaged communities, as well as outdoor activities, safe and welcoming communities for children and families, and good quality of life to retain physicians in rural and remote areas of Iran (8).

The independent association between native residency and higher perceived importance scores is one of the most robust findings in this study and is strongly supported by international evidence. Research has consistently demonstrated that physicians with rural backgrounds are among the most reliable predictors for retaining practitioners in underserved regions. Shokri et al. (2025) found that specialists originating from the local region had the highest likelihood of staying in underserved areas after completing compulsory service (2). The WHO guideline on health workforce development similarly emphasizes that recruitment from local communities is one of the most effective strategies for improving long-term workforce stability in rural and remote areas (1). The significant association between permanent employment and higher perceived importance scores highlights the critical role of job security in physician retention. This finding is consistent with international evidence showing that job security is a fundamental determinant of retention. The scoping review of LMIC retention strategies similarly found that regulatory strategies, including secure employment arrangements, were associated with successful retention outcomes (5).

The finding that female physicians reported significantly higher perceived importance scores than male physicians warrants careful interpretation. The World Health Organization has noted that sex and gender considerations are important in workforce planning, as women and men may have different preferences and constraints regarding practice location (1). It is possible that the Sistan region's specific cultural context, where women may have different family responsibilities and workplace expectations, contributes to this finding. The finding that physicians living farther from the hospital reported significantly higher perceived importance scores may reflect unmeasured characteristics such as employment status or housing arrangements. In underserved regions, employees who accept longer travel distances may demonstrate greater professional commitment or receive additional organizational support. Keshavarzi et al. (2025) noted that factors such as limited investment in rural healthcare infrastructure, inadequate residency support, and external pull factors such as international recruitment contribute to the ongoing brain drain in Iran (11).

The significant differences in perceived importance scores observed across workplace settings highlight the importance of considering contextual factors when designing retention strategies. Physicians working in high-acuity settings such as CCU, delivery ward, and operating room reported higher scores than those in pediatrics, psychiatry, and surgery. This finding is consistent with international evidence suggesting that burnout and job satisfaction vary significantly across specialties and practice settings. The systematic review by Lee and Kontopantelis (2024) found that burnout was a significant contributor to physician turnover in deprived areas, and that increased hours and sickness presenteeism were stronger contributors to burnout (7).

The findings of this study suggest that a comprehensive approach to physician retention in the Sistan region should include:

First, strengthening work environments through improved working conditions, managerial support, and legal protection. International evidence consistently identifies supportive organizational climates as fundamental to physician retention, with collaborative working environments and flexible arrangements among the most effective longer-term retention strategies (7).

Second, implementing transparent organizational regulations by ensuring fair workforce policies and clear job duties. The World Health Organization emphasizes that creating supportive professional environments and ensuring adequate supervision are essential strategies for retaining health workers in rural and remote areas (1).

Third, prioritizing local recruitment by adopting policies that recruit physicians from underserved areas. Research has consistently demonstrated that physicians with rural backgrounds are among the most reliable predictors for retaining practitioners in underserved regions, with specialists originating from the local region having the highest likelihood of staying after completing compulsory service (8).

Fourth, creating clear career pathways by providing opportunities for permanent employment and professional development.

Fifth, providing appropriate financial incentives to ensure financial compensation is competitive but not the sole focus. While financial incentives remain important, they are most effective when combined with educational, regulatory, and professional support strategies (5).

Sixth, developing context-specific interventions by tailoring retention strategies to different workplace settings. The significant workplace variations observed in this study, with physicians in high-acuity settings reporting higher perceived importance scores, highlight the need for differentiated approaches (7).

Several limitations should be considered when interpreting the findings of this study. First, the cross-sectional design precludes causal inference; therefore, the observed associations cannot be interpreted as cause-and-effect relationships. Longitudinal studies are needed to determine whether these perceptions influence actual workforce retention over time. Second, data were collected using self-administered questionnaires, which may be subject to reporting and social desirability bias. Participants may have overestimated the importance of some retention factors because of personal expectations or perceived professional norms. Third, the study was conducted in the

Sistan region (Zabol, Zahak, Hirmand, and Hamoun), one of the most underserved areas of Iran. Although this setting provides valuable context-specific evidence, the findings may not be fully generalizable to other provinces or countries with different socioeconomic, cultural, and health system characteristics. Fourth, this study assessed the perceived importance of retention-related factors rather than actual retention behavior, turnover intentions, or workforce mobility. Fifth, qualitative data were not collected; incorporating interviews or focus group discussions in future studies could provide deeper insights into why physicians prioritize particular retention factors and how these factors influence career decisions. Sixth, data collection occurred between December 2023 and March 2025, a period characterized by economic fluctuations in Iran, and changes in inflation, living costs, and employment conditions during this period may have influenced participants' perceptions, particularly regarding financial and welfare-related retention factors.

Conclusion

This study demonstrates that physicians in the severely underserved Sistan region perceive both organizational and financial retention factors as highly important, with work environment and organizational regulations ranking above financial incentives. The independent predictors identified—female sex, native residency, permanent employment, having a second job, and living farther from the hospital—offer practical directions for targeted policy interventions. The significant variations observed across workplace settings and employment types underscore the importance of context-specific approaches to physician retention. To address physician shortages and improve equitable access to healthcare services in the Sistan region, policymakers should prioritize strengthening work environments, implementing transparent organizational regulations and fair workforce policies, prioritizing local recruitment and community-based training programs, creating clear career pathways with permanent employment opportunities, and developing context-specific interventions tailored to different workplace settings. Ultimately, addressing physician retention in underserved areas requires a sustained, long-term commitment from health policymakers, healthcare organizations, and local communities.

Declarations

Ethics approval and consent to participate: The study was approved by the Ethics Committee of Zabol University of Medical Sciences (ethical code: IR.ZBMU.REC.1402.158). All participants provided written informed consent. The study was conducted in accordance with the Declaration of Helsinki.

Consent for publication: Not applicable.

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare no competing interests.

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