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8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხო-ური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიდრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი,წელი,ჟურნალის №,პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიდრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანე-ლის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა,მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა,რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შე-ჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

Содержание:

NURSES' PERCEIVED PROFESSIONAL PERFORMANCE IN PRIMARY HEALTH CARE: A NATIONAL STUDY OF ORGANIZATIONAL AND WORKFORCE DETERMINANTS

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Abstract.

Aim: To examine perceived professional competence of nurses in Kazakhstan's primary health care system and identify organizational and workforce factors associated with competence and collaboration.

Methods: Between April and June 2022, primary health care nurses in urban and rural Kazakhstan completed a 64-item questionnaire assessing perceived professional competence, nurse–physician collaboration, availability of resources, and preparedness for epidemic conditions. A context-specific instrument was developed based on national PHC regulations and COVID-19 protocols. Data were analyzed using descriptive statistics, Spearman correlation, multiple linear regression, and exploratory factor analysis.

Results: A total of 1,134 nurses participated, with 56.66% holding technical or vocational qualifications. Most respondents rated nurse-physician collaboration positively (80% "Yes"). Higher perceived competence was associated with preparedness for pandemics, regulatory knowledge, and use of triage algorithms. Three factors explained 65% of the variance: organizational effectiveness, workforce characteristics, and epidemic-related conditions.

Conclusions: Nurses' perceived competence in Kazakhstan is shaped by organizational readiness, particularly in rural areas. Strengthening preparedness and regulatory literacy is key to enhancing resilience in PHC.

Key words. Primary health care, nursing workforce, perceived competence, collaboration, organizational readiness, Kazakhstan.

Introduction.

Primary health care (PHC) represents the cornerstone of Kazakhstan's health system, delivering first-contact, continuous, and preventive services alongside long-term management of chronic conditions at the community level [1]. PHC services are predominantly organized through outpatient polyclinics and district facilities that integrate curative care with population-oriented prevention programs [2,3]. Within this structure, nurses constitute the largest professional group and play a critical role in screening, health education, immunization, home-based follow-up, and monitoring of noncommunicable diseases [4,5]. In rural and remote areas—where physician availability and infrastructure are often constrained—nurses frequently function as the first point of contact and provide essential continuity of care for patients and families [1,3].

In this study, the term "PHC nurses" refers to licensed nurses employed in Kazakhstan's PHC polyclinics and district outpatient facilities who deliver direct patient care and preventive services within multidisciplinary teams. This definition reflects the prevailing workforce configuration, in which most PHC nurses hold technical or vocational qualifications or applied bachelor's degrees and practice within a regulatory framework that specifies preventive, clinical, and organizational responsibilities [3,4]. While the scope of nursing practice has expanded internationally through advanced education pathways and enhanced professional autonomy, the extent to which such models can be directly transferred to Kazakhstan remains uncertain. Professional roles and decision-making authority are shaped by local governance structures, workforce preparation, and available resources [6-8].

International evidence indicates that strengthening the PHC nursing workforce—through education, leadership development, and effective interprofessional collaboration—supports improved access, continuity, and quality of care, particularly in chronic disease prevention and management [1,6,8]. Global policy frameworks similarly emphasize nursing and midwifery development as central to PHC strengthening and progress toward universal health coverage [6]. However, the applicability of this evidence depends on the availability of country-specific data describing nurses' perceived professional functioning and the organizational conditions that enable or constrain their practice. In the absence of such data, workforce planning risks being guided by normative assumptions rather than empirically grounded needs.

In Kazakhstan, PHC reforms have increasingly emphasized multidisciplinary team-based care and a shift toward community-level prevention and chronic disease management [1,3]. Concurrently, persistent workforce challenges—including uneven distribution of nursing staff, limited opportunities for continuing and postgraduate education, and variability in organizational support—may influence nurses' capacity to deliver consistent, person-centered care across settings [2,4,8]. Available reports and smaller studies suggest ongoing challenges related to interprofessional communication, access to medicines and equipment, and consistent implementation of standard operating procedures (SOPs) and clinical guidelines—factors plausibly associated with nurses' perceived competence and everyday performance in PHC practice [1,4,5]. Nevertheless, the evidence base remains fragmented and largely program-specific, limiting national-level insight [3].

Accordingly, a clear empirical gap persists: national-level data on PHC nurses' perceived professional performance and its organizational and workforce determinants in Kazakhstan are scarce. Addressing this gap is particularly important in rural and resource-constrained contexts, where PHC nurses often assume expanded responsibilities [1,8]. To address this gap, we situate nurses' perceived professional competence within an organizational context relevant to health system resilience, focusing on how structures and preparedness mechanisms may enable or constrain frontline performance in routine and surge conditions. Therefore, the aim of this study was to assess self-reported professional performance among nurses working in Kazakhstan's PHC system and to examine organizational and workforce factors associated with perceived competence and effective collaborative practice.

Materials and Methods.

Study design and setting: A national, descriptive cross-sectional study was conducted to examine self-reported professional performance among nurses working in Kazakhstan's PHC system. In Kazakhstan, PHC services are delivered predominantly through state-funded outpatient polyclinics that provide first-contact, continuous, and preventive care, including chronic disease management and population-oriented health promotion. Data collection was carried out between April and June 2022 and included nurses employed in both urban and rural PHC polyclinics across the country.

Participants and recruitment: Eligible participants were licensed nurses employed in PHC polyclinics who were directly involved in patient care and preventive services at the time of the study. Nurses working exclusively in inpatient hospital settings or occupying administrative positions without direct patient contact were excluded. A purposive recruitment strategy was employed to achieve broad geographic coverage and inclusion of nurses from diverse organizational contexts. Study invitations were disseminated through regional health authorities, PHC administrators, and professional nursing communication channels. Participation was voluntary and anonymous, and electronic informed consent was obtained prior to survey access. A total of 1,134 PHC nurses completed the questionnaire and were included in the final analysis, representing 11 regions and one city of republican status across Kazakhstan. As invitations were distributed through multiple overlapping channels, a precise response rate could not be calculated.

Instrument development, piloting, and validation: The data collection instrument was developed through a structured, multi-stage process to ensure contextual relevance, content validity, and feasibility for use in Kazakhstan's PHC system. Questionnaire development was conducted within a national technical assignment focused on evaluating PHC service effectiveness and workforce readiness under epidemic conditions, including COVID-19.

Instrument construction was informed by national PHC regulatory documents, standard operating procedures, epidemic preparedness protocols, and methodological principles of the AGREE framework. Expert input from PHC managers, nursing methodologists, and health workforce specialists guided item formulation. As a result, six structured questionnaires and one organizational assessment checklist were developed to capture perspectives of key stakeholder groups within PHC organizations.

A formal piloting and approbation phase was conducted prior to the main study in September 2021 in one urban and one rural PHC organization. The pilot included PHC managers, nurses, physicians, and PHC service users, reflecting the multi-actor nature of PHC service delivery. In total, 91 respondents participated, including 24 nurses.

Both online self-administered and interviewer-assisted formats were tested. Overall acceptability was high, with no major comprehension difficulties among professional respondents. Minor wording issues were identified in selected epidemic-related items for service users, leading to targeted simplification. Pilot findings informed final item refinement, interviewer instructions, and data collection procedures.

The piloting process supported the face and content validity of the instruments. Internal consistency of the perceived professional competence scale was acceptable (Cronbach's alpha ≈ 0.84). Based on these results, the instruments were considered suitable for large-scale national implementation.

Measures: The final questionnaire comprised 64 items and included sociodemographic and professional characteristics (age, education level, total professional experience, and tenure in PHC). The primary outcome—perceived professional competence—was operationalized as a composite score derived from multiple items assessing role clarity, clinical responsibilities, preparedness for complex care situations, and use of standardized procedures. Item responses were rated on five-point Likert-type scales and aggregated by calculating mean scores, with higher values indicating higher perceived competence.

Additional domains assessed nurse–physician collaboration and teamwork, availability of medicines, medical equipment and transport, use of standard operating procedures and clinical guidelines, readiness to work under epidemic or pandemic conditions, and access to professional development and patient education activities.

Data collection: The questionnaire was administered online using the SurveyMonkey platform. Browser-based restrictions were applied to reduce the likelihood of duplicate submissions. No IP addresses or personal identifiers were collected or stored. Survey data were downloaded in anonymized form and securely stored on password-protected institutional servers accessible only to the research team.

Statistical analysis: Statistical analyses were performed using IBM SPSS Statistics 28. Descriptive statistics were used to summarize participant characteristics and questionnaire responses. Categorical variables were presented as frequencies and percentages, while continuous variables were reported as means, standard deviations, and confidence intervals (CIs) where appropriate. This additional step allows for better assessment of the accuracy of the estimates.

Bivariate associations between perceived professional competence and organizational, workforce, and collaboration-related variables were examined using Pearson's chi-square tests for categorical variables and Spearman's rank correlation

coefficients for ordinal or non-normally distributed measures. Spearman correlation was selected due to the ordinal nature of several questionnaire items and the non-normal distribution of selected scale scores. Additional pairwise comparisons were conducted where appropriate to explore specific associations between groups.

A multiple linear regression analysis was conducted to identify organizational and professional factors independently associated with perceived professional competence. All candidate predictors (including demographic and organizational variables) were entered simultaneously into the model to assess their adjusted associations with the dependent variable — perceived professional competence. Interaction terms between key predictors were also explored to identify potential combined effects.

Before interpreting the model, key assumptions of linear regression were evaluated, including linearity, normality of residuals, and multicollinearity. Multicollinearity was assessed using variance inflation factors (VIF), with VIF values > 10 indicating potential issues with collinearity. No such issues were found in the final model. Residual analysis was also conducted to check for heteroscedasticity and outliers, and robust standard errors were used to account for any violations.

Missing data were handled by excluding cases with missing values on the variables included in the analysis. Sensitivity analyses were conducted to ensure that results were not biased due to the nature of the missing data.

All statistical tests were two-sided, and a p-value of < 0.05 was considered statistically significant.

Results.

A total of 1,134 primary health care (PHC) nurses from 11 regions and one city of republican status participated in the survey. The demographic and professional characteristics of the sample are presented in Table 1. Nearly half of respondents were aged 18–39 years (48.76%), while 47.16% were aged 40–60 years; nurses older than 60 years accounted for 4.08% of the sample.

Regarding educational background, 56.66% (n = 621) of respondents held a technical or vocational nursing qualification, 37.14% (n = 407) had an applied bachelor's degree, 5.29% (n = 58) held an academic bachelor's degree, and 0.91% (n = 10) reported a master's degree. More than half of participants (51.35%) reported over 10 years of experience in PHC. Nurses from both rural and urban polyclinics were represented.

Multiple linear regression analysis was performed to identify factors associated with perceived professional competence among PHC nurses. The adjusted model explained 21.4% of the variance in competence scores ($R^2 = 0.214$). As shown in Table 2, higher perceived competence was significantly associated with pandemic preparedness, knowledge of legal and regulatory documents, and the use of infection-detection or triage algorithms. SOP use and gender were not statistically significant predictors of perceived professional competence. Compared with nurses aged 18–39 years, those aged >60 years demonstrated lower perceived competence scores; however, this association should be interpreted with caution given the relatively small proportion of respondents in this age group.

Table 1. *Demographic and professional characteristics of PHC nurses (N = 1,134).*

Characteristic	Category	N	%
Age (years)	18–39	553	48.76
	40–60	535	47.16
	>60	46	4.08
Education	Technical/vocational qualification	621	56.66
	Applied bachelor's degree	407	37.14
	Academic bachelor's degree	58	5.29
	Master's degree	10	0.91
Work setting	Rural polyclinic	851	75.04
	Urban polyclinic	283	24.96
PHC experience	>10 years	582	51.35

Table 2. *Predictors of perceived professional competence among PHC nurses (multiple linear regression model).*

Predictor	B	SE	Standardized β	t	p-value
Intercept	2.597	0.076	—	34.390	<0.001
Pandemic preparedness	0.252	0.010	0.350	24.587	<0.001
Knowledge of legal/regulatory documents	0.074	0.011	0.095	6.585	<0.001
Use of infection-detection/triage algorithms	0.132	0.014	0.136	9.718	<0.001
SOP use	-0.001	0.006	-0.001	-0.091	0.928
Gender (female vs male)	0.045	0.029	0.020	1.551	0.121
Age 40–60 vs 18–39	-0.005	0.013	-0.006	-0.427	0.669
Age >60 vs 18–39	-0.158	0.041	-0.051	-3.875	<0.001

Notes: Reference categories: male, age 18–39 years.
B = unstandardized coefficient; Standardized β = standardized coefficient.
Model fit: $R^2 = 0.214$.

No statistically significant differences were observed for nurses aged 40–60 years.

Perceptions of nurse–physician collaboration were generally favourable. Eighty percent (80.00%) of respondents selected "Yes," and 16.30% selected "Almost yes," indicating positive interprofessional interaction (Figure 1).

Spearman's rank correlation analysis indicated that age was positively correlated with total years of professional experience in PHC. Perceived effectiveness of nurse–physician collaboration was positively correlated with self-reported professional competence. Availability of medicines and medical supplies was positively correlated with perceived organizational functioning. No statistically significant association was observed between length of employment in the current PHC organization and perceived effectiveness of polyclinic management.

Figure 2 illustrates the proportion of variance explained by the three factors extracted through principal component analysis with Varimax rotation. The first factor, accounting for 29.6% of the total variance, represents organizational effectiveness and resource availability, indicating its dominant contribution to the underlying structure of perceived professional competence. The second factor explains 13.6% of the variance and reflects workforce experience characteristics, while the third factor also accounts for 13.6% of the variance and captures epidemic-related working conditions. Collectively, the three-factor solution explains 56.8% of the total variance in organizational and performance-related indicators, supporting the multidimensional nature of professional competence in primary health care settings.

Exploratory factor analysis using principal component extraction with Varimax rotation identified three underlying factors representing organizational effectiveness and resource availability, workforce experience characteristics, and epidemic-related working conditions. The rotated factor loading matrix (Table 3) demonstrates that items related to management effectiveness, availability of medicines and equipment, and patient flow organization loaded primarily on the organizational effectiveness factor, while the use of infection-detection algorithms and rapid response to infectious cases loaded on the epidemic-related working conditions factor, and professional development and guideline awareness contributed to the workforce experience factor.

Discussion.

This national survey advances current understanding of PHC nursing by examining how perceived professional competence is shaped within a transitional health system undergoing organizational and workforce transformation in Kazakhstan [1-3]. Rather than being driven primarily by demographic or experience-related characteristics, perceived competence among PHC nurses in Kazakhstan appears to be closely associated with organizational readiness and preparedness-related conditions. This finding underscores the centrality of system-level environments in shaping everyday PHC nursing practice, consistent with global PHC and workforce frameworks [1,6,9] and comparative system indicators used for workforce planning [8].

Importantly, perceived professional competence in this study should not be interpreted solely as an individual self-assessment or a direct proxy for objectively measured clinical performance. Instead, it may be conceptualized as a functional manifestation of frontline health system resilience. In PHC settings, nurses' perceptions of competence reflect the extent to which organizational structures enable safe, coordinated, and adaptive practice under both routine and non-routine conditions. This interpretation aligns with contemporary health services research, which conceptualizes professional functioning as a system-embedded phenomenon rather than an exclusively individual attribute [1,3,6].

From this perspective, organizational readiness—including preparedness training, regulatory clarity, and access to standardized clinical pathways—acts as a structural buffer that stabilizes individual performance in the face of system-level stressors [1,9]. Such buffers reduce reliance on individual coping mechanisms and instead embed professional functioning within supportive organizational environments. This distinction is important because coping-centered explanations (common in nursing education and workforce literature) may describe individual responses to stress but do not substitute for structural solutions [10]. In health systems exposed to resource variability, epidemiological shocks, or ongoing reform, these structural supports are central to maintaining consistent frontline performance [1,9,11].
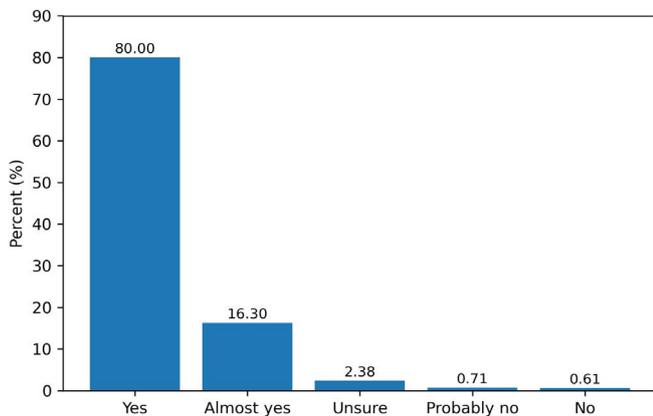
Figure 1. *Perceptions of nurse–physician collaboration among PHC nurses (N = 1,134).*
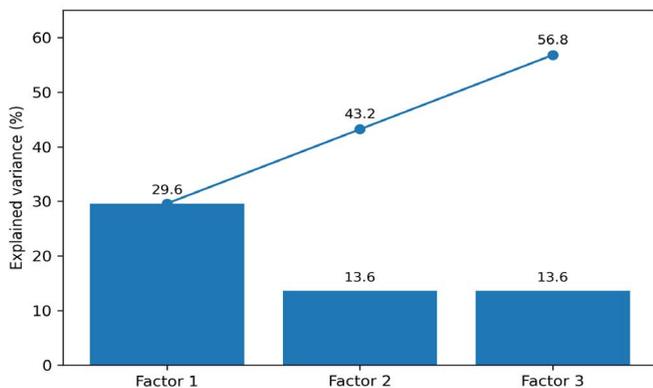
Figure 2. *Percentage of variance explained by the three extracted factors (principal component analysis with Varimax rotation).*

Table 3. *Rotated factor loading matrix (PCA with Varimax rotation).*

Item (question)	Code	Factor 1	Factor 2	Factor 3	h²
In your opinion, does the management of the polyclinic effectively manage the organization?	q0010	0.612			0.447
Is your polyclinic sufficiently supplied with medicines and medical products for patients under dynamic follow-up?	q0015	0.737			0.577
In your opinion, does the current practice of supplying medicines and medical products enable adequate patient care in your polyclinic?	q0018	0.772			0.678
In your opinion, does your polyclinic have sufficient equipment to provide high-quality preventive services to patients?	q0019	0.762			0.655
In your opinion, does your polyclinic have sufficient equipment to provide high-quality therapeutic care to patients?	q0020	0.750			0.630
In your opinion, does the existing provision of equipment and transport enable readiness to work under emergency or epidemic conditions?	q0024	0.654			0.571
In your opinion, is patient flow management and regulation well organized in your polyclinic?	q0030	0.473		0.506	0.511
In your opinion, does the current management and organization of health care delivery in your polyclinic ensure effective functioning?	q0033	0.547	0.485		0.598
In your organization, is an individual professional development plan developed for each employee, including yourself?	q0034			0.464	0.455
You and other nurses in your polyclinic regularly attend continuing education courses and/or participate in trainings and seminars.	q0035			0.551	0.400
You are informed about national nursing clinical guidelines adopted in the Republic of Kazakhstan and use them in your practice.	q0036		0.479	0.519	0.510
In your opinion, does the current staffing capacity of your organization ensure readiness to work during the COVID-19 pandemic?	q0014	0.712			0.595
You use clear algorithms for identifying infectious patients.	q0027		0.794		0.656
In your opinion, do polyclinic staff respond promptly to the identification of a contact case or infectious patient?	q0028		0.661		0.578
Is the separation of flows of healthy and ill patients organized in your polyclinic?	q0031			0.788	0.655

Notes: *Loadings <0.40 are suppressed (left blank). Extraction method: principal components analysis. Rotation method: Varimax with Kaiser normalization. Missing data were handled using listwise deletion. Sampling adequacy was excellent (Kaiser–Meyer–Olkin measure, KMO = 0.938). Bartlett's test of sphericity was statistically significant ($\chi^2 = 28{,}049.33$, $p <0.001$). The three-factor solution explained 56.8% of the total variance (Factor 1 = 29.6%, Factor 2 = 13.6%, Factor 3 = 13.6%). Each item loaded primarily on a single factor, with minimal cross-loadings, supporting the interpretability of the factor structure.*

Interpretations in this section are limited to self-reported perceived professional competence, which constitutes the study outcome, and should not be conflated with objectively measured clinical performance. Nevertheless, self-perceived competence remains a meaningful indicator of nurses' confidence in fulfilling professional roles within existing organizational constraints and has been widely used in workforce and organizational research to capture dimensions of role clarity, preparedness, and professional agency [6,8].

The present findings support this interpretation, as higher perceived competence was associated primarily with preparedness for epidemic or pandemic conditions, regulatory literacy, and the use of structured infection-detection or triage algorithms, rather than with demographic characteristics. This pattern suggests that competence in PHC nursing operates as a context-dependent construct, emerging from the interaction between individual roles and system-level conditions [1,9]. Recent international literature similarly emphasizes that preparedness training, clarity of regulatory frameworks, and access to operational guidance are critical for sustaining frontline nursing performance in primary care—particularly in systems facing recurrent public health shocks and organizational constraints [1,6,9,11]. The consistency between the present findings and this literature reinforces the interpretation of organizational readiness as a key component of resilient PHC nursing practice [1,9].

Given that data collection occurred during the COVID-19 period, preparedness-related perceptions may partly reflect heightened situational salience rather than stable long-term system characteristics [4]. Nonetheless, the observed associations highlight preparedness-related capacities as salient organizational resources during periods of systemic stress. Evidence from the post-pandemic period suggests that capacities strengthened during COVID-19—such as protocol standardization, rapid training mechanisms, and interprofessional coordination—remain relevant for broader health system resilience beyond pandemic contexts [9,11].

Interprofessional collaboration, particularly nurse–physician interaction, also emerged as an important organizational

correlate of perceived professional competence. The favorable assessments of collaboration and its positive association with competence suggest that effective teamwork functions as an enabling organizational context for confident and coordinated PHC nursing practice [1,3]. This is consistent with broader literature emphasizing continuing professional development (CPD) and team-based learning as mechanisms that strengthen collaborative performance and role clarity in practice settings [12]. In addition, nursing contributions to improving access and continuity in PHC—especially in underserved or remote populations—have been documented internationally, supporting the plausibility that collaboration and system supports are particularly consequential where resources are constrained [13].

Within the present cross-sectional design, interprofessional collaboration should be interpreted as a contextual organizational condition associated with perceived competence rather than as an independent explanatory or causal factor. Notably, the association between collaboration and perceived competence persisted after accounting for demographic and experience-related variables, underscoring its organizational rather than individual nature. This aligns with evidence suggesting that collaboration in PHC is shaped by organizational culture, leadership practices, and institutional support mechanisms [1,2], and by policy levers that influence roles, autonomy, and implementation pathways in primary care nursing [7].

Although the regression model explained a modest proportion of variance in perceived professional competence, this magnitude is consistent with findings from studies conducted in complex health service environments. Professional functioning in PHC is influenced by multiple interacting organizational, contextual, and situational factors, and is rarely determined by single predictors [1,9]. From a workforce policy standpoint, this reinforces the need to avoid "single-lever" solutions and instead combine staffing, education, organizational supports, and governance reforms [8,1,6,9]. Critically, decades of international evidence indicate that staffing and education are associated with patient outcomes and system performance, underscoring why workforce planning should be grounded in empirical data rather than normative expectations [14].

The exploratory factor analysis further supports this interpretation by identifying three interrelated dimensions underlying nurses' work environments: organizational effectiveness and resource availability, workforce experience characteristics, and epidemic-related working conditions. Rather than representing discrete domains, these factors illustrate how structural capacity, accumulated professional experience, and situational pressures jointly shape the conditions under which PHC nursing practice occurs [1,9]. Kazakhstan-specific policy and system analyses likewise emphasize that organizational culture and management structures are pivotal for the future development of nursing services [2], while regional evidence highlights nursing and midwifery as key levers for resilience in Central Asia [3]. National data on nurses' roles in chronic disease prevention further support the relevance of examining system supports that enable consistent implementation of preventive and monitoring activities within PHC [5].

Methodologically, because the study relies on self-report and a survey approach, reporting and interpretation should account for common limitations such as social desirability and non-response bias. Where the instrument was administered online, transparency consistent with established e-survey reporting standards (e.g., CHERRIES) is important for appraisal of survey quality and potential bias [15]. These limitations do not invalidate the findings, but they constrain causal interpretation and emphasize the need for complementary approaches (e.g., objective performance indicators, audits, or mixed-methods triangulation) in future work [1,9].

Finally, the implications of this work align with current national and international priorities for strengthening nursing capacity through education, leadership, and professional development [4,6]. In Kazakhstan, ongoing reforms in master's and PhD-level nursing education and research infrastructure are explicitly designed to enable a more evidence-informed nursing workforce and should be viewed as part of the system-level conditions that can strengthen perceived and actual professional functioning in PHC [16,17]. Against the backdrop of global nurse shortages and workforce pressures, investing in such capacity-building is consistently emphasized across international reports and policy analyses [4,9,18,19]. Taken together, these findings indicate that perceived professional competence among PHC nurses in Kazakhstan is embedded within a broader organizational and systemic context: competence appears shaped not only by individual knowledge or experience, but by the extent to which health systems provide clear regulatory guidance, support interprofessional collaboration, and enable preparedness for complex and unpredictable care demands [1,6,9].

Implications for Public Health Nursing.

The findings highlight the importance of organizational supports and preparedness-related competencies in shaping nurses' perceived professional performance in PHC. Approaches that prioritize preparedness training, regulatory literacy, and interprofessional collaboration can improve nursing practice, particularly in rural and resource-constrained environments. These supports help ensure consistent and resilient practice by reducing reliance on individual coping mechanisms.

In rural and low-resource settings, organizational capacity—such as training, clear regulations, and standardized protocols—directly impacts frontline performance. Strengthening these supports will enhance the resilience of PHC systems and improve overall care quality.

Integrating preparedness and collaboration into policy development is essential to empower nurses and ensure high-quality care, especially during health crises or pandemics.

Conclusion.

This study provides a large-scale national assessment of perceived professional competence among nurses working in Kazakhstan's primary health care (PHC) system and identifies key organizational and workforce-related factors associated with professional functioning. The findings emphasize that perceived competence in PHC nursing is predominantly shaped by system-level conditions—particularly organizational readiness, regulatory literacy, preparedness for complex care contexts, and interprofessional collaboration—rather than by demographic characteristics alone.

The results underscore that organizational supports—including clear regulatory frameworks, preparedness training, and access to standardized clinical pathways—are central to nurses' perceived ability to perform their professional roles. These findings highlight the critical importance of strengthening both structural and regulatory environments within PHC settings. This is especially vital in resource-constrained contexts, where the capacity and clarity of organizational roles significantly influence the consistency and effectiveness of frontline service delivery.

Given the findings, PHC workforce development in Kazakhstan should not only focus on individual training but also integrate organizational levers, including clearer implementation-oriented regulatory guidance and routine interprofessional coordination mechanisms. This dual approach will support the development of a resilient and adaptive workforce capable of responding to both routine and emergency health needs.

Although based on self-reported measures and a cross-sectional design, the results provide valuable empirical evidence from a geographically diverse national sample. This study adds to the growing body of evidence supporting the idea that professional competence in PHC is best understood as a system-embedded phenomenon, shaped by both individual capabilities and the organizational and systemic context. These findings underscore the importance of organizational readiness as a key component of resilient and effective primary health care, contributing to the evolving understanding of workforce dynamics in transitional health systems.

Limitations.

This study has several limitations that should be considered when interpreting the findings. First, the analysis relied on self-reported measures of perceived professional competence and organizational conditions, which may be subject to reporting and social desirability bias. Second, the cross-sectional design does not allow for causal inference, and the observed associations should be interpreted as correlational.

Third, although the regression model explained a meaningful proportion of variance in perceived professional competence ($R^2 = 0.214$), a substantial share of variability remained unexplained. This likely reflects the influence of unmeasured factors that were not captured in the present survey. Such factors may include individual motivation, leadership style, organizational culture, workload intensity, job satisfaction, burnout, and informal team dynamics, all of which have been shown in previous research to shape professional functioning in primary health care settings. The absence of these psychosocial and leadership-related variables may have limited the explanatory power of the model.

Finally, the study was conducted within the context of Kazakhstan's primary health care system, which is undergoing organizational and workforce transformation. While the large national sample enhances internal validity, caution is warranted when generalizing the findings to health systems with different institutional and regulatory contexts.

Ethical considerations.

The study protocol was reviewed and approved by the Local Ethics Committee (Protocol No. 12(118), meeting dated 28 September 2021). The study was classified as non-interventional and posed minimal risk to participants. Participation was voluntary, informed consent was obtained electronically, and all data were collected anonymously in accordance with ethical standards for research involving human participants.

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Аннотация.

Цель: Оценить воспринимаемую профессиональную компетентность медсестер в системе первичной медико-санитарной помощи (ПМСП) Казахстана и определить организационные и кадровые факторы, связанные с компетентностью и эффективным межпрофессиональным сотрудничеством.

Методы: В период с апреля по июнь 2022 года медицинские сестры первичной медико-санитарной помощи, работающие в городских и сельских регионах Казахстана, заполнили анкету из 64 пунктов, оценивающую воспринимаемую профессиональную компетентность, сотрудничество между медицинской сестрой и врачом, доступность ресурсов и готовность к эпидемическим условиям. Для данного исследования был разработан контекстно-ориентированный инструмент на основе национальных регламентов ПМСП и протоколов COVID-19. Анализ данных проводился с использованием описательной статистики, корреляционного анализа Спирмена, множественной линейной регрессии и эксплораторного факторного анализа.

Результаты: В исследовании приняли участие 1 134 медсестры, из которых 56,66% имели техническое или профессиональное образование. Большинство респондентов положительно оценили сотрудничество медсестра-врач (80% «Да»). Более высокая воспринимаемая компетентность была связана с готовностью к пандемиям, знанием нормативных документов и использованием алгоритмов триажа. Три фактора объясняли 65% общей дисперсии: организационная эффективность, характеристики рабочего опыта и эпидемические условия.

Заключения: Восприятие профессиональной компетентности медсестер в Казахстане формируется на основе организационной готовности, особенно в сельских районах. Усиление готовности и нормативной грамотности важно для повышения устойчивости ПМСП.

Ключевые слова: Первичная медико-санитарная помощь, медицинские сестры, воспринимаемая компетентность, сотрудничество, организационная готовность, Казахстан.

რეზიუმე.

მიზანი: გამოიკვლიოს თვითშეფასებული პროფესიული კომპეტენცია კაზახსტანის პირველადი ჯანდაცვის სისტემაში მომუშავე ექთნებში და გაარკვიოს ორგანიზაციული და სამუშაო ძალის ფაქტორები, რომლებიც დაკავშირებულია კომპეტენციასთან და ეფექტურ ინტერპროფესიონალურ თანამშრომლობასთან.

მეთოდები: 2022 წლის აპრილიდან ივნისამდე პერიოდში, ქალაქურ და სოფლის რეგიონებში მომუშავე პირველადი ჯანდაცვის (PHC) ექთნებმა ყაზახეთში შეავსეს 64-პუნქტიანი კითხვარი, რომელიც აფასებდა აღქმულ პროფესიულ კომპეტენციას, ექთანსა და ექიმს შორის თანამშრომლობას, რესურსების ხელმისაწვდომობას და ეპიდემიური პირობებისთვის მზადყოფნას. კვლევისთვის შემუშავდა კონტექსტზე მორგებული ინსტრუმენტი, რომელიც ეფუძნებოდა პირველადი ჯანდაცვის ეროვნულ რეგულაციებსა და COVID-19-ის პროტოკოლებს. მონაცემთა ანალიზი ჩატარდა აღწერითი სტატისტიკის, სპირმანის კორელაციური ანალიზის, მრავალცვლადი ხაზოვანი რეგრესიის და ექსპლორატორული ფაქტორული ანალიზის გამოყენებით.

შედეგები: კვლევაში მონაწილე 1,134 ექთნიდან, 56.66%-ს ჰქონდა ტექნიკური ან პროფესიული განათლება. უმეტესობამ დადებითად შეაფასა ექთანსა და ექიმს შორის თანამშრომლობა (80%-მა თქვა "დიახ"). უფრო მაღალი პროფესიული კომპეტენცია იყო დაკავშირებული პანდემიისთვის მომზადებასთან, ნორმატიული სამართლის დოკუმენტების ცოდნასთან და ინფექციის განასაზღვრელი ან ტრიაჟის ალგორითმების გამოყენებასთან. სამი ფაქტორი ახსნის საერთო შიდრაქის 65%-ს: ორგანიზაციული ეფექტურობა, სამუშაო გამოცდილების მახასიათებლები და ეპიდემიური სამუშაო პირობები.

დასკვნები: კაზახსტანის ექთნების პროფესიული კომპეტენცია ძირითადად ფორმირდება ორგანიზაციული მზადყოფნის საფუძველზე, განსაკუთრებით სოფლის რეგიონებში. პანდემიისთვის მომზადება და რეგულაციების ცოდნა მნიშვნელოვანია პირველადი ჯანდაცვის სისტემის გამძლეობის ასამაღლებლად.

საკვანძო სიტყვები. პირველადი ჯანდაცვა, საზოგადოებრივი ჯანმრთელობის ექთნები, ექთნების სამუშაო ძალა, აღქმული კომპეტენცია, ინტერპროფესიონალური თანამშრომლობა, ორგანიზაციული მზადყოფნა, კაზახსტანი.