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Development and Preliminary Psychometric Evaluation of the PQoL-34 Questionnaire for the Comprehensive Assessment of Quality of Life During Pregnancy and Family Preparedness for Childbirth: A Cross-Sectional Online Study in Southern Kazakhstan

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Research Article

Keywords: Pregnancy, Pregnant women, Quality of life, PQoL-34, Psychometric evaluation, Content validity, Internal consistency, Social and family support, Antenatal care, Kazakhstan.

Posted Date: July 8th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-9916045/v1

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Additional Declarations: No competing interests reported.

Abstract

Background

Quality of life during pregnancy is a multidimensional construct encompassing physical condition, psychological and emotional well-being, social support, interaction with the healthcare system, and family readiness for childbirth. In Kazakhstan, locally adapted instruments that simultaneously assess these dimensions remain lacking. This study aimed to develop and conduct a preliminary psychometric evaluation of the PQoL-34 questionnaire for the comprehensive assessment of women's quality of life during pregnancy and family readiness for childbirth.

Methods

A quantitative cross-sectional online study was conducted in the southern region of Kazakhstan. The PQoL-34 comprises 34 items: a socio-demographic and obstetric section, 25 scale-based items across four domains, and one global self-rated quality of life item. Content validity was assessed by an expert panel of nine specialists using the I-CVI, S-CVI/Ave, S-CVI/UA, and modified kappa statistic. A total of 461 pregnant women completed the online survey. Analyses included descriptive statistics, internal consistency (Cronbach's alpha), item analysis, preliminary factorability evaluation (Kaiser–Meyer–Olkin measure and Bartlett's test of sphericity), and correlation analysis with the global quality of life item.

Results

All items demonstrated high content validity. For relevance, I-CVI, S-CVI/Ave, and S-CVI/UA were all 1.000; for clarity, S-CVI/Ave was 0.991 and S-CVI/UA was 0.923. Overall internal consistency was high (Cronbach's $\alpha = 0.918$), with domain-level alpha values ranging from 0.753 to 0.853. All domain scores and the total PQoL-34 score showed statistically significant positive correlations with the global quality of life item; the strongest association was observed for the total score ($\rho = 0.605$; $p < 0.001$). KMO values ranged from 0.796 to 0.875, and Bartlett's test was significant for all domains ($p < 0.001$).

Conclusions

The PQoL-34 demonstrated high content validity, good internal consistency, and preliminary evidence of convergent validity. The instrument represents a promising basis for the full-scale assessment of quality of life among pregnant women and family readiness for childbirth in Kazakhstan. Further studies should address extended factorial validation, test–retest reliability, and applicability across different regions and populations.

Background

Quality of life is a multidimensional indicator of subjective well-being that reflects an individual’s perception of their position in life within the context of culture, values, goals, expectations, and everyday limitations [1]. Health-related quality of life (HRQoL) is regarded as a key outcome that complements

traditional indicators of maternal morbidity and mortality and is increasingly used to evaluate the effectiveness of antenatal interventions [2, 3]. During pregnancy, this concept becomes particularly important, as physiological changes, psychological and emotional adaptation, family support, and interaction with the healthcare system directly influence a woman's well-being and her readiness for childbirth and motherhood [4]. Even in uncomplicated pregnancies, pregnancy-related physical, emotional, and social changes may reduce a woman's quality of life and shape her need for additional support [5]. Therefore, quality of life among pregnant women should be considered not only as a clinical or psychological measure but also as an important indicator of public health and the quality of antenatal care.

Pregnancy is accompanied by a range of physical, emotional, and social changes that may affect a woman's subjective well-being in different ways. A systematic review by Lagadec et al. showed that quality of life among pregnant women is associated with age, gestational age, physical symptoms, socioeconomic conditions, support from family and friends, physical activity, optimism, and perceived happiness related to pregnancy; at the same time, the physical component of quality of life tends to decline as pregnancy progresses [6]. A meta-analysis assessing changes in HRQoL across pregnancy trimesters confirmed the heterogeneous nature of these changes: the physical component, as measured by the SF-12 and SF-36, consistently decreases by the third trimester, whereas WHOQOL-BREF scores may, in contrast, gradually improve [7]. Factors associated with lower quality of life also include pregnancy complications, nausea and vomiting, back pain, sleep disturbances, stress, anxiety, and depressive symptoms. Beyond physiological factors, social and maternal characteristics, including age, gestational age, type of housing, employment status, and partner support, are also important predictors [6, 8]. These findings highlight the need for a multidomain assessment of quality of life in pregnant women that goes beyond somatic health alone.

Physical health remains one of the key components of quality of life during pregnancy. Changes in sleep, energy levels, daily activity, nutrition, the severity of discomfort, and access to healthcare shape the everyday experience of a pregnant woman. Sleep disturbances and fatigue are among the most common complaints: estimates of poor sleep quality among pregnant women vary widely and often exceed half of the examined population, while fatigue has been reported by a substantial majority of women in some samples [9, 10]. Sleep and fatigue are closely interrelated and may jointly impair physical well-being and quality of life, particularly in the third trimester [10].

Among generic instruments used to assess HRQoL during pregnancy, the SF-36 and WHOQOL-BREF are among the most commonly applied. However, their psychometric properties in this population remain a matter of discussion, which has encouraged the development of both adapted and pregnancy-specific scales [11, 12]. The previously developed pregnancy-specific QOL-GRAV instrument showed that quality of life specific to normal pregnancy is related to, but does not fully overlap with, general quality of life. The authors emphasised that pregnancy-specific instruments may be more sensitive in capturing pregnancy-related characteristics than generic scales [13]. Accordingly, quality of life assessment

among pregnant women should consider not only the overall level of well-being but also physical and organisational aspects specific to pregnancy.

Psycho-emotional well-being is another important dimension of quality of life during pregnancy. According to the WHO, perinatal mental disorders, particularly depression, affect approximately 10% of pregnant women worldwide, with higher prevalence reported in resource-limited settings [14]. Fear of childbirth occupies a specific place among psychological and emotional stressors: systematic reviews and meta-analyses indicate that severe fear of childbirth is reported by approximately 14–16% of pregnant women, although estimates vary considerably depending on the instrument used and the cultural context [15, 16]. Fear of childbirth is associated with anxiety, depression, insufficient social support, and unplanned pregnancy, and may adversely affect labour and the postpartum period [16, 17]. Anxiety, internal tension, childbirth-related fears, depressive experiences, and financial or household stress may reduce subjective quality of life even in the absence of severe somatic pathology. Therefore, psychological and emotional indicators should be considered as an independent component of quality of life assessment during pregnancy, rather than merely as accompanying complaints.

Social and family support during pregnancy is also of substantial importance. Recent studies have shown a positive association between perceived social support and quality of life among pregnant women; support from a partner, family members, and significant others may serve as an important resource for subjective well-being during pregnancy [18]. Empirical evidence from perinatal and postpartum contexts also suggests that social and family-related factors may be associated with higher quality of life among women [18, 19]. However, in most existing studies, family support is considered mainly as a general social resource, whereas practical family readiness for childbirth — including partner involvement, assistance with daily activities, discussion of newborn care, and distribution of responsibilities — is rarely distinguished as an independent component of assessment instruments.

Informational and medical preparedness is another important aspect of quality of life during pregnancy. It includes awareness of pregnancy and childbirth, the clarity of explanations provided by healthcare professionals, knowledge of actions to take in the event of possible complications, trust in the healthcare system, support from medical staff, and participation in organised forms of childbirth preparation. In its recommendations on antenatal care for a positive pregnancy experience, the WHO emphasises the importance of timely and adequate antenatal care, including information provision and psychological support for women, as a condition for a favourable course of pregnancy [20]. A systematic review and meta-analysis by Zaman et al. showed that antenatal education may improve maternal self-efficacy and reduce fear of childbirth, although the outcomes of such programmes may depend on the context, quality of implementation, and accessibility of services [21]. This supports the need to include an informational and medical domain in the thorough assessment of quality of life and readiness for childbirth.

In recent years, international literature has shown growing interest in the development of pregnancy-specific instruments for assessing quality of life. A systematic scoping review of instruments used to

assess parental quality of life during pregnancy and the postpartum period demonstrated substantial heterogeneity among available scales and incomplete evidence on their measurement properties [22]. For example, the PREG-QOL scale was developed as a new instrument for assessing quality of life during pregnancy and underwent psychometric testing, including the assessment of content and construct validity, factor structure, and reliability [23]. In parallel, pregnancy-specific adaptations of generic instruments have also been proposed [11]. Nevertheless, even contemporary instruments do not always distinguish family readiness for childbirth and informational and medical preparedness as separate domains. For countries and regions where family involvement in pregnancy and postpartum care is particularly significant, such differentiation may have particular practical value.

For Kazakhstan, the issue of systematically assessing quality of life among pregnant women remains insufficiently studied. In countries and regions with limited resources, assessing quality of life in pregnant women may be particularly useful for identifying needs related to physical, emotional, and social changes during pregnancy and for improving antenatal care [24]. Existing national studies have more often focused on satisfaction with antenatal care, selected aspects of perinatal service organisation, or women's psychological and emotional status. In particular, a study by Dauletyarova et al. showed that most women in an urban Kazakhstani context were satisfied with antenatal care; however, dissatisfaction was associated with lower educational level and organisational aspects of care [25]. Another study among Kazakhstani women with recurrent pregnancy loss identified the clinically and psychologically significant role of depression, anxiety, and stress [26].

However, the available literature lacks locally adapted instruments that simultaneously assess physical health, psychological and emotional well-being, social and family support, family readiness for childbirth, and informational and medical preparedness among pregnant women. This limits the possibilities for thorough assessment of pregnant women's needs in primary care and for the development of family-oriented antenatal support programmes.

The development of a new questionnaire requires not only a substantive justification of its domains but also a preliminary evaluation of its measurement properties. Contemporary recommendations for scale development emphasise the need for a stepwise process that includes construct definition, item generation, expert content assessment, evaluation of internal consistency, and further validation of the instrument [27]. The content validity index is widely used to provide quantitative evidence of expert agreement during questionnaire development [28]. In turn, the COSMIN guidelines and criteria for evaluating measurement properties emphasise that studies of patient-reported outcome measures should clearly describe the structure of the instrument, its reliability, validity, and the limitations of preliminary testing [29, 30].

In response to these gaps, we developed the PQoL-34 questionnaire as an instrument for the comprehensive assessment of women's quality of life during pregnancy and family readiness for childbirth. The questionnaire includes a socio-demographic section, four substantive domains, and a global self-rated quality of life item. The four domains reflect physical health and access to basic

healthcare, psychological and emotional well-being and perceived support, social and family support and family readiness, and informational and medical preparedness.

The aim of this study was to develop and conduct a preliminary psychometric evaluation of the PQoL-34 questionnaire for the comprehensive assessment of women's quality of life during pregnancy and family readiness for childbirth, based on data from a cross-sectional online study conducted in the southern region of Kazakhstan.

Methods

Study Design

This study was a quantitative cross-sectional online study comprising two interrelated stages.

The first stage included the development of the PQoL-34 questionnaire and expert assessment of its content validity. In the second stage, the final version of the questionnaire was administered through an online survey of pregnant women, followed by a preliminary psychometric evaluation of the instrument and analysis of its domains.

The questionnaire covers several aspects of quality of life during pregnancy, including physical health, psychological and emotional well-being, social and family support and family readiness for childbirth, informational and medical preparedness, and overall subjective assessment.

The manuscript was prepared with consideration of the main STROBE recommendations for reporting cross-sectional observational studies [31]. Given the aim of the study, this work was considered an instrument development and preliminary psychometric evaluation study rather than a full-scale validation of the scale. The general methodological approach was aligned with contemporary recommendations for evaluating the measurement properties of patient-reported outcome measures [32].

Setting and Study Period

The study was conducted in the southern region of the Republic of Kazakhstan from January 19 to February 19, 2026. The target population consisted of pregnant women receiving outpatient antenatal care.

Data were collected remotely via an electronic questionnaire hosted on Google Forms. The questionnaire link was distributed through WhatsApp messenger: primary healthcare specialists, including general practitioners, obstetricians, and gynaecologists, shared the link directly with pregnant women under their care and forwarded it to relevant patient group chats. No in-person recruitment was conducted. No follow-up reminders were sent, as individual responses could not be tracked given the anonymous nature of the survey.

Because the questionnaire link was distributed through messenger networks, the number of women who received or viewed the invitation was unknown; therefore, a conventional response rate could not be calculated.

Study Participants and Sampling

The study included pregnant women residing in the southern region of the Republic of Kazakhstan who were receiving outpatient antenatal care during the study period. A non-probability convenience sampling approach was used.

The inclusion criteria were as follows: confirmed pregnancy at the time of questionnaire completion, voluntary informed consent to participate in the study, and the ability to complete the questionnaire independently in electronic format.

Questionnaires submitted by women who did not provide informed consent were excluded from the analysis. During data processing, the dataset was additionally checked for duplicate records and completeness. No duplicate or unusable records requiring exclusion were identified.

A total of 486 electronic forms were received. Of these, 461 women confirmed informed consent and were included in the final analysis; the remaining 25 questionnaires, in which consent was not confirmed, were not included in the study sample.

Sample Size Justification

The scale-based part of the PQoL-34 consists of 25 items grouped into four domains. With 461 participants included in the study, the ratio was approximately 18 respondents per scale item, which exceeds commonly used practical recommendations for the ratio of observations to items in psychometric studies [33]. This sample size was considered sufficient for assessing internal consistency, conducting item analysis, performing a preliminary evaluation of data suitability for factor analysis, and examining correlations between domain scores and the global self-rated quality of life item.

Development of the PQoL-34 Questionnaire

The study instrument was the newly developed PQoL-34 questionnaire — the Pregnancy Quality of Life Questionnaire, 34 items. The full questionnaire comprised 34 questions: 8 socio-demographic and obstetric items, 25 main scale items distributed across four domains, and one global question assessing current quality of life on a 10-point scale.

The development of the instrument was based on an analysis of international scientific literature and existing conceptual approaches to the assessment of quality of life, maternal well-being, psychological

and emotional status, family support, family readiness for childbirth, and informational and medical preparedness.

At the initial stage, a targeted literature review was conducted in PubMed, Scopus, Web of Science, and Google Scholar. Primary attention was given to publications from the past 10 years; however, earlier studies on quality of life during pregnancy and approaches to its measurement were also considered when they had conceptual relevance.

Search queries were built around key concepts related to pregnancy, quality of life, maternal well-being, social and family support, health during pregnancy, and readiness for childbirth. The search was conducted using English-language terms and their combinations, including: pregnancy, quality of life, health-related quality of life, maternal well-being, social support, family support, pregnancy-related health, childbirth preparedness, and antenatal education.

Based on the literature analysis, the key substantive domains of the future questionnaire were identified, and an initial item pool was developed. During item development, consideration was given to content relevance, clarity for respondents, brevity, absence of ambiguity, and applicability to the real-life experiences of pregnant women.

Expert Assessment and Content Validity

The expert panel comprised nine specialists: obstetricians-gynaecologists (n = 2), general practitioners (n = 3), public health specialists (n = 2), a therapist (n = 1), and a psychiatrist/psychotherapist (n = 1). Eight of the nine experts held academic degrees (Doctor of Medical Sciences, PhD, or Candidate of Medical Sciences); one expert was a gynaecologist of the highest qualification category. Professional experience ranged from 20 to 44 years (median: 40 years). All experts were active practitioners at healthcare or higher education institutions in the southern region of Kazakhstan.

Content validity was assessed for the 25 scale items of the main part of the questionnaire and one global quality of life item. The socio-demographic and obstetric section was not included in the calculation of content validity indices, as it was used to describe the characteristics of the study participants.

To quantitatively assess content validity, the item-level content validity index (I-CVI), the scale-level content validity index based on the average method (S-CVI/Ave), the scale-level content validity index based on universal agreement (S-CVI/UA), and the modified kappa coefficient were calculated [28, 34]. Scores of 3 and 4 on the 4-point expert rating scale were considered to indicate confirmation of item relevance or clarity [34]. I-CVI and S-CVI values of at least 0.80 were regarded as an acceptable level of content validity for a preliminarily developed instrument [28].

Expert comments were used to refine item wording, eliminate semantic and stylistic ambiguities, and prepare the final version of the questionnaire for subsequent online administration and preliminary

psychometric evaluation.

Study Instrument and Questionnaire Structure

The questionnaire included an introductory information section in which participants were informed about the aim of the study, conditions of participation, the voluntary nature of participation, principles of anonymity and confidentiality, and the use of data only in aggregated form for scientific purposes.

Before the main section of the questionnaire, a mandatory informed consent item was presented. Respondents were asked to choose one of two response options: consent to participate or refusal to participate. Only after providing consent could a participant proceed to complete the rest of the questionnaire.

The main scale-based part of the PQoL-34 was designed to provide a comprehensive assessment of women's quality of life during pregnancy and included four domains: physical health and access to basic healthcare, psychological and emotional well-being and perceived support, social and family support and family readiness, and informational and medical preparedness.

The full English version of the PQoL-34 questionnaire is provided in Additional file 1.

Responses to the statements in the main part of the questionnaire were assessed using a 5-point Likert scale, where 1 indicated "strongly disagree," 2 "partly disagree," 3 "difficult to answer," 4 "partly agree," and 5 "strongly agree." Reverse coding was applied to selected items so that, in all cases, higher scores reflected a more favourable level of quality of life, support, or preparedness.

The domain structure, coding rules, and score calculation procedures for the PQoL-34 are presented in Table 1.

Table 1
Domain structure, coding rules, and score calculation procedures for the PQoL-34

Domain / score	Items	Number of items	Reverse-coded items	Scoring method	Interpretation
Physical health and access to basic healthcare	B1–B6	6	B2	Mean of B1, B2_rev, B3, B4, B5, and B6	A higher score indicates better physical health and better access to basic healthcare.
Psycho-emotional well-being and perceived support	C1–C7	7	C1, C5	Mean of C1_rev, C2, C3, C4, C5_rev, C6, and C7	A higher score indicates better psychological and emotional well-being and stronger perceived support.
Social and family support and family readiness	D1–D5	5	None	Mean of D1, D2, D3, D4, and D5	A higher score indicates stronger social and family support and greater family readiness for childbirth.
Informational and medical preparedness	E1–E7	7	None	Mean of E1, E2, E3, E4, E5, E6, and E7	A higher score indicates a higher level of informational and medical preparedness, trust in healthcare, and perceived support from healthcare professionals.
Total PQoL-34 score	B1–E7	25	B2, C1, C5	Mean of all B–E items after reverse coding of reverse-coded items	A higher score indicates a more favourable overall profile of quality of life and readiness for childbirth.
Global self-rated quality of life	One global item	1	None	Score on a 10-point scale	A higher score indicates a higher subjective rating of current quality of life.

Note. All items in the main domains were assessed using a 5-point Likert scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). Reverse coding was applied to items B2, C1, and C5 using the following formula: new score = 6 − original score. Thus, in all domains, a higher final score reflected a more favourable level of quality of life, support, or preparedness. The global self-rated quality of life item was analysed separately and was not included in the calculation of the total PQoL-34 score.

Linguistic Preparation and Bilingual Presentation of the Questionnaire

The PQoL-34 questionnaire was prepared in Kazakh and Russian for use among pregnant women in the southern region of Kazakhstan. The online form was presented in a single bilingual format: each

questionnaire item was displayed first in Kazakh and then in Russian. A separate option to select the language of completion was not provided; all participants saw both language versions simultaneously.

The two language versions were developed through sequential semantic harmonisation: the wording was checked in both directions, from Kazakh to Russian and back. Particular attention was paid to semantic equivalence of the items, consistency of terminology, and clarity of the questions for pregnant women. The approach to linguistic preparation was guided by general principles of cross-language and cultural adaptation of self-report instruments [35].

Following this reconciliation process, some formulations were refined to eliminate potential differences in meaning and interpretation of the scale statements. The Kazakh and Russian versions were fully identical in structure, item order, response options, and scoring rules. The English version was prepared for international presentation of the instrument and was also checked against the Kazakh and Russian versions to maintain terminological and content consistency.

Socio-demographic and Obstetric Characteristics

Block A of the questionnaire included items designed to collect socio-demographic and obstetric characteristics of the participants. This block included age, education level, marital status, gestational age with subsequent grouping by trimester, number of previous births, employment or regular occupation status, type of residence — urban or rural — and administrative region of residence.

Participants' age was analysed as a categorical variable and grouped into the following age categories: <20 years, 20–24 years, 25–29 years, 30–34 years, and ≥ 35 years. Education level was assessed using three categories: secondary education, specialised secondary education, and higher education. Marital status included the following categories: unmarried, married, and cohabiting. Employment was assessed as the presence or absence of work or regular occupation.

Gestational age was presented by trimester: first, second, and third trimester. The number of previous births was used as an obstetric characteristic and, for descriptive analysis, was grouped into the following categories: 0, 1, 2, and ≥ 3 previous births. During preliminary data processing, responses for this variable were standardised and converted into a unified numeric format.

Socio-demographic and obstetric characteristics were used to describe the analytical sample and to conduct additional comparative analysis of domain scores across selected participant subgroups.

PQoL-34 Domains and Calculation of Domain Scores

Domain B, "Physical Health and Access to Basic Healthcare" (6 items), covers subjective well-being, energy level, sleep, the ability to cope with daily activities, nutrition, and access to healthcare. Item B2 ("I often experience physical discomfort, such as pain, heaviness, etc.") was worded in the reverse direction and was therefore reverse coded.

Domain C, “Psycho-emotional Well-being and Perceived Support” (7 items), addresses anxiety, confidence in a favourable childbirth outcome, inner calmness, support from close relatives or significant others, the impact of household and financial difficulties, optimism about motherhood, and a sense of meaning in the ongoing experience. Items C1 and C5 were reverse-coded items.

Domain D, “Social and Family Support and Family Readiness” (5 items), describes partner involvement in childbirth preparation, help from family members with household activities, family discussion of future newborn care and distribution of responsibilities, and the subjective readiness of the family for the child’s birth. This domain included no reverse-coded items.

Domain E, “Informational and Medical Preparedness” (7 items), reflects awareness of pregnancy and childbirth, clarity of medical explanations, understanding of actions to take in the event of complications, attendance at courses for expectant mothers, trust in healthcare, perceived support from healthcare staff, and consideration of the woman’s opinion in decision-making. This domain included no reverse-coded items.

For each domain, a mean score was calculated based on the items included in that domain. The total PQoL-34 score was calculated as the mean of all 25 items in the main scale-based part after reverse coding of negatively worded statements. The global item assessing current quality of life on a 10-point scale was analysed separately and was not included in the total PQoL-34 score.

Study Variables

The main external criterion variable used to assess preliminary convergent validity was the pregnant woman’s overall subjective quality of life rating on a 10-point scale.

The main scale variables were the PQoL-34 domain scores: physical health and access to basic healthcare, psychological and emotional well-being and perceived support, social and family support and family readiness, informational and medical preparedness, and the total PQoL-34 score.

Socio-demographic and obstetric characteristics of the participants were additionally included in the analysis: age, education, marital status, pregnancy trimester, number of previous births, employment status, place of residence, and region.

Data Collection and Processing

Data were collected electronically using Google Forms. In describing the online survey procedure, selected reporting elements for internet-based surveys were considered, including the electronic format of the questionnaire, the method of link distribution, informed consent, and subsequent processing of electronic responses [36]. After the survey was closed, responses were exported into a database for verification, cleaning, and analysis. Since the form was unified and bilingual, with the same item structure and coding, all responses were included in a single analytical dataset.

Preliminary data processing included checking data completeness, identifying and removing duplicate records, standardising variables and response categories, and reverse coding items B2, C1, and C5 using the formula “new score = 6 − original score” so that, in all cases, a higher score reflected a more favourable level of quality of life, support, or preparedness.

Preliminary processing, data cleaning, and coding were performed in Microsoft Excel version 16.0. The main statistical analysis was conducted using IBM SPSS Statistics version 27.0.

Statistical Analysis

Descriptive statistics were applied to sample characteristics, item response distributions, and domain scores. Categorical variables are presented as frequencies and percentages, while quantitative variables are presented as means and standard deviations or medians and interquartile ranges, depending on the distribution. For domain scores, the total PQoL-34 score, and the global self-rated quality of life item, minimum and maximum values, skewness coefficient (As), floor effect, and ceiling effect were calculated. Floor and ceiling effects were defined as the proportion of participants with the minimum and maximum possible values of the corresponding score.

Content validity of the questionnaire was assessed based on expert evaluation. For each item, the item-level content validity index (I-CVI) and modified kappa coefficient were calculated. For the overall scale, the scale-level content validity index based on the average method (S-CVI/Ave) and the scale-level content validity index based on universal agreement (S-CVI/UA) were calculated.

Internal consistency was assessed using Cronbach’s alpha for the overall scale and for each domain. In addition, corrected item–total correlations and alpha values if an item was deleted were calculated. Internal consistency was interpreted using the commonly accepted threshold of $\alpha \geq 0.70$ for research scales. Values around 0.60–0.70 for individual domains were interpreted cautiously as acceptable at the stage of preliminary psychometric evaluation [37, 38], while a corrected item–total correlation of approximately 0.30 or higher was considered a practical indicator of a satisfactory contribution of an item to the corresponding domain [39].

The mean inter-item correlation was additionally calculated for each domain and used to assess the degree of item homogeneity within the domain and potential content redundancy. Mean inter-item correlation values were interpreted together with Cronbach’s alpha and corrected item–total correlations.

Preliminary suitability of the data for factor analysis was assessed at the level of individual domains using the Kaiser–Meyer–Olkin measure [40] and Bartlett’s test of sphericity [41]. In addition, the proportion of variance explained by the first principal component of each domain was assessed as an indicator of preliminary unidimensionality. Full exploratory and confirmatory factor analyses of the entire scale were not conducted in the present study, and the preliminary nature of the psychometric evaluation was taken into account when interpreting the results.

Preliminary convergent validity was assessed by analysing the associations between PQoL-34 domain scores and the overall subjective quality of life rating on a 10-point scale. Spearman's rank correlation coefficient was used as the main measure, as responses to most items were ordinal and a ceiling effect was expected for some variables. Pearson's correlation coefficient was additionally calculated to allow comparability with findings from other studies. The strength of correlations was interpreted according to commonly used thresholds as weak, moderate, or strong [42].

To assess differences in domain scores between participant groups, supplementary comparative analyses were performed. Urban and rural participants were compared using the Mann–Whitney U test. Differences by trimester, education level, and marital status were assessed using the Kruskal–Wallis test. Differences by employment status were assessed using the Mann–Whitney U test. Preliminary differentiation between domains was evaluated using inter-domain Pearson correlations. These comparisons were exploratory in nature; no correction for multiple testing was applied, and the results were considered supplementary rather than primary evidence of validity. A p value of < 0.05 was considered statistically significant.

Ethical Considerations

The study was conducted in accordance with the principles of voluntariness, anonymity, and confidentiality. Before completing the questionnaire, women were provided with information about the aim of the study, the conditions of participation, and the fact that the collected data would be used only in aggregated form and for scientific purposes.

Participation in the study was voluntary. Respondents could decline participation by not confirming informed consent in the electronic form. Access to the main part of the questionnaire was possible only after informed consent had been confirmed, which was considered an indication of voluntary participation in the online study.

The study was approved by the Local Bioethics Committee of JSC South Kazakhstan Medical Academy; a positive approval decision was issued on December 10, 2025, Protocol No. 8. According to the committee's conclusion, no violations were identified in the planning, recruitment, or conduct of the scientific study, and the protection of the rights, safety, and well-being of the study participants was ensured in accordance with the current legislation of the Republic of Kazakhstan and international ethical standards.

Results

Socio-demographic and Obstetric Characteristics of the Participants

The final analysis included 461 pregnant women from the southern region of Kazakhstan who confirmed informed consent to participate in the study. The mean age of the participants was 28.5 ± 6.1 years

(range: 17–45 years), and the median number of previous births was 2 (range: 0–8).

The largest age group consisted of participants aged 25–29 years — 135 women (29.3%). This was followed by women aged 20–24 years — 122 participants (26.5%) — and those aged 30–34 years — 103 participants (22.3%). Participants aged 35 years and older accounted for 85 women (18.4%), while women younger than 20 years accounted for 16 participants (3.5%).

Most respondents had higher education — 248 women (53.8%). Specialised secondary education was reported by 107 participants (23.2%), and secondary education by 106 participants (23.0%). The vast majority of participants were married — 440 women (95.4%). The sample was almost evenly represented by urban and rural participants: 233 women (50.5%) lived in urban areas, and 228 women (49.5%) lived in rural areas.

By gestational age, most participants were in the second and third trimesters: 202 women (43.8%) and 195 women (42.3%), respectively. A total of 64 participants (13.9%) were in the first trimester. The global self-rated current quality of life score on a 10-point scale was high: the mean value was 9.11 ± 1.52 points, and the median was 10.00 [9.00–10.00]. Detailed characteristics are presented in Table 2.

Table 2
Socio-demographic and obstetric characteristics of the study participants (N = 461)

Characteristic	Category / value	n (%) / M ± SD
Total participants	—	461 (100)
Age, years	mean ± SD; range	28.5 ± 6.1; 17–45
Age group	< 20 years	16 (3.5)
	20–24 years	122 (26.5)
	25–29 years	135 (29.3)
	30–34 years	103 (22.3)
	≥ 35 years	85 (18.4)
Number of previous births	mean ± SD; median; range	2.1 ± 1.7; Md = 2; 0–8
	0	95 (20.6)
	1	101 (21.9)
	2	85 (18.4)
	≥ 3	180 (39.0)
Education	secondary education	106 (23.0)
	specialised secondary education	107 (23.2)
	higher education	248 (53.8)
Marital status	unmarried	5 (1.1)
	married	440 (95.4)
	cohabiting	16 (3.5)
Employment status	employed / regularly occupied	254 (55.1)
	not employed / no regular occupation	207 (44.9)
Type of residence	urban	233 (50.5)
	rural	228 (49.5)
Administrative region of residence	Kyzylorda Region	66 (14.3)
	Turkestan Region	136 (29.5)

Note. M ± SD — mean ± standard deviation; Md — median; IQR — interquartile range. Data are presented as n (%) unless otherwise specified.

Characteristic	Category / value	n (%) / M ± SD
	Zhambyl Region	195 (42.3)
	other regions	64 (13.9)
Pregnancy trimester	first trimester	64 (13.9)
	second trimester	202 (43.8)
	third trimester	195 (42.3)
Global self-rated quality of life	1–10 points; M ± SD; Md [IQR]	9.11 ± 1.52; 10.00 [9.00–10.00]

Note. M ± SD — mean ± standard deviation; Md — median; IQR — interquartile range. Data are presented as n (%) unless otherwise specified.

Content Validity of the PQoL-34

The content validity of the PQoL-34 was assessed by an expert panel of nine specialists. A total of 26 evaluated items were included in the calculation: 25 items from the main scale-based part of the questionnaire and one global item assessing subjective quality of life. The socio-demographic and obstetric section was not included in the calculation of content validity indices, as it was used to describe the characteristics of the study participants.

For the relevance criterion, all evaluated items received full expert agreement. I-CVI values for this criterion were 1.000 for all items, with S-CVI/Ave = 1.000 and S-CVI/UA = 1.000. Modified kappa values were also 1.000 for all items.

For clarity of wording, I-CVI values ranged from 0.889 to 1.000. The scale-level content validity index based on the average method was S-CVI/Ave = 0.991, and the scale-level content validity index based on universal agreement was S-CVI/UA = 0.923. Modified kappa values ranged from 0.887 to 1.000. These results indicate a high level of content validity and expert agreement regarding the clarity of item wording.

The content validity results are presented in Table 3.

Table 3
Content validity of PQoL-34 items based on expert assessment

Expert assessment criterion	I-CVI range	S-CVI/Ave	S-CVI/UA	Modified kappa range
Content relevance	1.000–1.000	1.000	1.000	1.000–1.000
Clarity of wording	0.889–1.000	0.991	0.923	0.887–1.000

Note. I-CVI — item-level content validity index; S-CVI/Ave — scale-level content validity index based on the average method; S-CVI/UA — scale-level content validity index based on universal agreement;

modified kappa — modified kappa coefficient.

Descriptive Statistics of PQoL-34 Domains

Domain scores were calculated as the arithmetic mean of the included items, with possible values ranging from 1 to 5; reverse-coded items B2, C1, and C5 were recoded before score calculation. Descriptive statistics for PQoL-34 domain scores and the global self-rated quality of life item are presented in Table 4.

The mean values of all domain scores were in the upper part of the scale, indicating predominantly positive participant ratings across the main components of quality of life during pregnancy. The highest mean score was observed for Domain C, “Psycho-emotional Well-being and Perceived Support” — 4.63 ± 0.49 points, with a median of 4.86 [4.43–5.00]. Domain D, “Social and Family Support and Family Readiness,” also showed a high mean value — 4.50 ± 0.77 points, with a median of 4.80 [4.20–5.00].

Domain E, “Informational and Medical Preparedness,” had a mean score of 4.39 ± 0.67 points and a median of 4.57 [4.14–4.86]. The score for Domain B, “Physical Health and Access to Basic Healthcare,” was 4.29 ± 0.76 points, with a median of 4.50 [4.00–4.83]. The total PQoL-34 score, calculated across the 25 items of the main scale-based part, was 4.45 ± 0.55 points, with a median of 4.64 [4.20–4.84].

The distributions of domain scores were characterised by negative skewness and a shift of responses toward the upper part of the scale. A pronounced ceiling effect was observed for Domain D (47.5%) and Domain C (35.4%); for the total PQoL-34 score, the ceiling effect was 9.3%. Despite the high mean and median values, minimum values in individual domains ranged from 1.00 to 1.50 points, while the global self-rated quality of life score ranged from 1 to 10 points. This reflects the presence of some participants with low ratings in specific components of quality of life.

Table 4
Descriptive statistics of PQoL-34 domains and global self-rated quality of life

Score	Items	M	SD	Md [IQR]	Min-Max	As	Floor effect, %	Ceiling effect, %
Physical health and access to basic healthcare	6	4.29	0.76	4.50 [4.00-4.83]	1.50-5.00	-1.28	0.0	24.7
Psycho-emotional well-being and perceived support	7	4.63	0.49	4.86 [4.43-5.00]	1.00–5.00	-2.31	0.2	35.4
Social and family support and family readiness	5	4.50	0.77	4.80 [4.20-5.00]	1.00–5.00	-2.10	0.4	47.5
Informational and medical preparedness	7	4.39	0.67	4.57 [4.14–4.86]	1.00–5.00	-1.97	0.4	23.6
Total PQoL-34 score	25	4.45	0.55	4.64 [4.20–4.84]	1.20-5.00	-1.82	0.0	9.3
Global self-rated quality of life	1	9.11	1.52	10.00 [9.00–10.00]	1.00–10.00	-2.43	0.9	62.0

Note. M - mean; SD - standard deviation; Md - median; IQR - interquartile range; As - skewness coefficient. Floor and ceiling effects were calculated as the proportion of participants with the minimum and maximum possible values of the corresponding score. The global self-rated quality of life item was assessed on a 10-point scale and was not included in the total PQoL-34 score.

Internal Consistency of PQoL-34 Domains

The internal consistency of the PQoL-34 was assessed using Cronbach's alpha for the overall scale and separately for each domain. The overall internal consistency coefficient for the 25 items of the main scale-based part of the PQoL-34 was α = 0.918, indicating high consistency among the items of the overall scale.

At the domain level, α values ranged from 0.753 to 0.853. The highest values were obtained for Domain D, "Social and Family Support and Family Readiness" (α = 0.853), and Domain E, "Informational and Medical Preparedness" (α = 0.834). Domain B, "Physical Health and Access to Basic Healthcare," also demonstrated good internal consistency (α = 0.795). For Domain C, "Psycho-emotional Well-being and Perceived Support," the α value was 0.753, corresponding to acceptable internal consistency at the stage of preliminary psychometric evaluation.

Mean inter-item correlations across domains ranged from 0.32 to 0.56, indicating neither pronounced item redundancy nor substantial content heterogeneity. Corrected item–domain correlations exceeded the threshold of 0.30 in most cases. The lowest association with its domain was observed for the reverse-coded item C1_rev (0.288); however, its removal resulted in only a minimal increase in α, and therefore the item was retained.

Internal consistency results for the PQoL-34 domains are presented in Table 5.

Table 5
Internal consistency of PQoL-34 domains

Domain / score	Items	Cronbach's α	Mean inter-item r	Corrected item–domain r	α if item deleted	Interpretation
Physical health and access to basic healthcare	6	0.795	0.39	0.481–0.641	0.741–0.779	Good internal consistency; all items retained
Psycho-emotional well-being and perceived support	7	0.753	0.32	0.288–0.619	0.688–0.759	Acceptable internal consistency; all items retained
Social and family support and family readiness	5	0.853	0.56	0.638–0.765	0.796–0.831	Good internal consistency; all items retained
Informational and medical preparedness	7	0.834	0.51	0.376–0.773	0.787–0.898	Good internal consistency; item E4 requires substantive interpretation
Total PQoL-34 score	25	0.918	—	0.307–0.721	0.911–0.921	High internal consistency of the overall scale

Note. α — Cronbach's alpha coefficient; mean inter-item r — mean correlation between items within a domain; corrected item–domain r — range of corrected correlations between an item and the sum of the remaining items in the corresponding domain; α if item deleted — alpha value after removal of an individual item.

Detailed item-level descriptive and psychometric indicators for the 25 substantive items of the PQoL-34 are presented in Additional file 2.

Item Analysis and Preliminary Factorability Assessment

Additional item analysis of the PQoL-34 showed that most statements made a meaningful contribution to their corresponding domains. In Domain B, all items demonstrated acceptable corrected item–total

correlation values; the reverse-coded item B2_rev also showed an acceptable association with the domain score and was retained in the questionnaire structure.

In Domain C, the reverse-coded items C1_rev and C5_rev reflected the absence of pronounced anxiety and the absence of stress related to financial or household difficulties. Item C1_rev showed the lowest corrected item-domain correlation ($r = 0.288$), and its removal resulted in a marginal increase in α to 0.759 ($\Delta\alpha = +0.006$). Nevertheless, the item was retained as a substantively important indicator of psychological and emotional well-being.

In Domain E, item E4, "I attend classes or courses for expectant mothers," differed from the other items by having a lower mean value and higher variability of responses. This item reflects not only awareness but also the woman's actual participation in organised childbirth preparation. Therefore, it was retained in the PQoL-34 structure despite the increase in Cronbach's alpha that would result from its removal. At the same time, E4 requires further assessment in subsequent studies as a potential behavioural indicator of the availability and use of educational support.

The preliminary assessment of factorability showed acceptable to good KMO values across all domains: 0.826 for Domain B, 0.796 for Domain C, 0.860 for Domain D, and 0.875 for Domain E. Bartlett's test of sphericity was statistically significant for all domains ($p < 0.001$). The first component explained 49.6% of the variance in Domain B, 42.8% in Domain C, 64.7% in Domain D, and 59.7% in Domain E. These indicators do not contradict the preliminary unidimensionality of the individual domains and suggest that the data are suitable for further factor analysis in subsequent studies.

Preliminary Convergent Validity of the PQoL-34

Preliminary convergent validity of the PQoL-34 was assessed by examining the associations between domain scores and the total PQoL-34 score with an independent global quality of life item measured on a 10-point scale. Given the pronounced skewness of the global score, Spearman's correlation coefficient was considered the primary measure of association; Pearson's correlation coefficient is presented as an additional estimate.

All PQoL-34 domain scores showed statistically significant positive correlations with the global self-rated quality of life item. The strongest rank correlation was observed between the total PQoL-34 score and the global quality of life rating: $\rho = 0.605$; $r = 0.704$; $p < 0.001$. Among the individual domains, the highest Spearman correlation was found for Domain B, "Physical Health and Access to Basic Healthcare": $\rho = 0.557$; $p < 0.001$. For Domain C, Spearman's coefficient was $\rho = 0.536$; for Domain D, $\rho = 0.495$; and for Domain E, $\rho = 0.433$. All associations were statistically significant at $p < 0.001$.

Correlations between PQoL-34 domain and total scores and the global self-rated quality of life item are presented in Table 6.

Table 6
Correlations of PQoL-34 domain and total scores with global self-rated quality of life

PQoL-34 domain / score	Spearman's ρ	Pearson's r	p value	Interpretation
Physical health and access to basic healthcare	0.557	0.579	< 0.001	Moderate positive correlation
Psycho-emotional well-being and perceived support	0.536	0.623	< 0.001	Moderate positive correlation
Social and family support and family readiness	0.495	0.587	< 0.001	Moderate positive correlation
Informational and medical preparedness	0.433	0.550	< 0.001	Moderate positive correlation
Total PQoL-34 score	0.605	0.704	< 0.001	Moderate positive correlation; strongest among the examined scores

Note. ρ — Spearman's rank correlation coefficient; r — Pearson's correlation coefficient. The global self-rated quality of life item was assessed on a 10-point scale. All reported correlations were statistically significant at $p < 0.001$.

Inter-domain Correlations and Preliminary Differentiation of Domains

Inter-domain correlations ranged from 0.517 to 0.655 and were statistically significant in all cases ($p < 0.001$). These results confirm that the PQoL-34 domains are interrelated but do not fully duplicate one another. These findings support the preliminary justification of the four-domain structure of the instrument and allow the domains to be considered as distinguishable aspects of quality of life during pregnancy.

Inter-domain correlations of the PQoL-34 are presented in Table 7.

Table 7
Inter-domain correlations of the PQoL-34 (Pearson's r)

Domain	B	C	D	E
B. Physical health	1.000	0.609	0.526	0.570
C. Psycho-emotional well-being	0.609	1.000	0.655	0.612
D. Social and family support	0.526	0.655	1.000	0.517
E. Informational and medical preparedness	0.570	0.612	0.517	1.000

Note. All correlation coefficients were statistically significant at $p < 0.001$. B — physical health and access to basic healthcare; C — psychological and emotional well-being and perceived support; D — social and family support and family readiness; E — informational and medical preparedness.

Additional Group Comparisons

The additional comparative analysis was exploratory in nature and was not considered primary evidence of PQoL-34 validity. Given the skewed distribution of several scores and the pronounced ceiling effect, group differences were assessed using non-parametric tests. Means and standard deviations are presented descriptively to facilitate interpretation of the results.

By place of residence, statistically significant differences were observed for Domains B, C, and E. Rural participants had higher scores for Domain B (4.38 ± 0.72 vs 4.19 ± 0.79; $p = 0.011$), Domain C (4.69 ± 0.43 vs 4.57 ± 0.54; $p = 0.007$), and Domain E (4.53 ± 0.54 vs 4.26 ± 0.76; $p < 0.001$) compared with urban participants. No statistically significant differences by place of residence were found for Domain D ($p = 0.974$). The total PQoL-34 score was also higher among rural participants compared with urban participants (4.53 vs 4.38; $p = 0.004$). These differences were interpreted as exploratory and were not used as primary evidence of instrument validity.

When domain scores were compared across the first, second, and third trimesters of pregnancy, no statistically significant differences were identified: $p = 0.443$ for Domain B, $p = 0.085$ for Domain C, $p = 0.122$ for Domain D, and $p = 0.629$ for Domain E. The total PQoL-34 score also did not differ by trimester ($p > 0.05$). These results indicate relative stability of domain scores across gestational periods in the study sample.

In the additional analysis, the total PQoL-34 score did not show statistically significant differences by education level ($p = 0.960$) or employment status ($p = 0.168$). Differences by marital status were statistically significant ($p < 0.001$); however, due to the small size of the unmarried subgroup ($n = 5$), this result was considered preliminary and was not used for the main conclusions.

Discussion

Main Findings

This study aimed to develop and conduct a preliminary psychometric evaluation of the PQoL-34 questionnaire, a newly developed instrument for the comprehensive assessment of women's quality of life during pregnancy and family readiness for childbirth. The findings showed that the PQoL-34 demonstrated high content validity, acceptable to good internal consistency across individual domains, and statistically significant positive correlations with global self-rated quality of life.

The content validity of the questionnaire was confirmed through expert assessment. All evaluated items reached an acceptable level according to the criteria of relevance and clarity of wording. S-CVI/Ave

values were high for both relevance and clarity, indicating the content validity of the PQoL-34 structure and the correspondence of its items to the proposed domains. This approach is consistent with recommendations on the use of the content validity index in questionnaire development and evaluation [28, 43].

The overall internal consistency of the main scale-based part of the PQoL-34 was high, with Cronbach's α = 0.918. Because the PQoL-34 is a multidomain instrument, the overall Cronbach's alpha should be interpreted as an indicator of general item coherence rather than as evidence of unidimensionality of the entire scale. Individual domains also demonstrated acceptable to good values: α = 0.795 for physical health and access to basic healthcare, α = 0.753 for psychological and emotional well-being and perceived support, α = 0.853 for social and family support and family readiness, and α = 0.834 for informational and medical preparedness. These findings indicate the preliminary reliability of the instrument and support consideration of the PQoL-34 as a promising scale for further validation. Internal consistency was interpreted with reference to the commonly accepted use of Cronbach's alpha in psychometric research [38, 44].

Comprehensive Assessment of Quality of Life During Pregnancy

Quality of life during pregnancy is a multidimensional concept and cannot be reduced solely to physical well-being or the presence of medical complaints. The WHO defines quality of life as an individual's subjective perception of their position in life within the context of culture, value systems, goals, expectations, and standards [1]. Pregnancy affects physical health, emotional stability, the level of family support, access to information, trust in healthcare professionals, and the readiness of the woman and her family for childbirth and subsequent childcare. Therefore, the development of a multidomain instrument covering several interrelated domains is methodologically justified [6].

The structure of the PQoL-34 reflects this multidimensional approach. Domain B assesses physical health and access to basic healthcare; Domain C assesses psychological and emotional well-being and perceived support; Domain D assesses social and family support and family readiness; and Domain E assesses informational and medical preparedness. This structure makes it possible not only to obtain an overall quality of life score but also to identify specific areas in which a pregnant woman may need additional support.

The observed correlations between domain scores and global self-rated quality of life indicate that all four domains are associated with the subjective perception of quality of life. The strongest association was found between the total PQoL-34 score and global self-rated quality of life, supporting the preliminary convergent validity of the instrument.

Comparison With International Approaches to Assessing Quality of Life During Pregnancy

International studies on quality of life during pregnancy also emphasise the need for a multidomain approach. Contemporary instruments designed to assess quality of life among pregnant women generally include physical, emotional, social, and healthcare-related aspects. For example, the PREG-QOL scale was developed as a pregnancy-specific instrument for assessing quality of life during pregnancy and underwent psychometric testing, including assessment of content and construct validity, factor structure, and reliability [23]. Earlier, a pregnancy-specific quality of life scale for normal pregnancy was also proposed, demonstrating the need to account for women's specific experiences during pregnancy [13].

The PQoL-34 is conceptually close to this approach, as it also considers quality of life during pregnancy as a broad, multidomain construct. However, a distinctive feature of the PQoL-34 is the more explicit identification of family readiness for childbirth as an independent substantive component. In the present study, family support is not considered only as a general social resource. Rather, it includes the involvement of a spouse or partner, practical assistance from family members, discussion of future newborn care, distribution of responsibilities, and the moral and practical readiness of the family for childbirth.

This emphasis corresponds to the focus of the present study and has practical relevance for the Kazakhstani context, where the family is central to decision-making, emotional support, and organisation of care for the mother and child. The inclusion of a family-oriented domain thus expands the traditional assessment of quality of life among pregnant women and makes the instrument more sensitive to the social and cultural context. The importance of social and family environment for quality of life among pregnant women is also supported by international studies [6, 18, 45].

Interpretation of PQoL-34 Domain Scores

In the study sample, the mean and median values of all domain scores were located in the upper part of the scale. The highest score was obtained for Domain C, "Psycho-emotional Well-being and Perceived Support," indicating predominantly positive emotional self-perception among the participants and a high level of perceived support. Domain D, "Social and Family Support and Family Readiness," also showed a high mean score, reflecting the important role of family resources during pregnancy. These findings are consistent with data from a systematic review in which quality of life among pregnant women was considered to be associated with physical health, gestational age, family support, and socioeconomic conditions [6].

At the same time, high mean values do not indicate the absence of vulnerable groups. Minimum values in individual domains ranged from 1.00 to 1.50 points, while global self-rated quality of life ranged from 1 to 10 points. This indicates the presence of some participants with low ratings in specific components of quality of life. Therefore, the PQoL-34 may be useful not only for overall assessment but also for identifying women who may require additional physical, psychological and emotional, family-related, or informational and medical support.

Domain E, “Informational and Medical Preparedness,” deserves particular attention. Overall, participants gave high ratings for awareness, clarity of physicians’ explanations, trust in the healthcare system, and support from medical staff. However, item E4, related to attendance at classes or courses for expectant mothers, had the lowest mean value and the greatest variability of responses. This may indicate insufficient availability, irregular provision, or low engagement of pregnant women in organised educational programmes for childbirth preparation.

From a psychometric perspective, E4 differed from the other items in Domain E: it had the lowest mean value (M = 3.05; SD = 1.60), and removing this item increased the domain’s Cronbach’s alpha to 0.898. This indicates its relative content heterogeneity compared with items reflecting awareness, trust in physicians, and support from medical staff. Nevertheless, item E4 was retained in the PQoL-34 structure because its corrected correlation with the domain remained above the minimally acceptable level (r = 0.376), and the item itself has important substantive value. It reflects not only subjective informational and medical preparedness but also the woman’s actual participation in organised antenatal educational support. The relevance of this item is consistent with evidence on the role of antenatal education in reducing fear of childbirth and increasing women’s confidence in preparation for childbirth [21].

Family Support and Family Readiness as a Key Component of the PQoL-34

One of the most important findings of this study is that the family component demonstrated both substantive and psychometric significance within the PQoL-34 structure. Domain D showed good internal consistency and a statistically significant positive association with global self-rated quality of life. This indicates that family support and family readiness are not secondary factors but substantively important components of quality of life during pregnancy. International studies also show a positive association between social support and quality of life among pregnant women [18, 45].

The highest ratings in Domain D were related to the moral and practical readiness of the family, assistance with daily activities, and involvement of the spouse or partner. At the same time, the item reflecting the distribution of responsibilities for childcare had a relatively lower score compared with other items in the domain. This may indicate that emotional readiness of the family is perceived as higher than concrete planning of responsibilities after the child’s birth.

This observation regarding the gap between emotional and practical family readiness has practical significance. Antenatal care and childbirth preparation programmes may be more effective if they are oriented not only toward the pregnant woman but also toward the family. Involving the partner and close relatives in educational and counselling activities may contribute to more stable support for the woman during pregnancy and after childbirth. This approach is consistent with evidence on the importance of social support and antenatal education for maternal well-being [18, 21, 45].

Practical Implications of the Instrument

The PQoL-34 may have practical relevance for primary healthcare, antenatal clinics, obstetric and gynaecological services, and antenatal support programmes. The instrument makes it possible to assess not only overall quality of life but also specific problem areas, including physical health, psychological and emotional well-being, family support, and informational and medical preparedness.

The use of the PQoL-34 in practice may help healthcare professionals identify women with low scores in specific domains — including those related to anxiety, stress, fatigue, insufficient family support, or lack of participation in childbirth preparation courses — and refer them for additional counselling, psychological and emotional support, educational sessions, or family-oriented support. This is consistent with the contemporary approach to the use of patient-reported outcome measures as instruments that reflect the patient's subjective condition and needs [29]. In public health, the PQoL-34 may be used as a tool for monitoring the needs of pregnant women and evaluating the effectiveness of educational, preventive, and family-oriented programmes. In scientific research, the PQoL-34 may be used as an instrument for the full assessment of quality of life among women during pregnancy and family readiness for childbirth, as well as a basis for the subsequent development of antenatal support programmes.

Limitations of the Study

This study has several limitations. First, it was conducted as a cross-sectional online survey, which limits the ability to establish causal relationships. Second, the sample was recruited from the southern region of Kazakhstan and cannot be considered fully representative of all pregnant women in the country. Third, the data were based on participants' self-reports, which may be associated with social desirability bias and a tendency to select higher response options.

In addition, a pronounced ceiling effect was observed for several domains. It was most evident for Domain D, "Social and Family Support and Family Readiness," Domain C, "Psycho-emotional Well-being and Perceived Support," and the global self-rated quality of life item. This may reflect a predominantly favourable perception of pregnancy, a high level of family support, and positive self-assessment of health and well-being among most participants. At the same time, a pronounced ceiling effect may limit the ability of the instrument to distinguish between participants who already have high levels of quality of life, support, and preparedness. Therefore, the high scores obtained in this study should be interpreted with caution, particularly when comparing groups with generally favourable profiles. Nevertheless, the presence of minimum values in individual domains indicates that the PQoL-34 may identify participants with less favourable ratings in specific components of quality of life.

It should also be noted that the present study represents a preliminary psychometric evaluation rather than a full validation of the instrument. At this stage, a full assessment of the factor structure of the entire scale using exploratory and confirmatory factor analysis was not performed. The stability of results over time and the responsiveness of the instrument to change were also not assessed. In accordance with contemporary approaches to evaluating the measurement properties of questionnaires,

further validation should include assessment of the factor structure, reliability, different aspects of validity, and interpretability of results [29, 30].

Future Research Directions

Further studies should focus on extended validation of the PQoL-34 in more diverse samples of pregnant women from different regions of Kazakhstan. Exploratory and confirmatory factor analyses should be conducted, test–retest reliability should be assessed, discriminant and criterion validity should be examined, and the responsiveness of the instrument to changes during pregnancy and after the implementation of educational or supportive programmes should be evaluated. These stages are consistent with recommendations for assessing the measurement properties of patient-reported outcome measures [29, 30].

Items C1 and E4 require particular attention in subsequent studies. Item C1, which is related to anxiety, showed the lowest association with the psychological and emotional well-being domain, although it was retained as a substantively important indicator of emotional state. Item E4, which reflects attendance at classes or courses for expectant mothers, requires further assessment as a potential behavioural indicator of the availability and use of antenatal educational support. In the next stages of validation, it will be necessary to determine whether E4 should remain part of the informational and medical preparedness domain or be considered as a separate additional indicator related to the availability of educational programmes for pregnant women.

Another promising direction is the analysis of factors associated with low scores for quality of life and family readiness. Such factors may include place of residence, age, education, employment status, gestational age, number of previous births, availability of healthcare services, and participation in childbirth preparation courses. These issues may serve as a basis for subsequent analytical publications.

Summary of Findings and Study Significance

The findings of this study indicate that the PQoL-34 is a promising newly developed instrument for the comprehensive assessment of women’s quality of life during pregnancy and family readiness for childbirth. The instrument demonstrated high content validity, good overall internal consistency, and preliminary evidence of convergent validity. Pilot use of the PQoL-34 made it possible to identify predominantly high levels of quality of life and family support in the study sample, as well as specific areas requiring attention, including participation in organised childbirth preparation courses and the presence of some participants with low scores in several components of quality of life.

Thus, the PQoL-34 may be considered a basis for further validation and use in scientific research, antenatal support, and public health programmes aimed at supporting pregnant women and families preparing for childbirth.

Conclusions

In the present study, the PQoL-34 questionnaire was developed for the comprehensive assessment of women's quality of life during pregnancy and family readiness for childbirth, and its preliminary psychometric evaluation was conducted. The instrument includes four substantive domains: physical health and access to basic healthcare, psychological and emotional well-being and perceived support, social and family support and family readiness, and informational and medical preparedness.

The study findings showed that the PQoL-34 demonstrated high content validity, high overall internal consistency, and preliminary evidence of convergent validity. All questionnaire domains were statistically significantly associated with global self-rated quality of life, indicating the substantive relevance of the included components for assessing the subjective well-being of pregnant women.

Pilot use of the PQoL-34 in the southern region of Kazakhstan showed predominantly high levels of quality of life, psychological and emotional well-being, family support, and informational and medical preparedness among the study participants. At the same time, the presence of low values among some participants and a pronounced ceiling effect in several domains indicate the need for cautious interpretation of the results and further testing of the instrument in more diverse samples.

The inclusion of the social and family support and family readiness domain has particular practical importance, as it enables assessment not only of the individual condition of the pregnant woman but also of the family resource related to preparation for childbirth. Lower and more variable scores for the item related to attendance at courses for expectant mothers further emphasise the need to develop structured educational programmes and family-oriented antenatal support.

Thus, the PQoL-34 may be considered a promising newly developed instrument for scientific research and public health practice aimed at assessing quality of life among pregnant women and identifying needs for additional support. Further studies should include extended validation of the instrument, exploratory and confirmatory factor analyses, assessment of test–retest reliability, and evaluation of the applicability of the PQoL-34 across different regions and groups of pregnant women.

Abbreviations

ANC — antenatal care
CFA — confirmatory factor analysis
COSMIN — COnsensus-based Standards for the selection of health Measurement INstruments
CVI — content validity index
EFA — exploratory factor analysis
HRQoL — health-related quality of life
I-CVI — item-level content validity index
KMO — Kaiser–Meyer–Olkin measure
PQoL-34 — Pregnancy Quality of Life Questionnaire, 34 items

PROM — patient-reported outcome measure
S-CVI/Ave — average scale-level content validity index
S-CVI/UA — scale-level content validity index based on universal agreement
STROBE — Strengthening the Reporting of Observational Studies in Epidemiology
WHO — World Health Organization

Declarations

Ethics approval and consent to participate

The study was conducted in accordance with the principles of the Declaration of Helsinki and relevant national and institutional guidelines for research involving human participants. The study was approved by the Local Bioethics Committee of South Kazakhstan Medical Academy, Shymkent, Kazakhstan (Protocol No. 8, 10 December 2025). Participation was voluntary and anonymous. Before completing the questionnaire, participants were informed about the aim of the study, the voluntary nature of participation, confidentiality, and the use of data only in aggregated form for scientific purposes. All participants provided informed consent electronically before completing the online questionnaire.

Consent for publication

Not applicable.

Availability of data and materials

The data supporting the findings of this study are included in the article and its additional files. The raw dataset generated and analysed during the current study is not publicly available due to confidentiality, personal data protection requirements, and ethical restrictions. De-identified data may be made available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

This research received no external funding.

Authors' contributions

GD developed the original idea of the study, designed the PQoL-34 questionnaire, organised the main stages of the research, contributed to data collection, literature review, and drafting of the manuscript.

GS supervised the research, reviewed the methodological approach, and critically revised the manuscript for scientific accuracy and intellectual content.

KK provided methodological and statistical support, contributed to interpretation of the findings, assisted with manuscript revision and language editing, and acted as the corresponding author. All authors read and approved the final manuscript.

Acknowledgements

The authors thank the healthcare professionals who assisted in disseminating the online questionnaire and the pregnant women who participated in the study.

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