Research article

# Health-related quality of life among Moroccan women after vaginal birth and cesarean section: Cross-sectional study

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## ARTICLE INFO

## ABSTRACT

Background: During the postpartum period, understanding women's well-being, specifically their Health-related Quality of Life (HRQoL), is vital for comprehensive healthcare.

Objectives: Our study aims to explore the HRQoL and its associated factors in Moroccan women after vaginal birth (VB) and cesarean section (CS).

Study design: In this cross-sectional study we assessed the HRQoL and its associated factors among Moroccan women who gave birth at the provincial hospital center of Settat. We gathered data from 566 women, using the EQ-5D-5L instrument alongside questionnaires about socioeconomic and obstetrical aspects. The assessment was conducted utilizing the improved Relative to an Identified Distribution (RIDIT) approach, and we employed a multiple linear regression model to pinpoint the associated factors.

Results: A total of 566 women were included in our study. Our results revealed that the HRQoL in women who underwent CS was significantly lower than in VB women (EQ-5D index score = $0.30 \pm 0.28$ vs $0.61 \pm 0.31$; $p < 0.0001$). Similarly, the CS reduced the EQ-VAS score (mean difference = $-10.73 \pm 3.78$; $p < 0.0001$). The CS was associated negatively with problems in mobility (ARI = 55 % [42–67], $p < 0.0001$), autonomy (ARI = 67 % [57–80], $p < 0.0001$), and usual activities (ARI = 56 % [42–69], $p < 0.0001$). Also, CS was associated with pain/discomfort (ARI = 47 % [34–60], $p < 0.0001$) and anxiety/depression (ARI = 3 % [-5.8-12.6], $p = 0.31$). The women who had birth complications had the worst HRQoL (EQ-5D index score = 0.32) compared to those who had no complications (EQ-5D index score = 0.56). Likewise, women who had postpartum complications had the worst HRQoL (EQ-5D index score = 0.39 vs EQ-5D index score = 0.54).

Conclusion: The results highlighted that mode of birth, childbirth complications, and postpartum complications are strongly associated with women's HRQoL. The EQ-5D-5L dimensions were affected after delivery. Hence, there is a requirement to create specialized initiatives for overseeing postpartum HRQoL, aiming to enhance the quality of maternal healthcare.

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## 1. Introduction

As medical understanding evolves, it is clear that assessing health outcomes based on survival and medical parameters is insufficient. It is increasingly recognized that patients' perspectives, even if subjective, are crucial [1]. This shift has led to the emergence of health-related quality of life (HRQoL) as a fundamental dimension that considers how individuals perceive their well-being within their unique cultural and value contexts.

The World Health Organization (WHO) defines HRQoL as an individual's assessment of their life context, influenced by their cultural environment, values, aspirations, and concerns [2]. While medical care during pregnancy often emphasizes clinical aspects, it is recognized that non-clinical elements, such as emotional well-being and self-confidence, also play an important role in shaping the overall experience.

Women's perceived HRQoL is important for understanding perinatal health, which is usually influenced by clinical and non-clinical variables, including physical, psychological, and social dimensions [3,4]. The HRQoL is an important indicator of healthcare activity and can be used to track medical outcomes [5]. Variations in the HRQoL of women during pregnancy have been reported [6,7]. Significant differences were observed between trimesters. Understanding of these fluctuations could provide useful insights into the changing needs and concerns of pregnant women at each gestational age [8].

The postpartum period is a time of significant change and adaptation for women following a vaginal birth (VB) or cesarean section (CS) [9–12].In this experience, the assessment of women's HRQoL is of twofold interest. Firstly, to have complete information on HRQoL before and after childbirth. On the other hand, to address more specific management public health interventions to improve women's well-being. Previous research has demonstrated that the mode of childbirth can have a profound impact on women's postpartum HRQoL. Studies by Kavosi et al. and Fobelets et al. found that women who underwent CS reported lower HRQoL scores compared to those who had VB [11,12]. Similarly, Ali et al. observed differences in postpartum HRQoL between women in semi-urban Bangladesh, with mode of delivery being a significant factor [10]. Moreover, Slavin et al. validated the importance of assessing physical and mental health during the postpartum period in an Australian population, highlighting the need for comprehensive HRQoL measures [9].

While previous research has explored HRQOL among patients with different chronic diseases [13,14] and the multifaceted impact of childbirth on women's HRQoL [9–13], there is limited understanding, particularly in Morocco. Our study serves as a pioneering effort on the African continent to bridge this gap and provide insights that are relevant globally.

Drawing from previous research, our primary objective is to assess and compare the HRQoL of Moroccan women following VB and CS. We hypothesize that the mode of delivery significantly influences HRQoL, with varied impacts across distinct dimensions of well-being. Additionally, we aim to identify the associated factors, as well as the specific dimensions that are most affected by different modes of delivery.

## 2. Materials and methods

### 2.1. Study design and settings

It is a cross-sectional study of the postpartum women's HRQoL in rural and urban areas in the province of Settat. This study was conducted between November 2021 and April 2022 to assess the postpartum HRQoL and risk factors among women who had given birth via CS or VB at the provincial hospital Hassan II in Settat.

The group of participants consisted of women who were admitted to the maternity ward of Settat Provincial Hospital. To be eligible for the study, women had to be Moroccan, understand and speak Arabic, have given birth to a single baby, and not have any ongoing mental or physical illnesses. Their deliveries could be either vaginal or by cesarean section, but not forceps-assisted or vacuum-assisted vaginal deliveries. Our study specifically aimed to assess the HRQoL in women following childbirth, focusing on the impact of CS versus VB with or without episiotomy. The exclusion of instrumental births (forceps or vacuum) was a deliberate decision to maintain the study's scope, ensuring a focused analysis of the primary variables. This choice was influenced by limitations in available data and sample size. By concentrating on the two most prevalent delivery methods, we aimed to provide clinically relevant insights into the HRQoL outcomes associated with these common modes of delivery.

Once the women were categorized based on their delivery method as documented in their medical records, those who agreed to participate were given an HRQoL questionnaire (EQ-5D-5L) to complete. Additionally, information about their socio-economic status and obstetric characteristics was gathered. Women outside the postpartum period were excluded.

The interviewers involved in this study were Ph.D. students in the health sciences who had prior specialized instruction. They assisted illiterate participants in completing the questionnaire. Before documenting the data, two members of the group's researchers independently assessed the accuracy of the gathered data. They scrutinized for interviewer errors, issues related to measurement and coding, and instances of repetition (interviewing the same participant more than once).

### 2.2. Study size

According to the National Population and Family Health Survey (ENPSF) conducted in 2018, the proportion of CS in Morocco was around 15.1 %. In order to select a representative sample of the study population, the minimum number of women to be included in this study was calculated by:

$$n = \frac{p(1-p)\left(Z_{1-\alpha/2}\right)^2}{\Delta^2}$$

With an expected proportion of p = 0.15 and for a 95 % confidence interval (α = 0,05) and a precision of $\Delta = 0.03$, the minimum number of women to be interviewed was n = 544. With an expected non-response rate of 10 %, the total target sample was 598. Of the 598 women we approached, 566 gave their consent to take part in the study, with a response rate of 95 %.

### 2.3. Participants and variables

The women who met the inclusion criteria were chosen based on their medical records. Only women without psychiatric and/or chronic conditions and with singleton newborn were included. We also used the medical records to determine the mode of birth. To answer the questions, the interviewer conducted a 20-min interview. The first section of the questionnaire includes ten questions about socioeconomic factors (age, education, marital status, ethnicity, spouse presence, number of children, internet access, employment status, home, and socioeconomic level) and obstetric characteristics (parity, ANC visits, gestational complications, mode of birth, childbirth complication, and postpartum complication).

In terms of HRQoL, we used the EuroQol 5D-5L (EQ-5D-5L) questionnaire, a standardized measure of health status developed by the EuroQol Group, to provide a simple and generic measure of health for clinical and economic evaluation, and which has been internationally validated for the measurement of HRQoL. We used the validated Moroccan dialect version of the EQ-5D-5L questionnaire [15]. Mobility, self-care, usual activities, pain/discomfort, and anxiety/depression are the five dimensions used to determine a respondent's health status. There are five severity levels within each dimension, including no problem, slight problem, moderate problem, severe problem, and extreme problem. A participant's response was converted into a five-digit number that described their health state; for example, 12543 is the health state equivalent to no problems in mobility, slight problems in self-care, extreme problems in usual activities, severe problems in pain/discomfort, and moderate problems in anxiety depression.

The five-digit health states were transformed into utility scores, which are available for numerous countries using an appropriate algorithm. It would be appropriate to estimate utilities using a value set from another country when utility scores are not available. We used the France value set to generate utility scores using the EuroQol program because the Moroccan value set for the EQ-5D-5L has not yet been generated [16].

The evaluation of the HRQoL, as gauged through five dimensions, was supplemented by a comprehensive self-reported evaluation of one's overall health. This evaluation was acquired through a Visual Analogue Scale (EQ-VAS), which provided a personal and subjective assessment of health. Represented as a vertical line with markings ranging from 0 (extremely poor health) to 100 (excellent health), participants were requested to indicate their perception of their health by drawing a line between these points and recording the corresponding score.

### 2.4. Statistical methods

We utilized Statistical Package for the Social Science (SPSS) version 19 for data analysis. To evaluate the normality of quantitative parameters such as EQ-VAS and EQ-5D index, we conducted Shapiro-Wilk and Kolmogorov-Smirnov tests. Variables with a normal distribution were presented as means with their corresponding standard deviations (SD), while categorical variables were reported using absolute and relative frequency. The EQ-5D index and EQ-VAS were considered as the dependent variables. To compare the socio-demographic, economic, perinatal, and HRQoL attributes among the groups categorized by mode of delivery, we utilized Student's t-tests and ANOVA for continuous variables. A multiple linear regression was used to study the association between the HRQoL (measured by EQ-5D index and EQ-VAS) among postpartum women and the socio-demographic and obstetrical variables.

The impact of the delivery method on the HRQoL for women was evaluated by contrasting EQ-5D-5L information between the comparison groups. This analysis involved comparing overall scores, visual analog scales (VAS), and EQ-5D-5L aspects. To examine each EQ-5D-5L dimension, which was represented by a ranked variable indicating the severity level, we employed an enhanced technique centered on the RIDIT method [17] The RIDIT statistics were carried out using the RIDIT Excel program [18].

The improved RIDIT method considers the severity of EQ-5D-5L dimensions, allowing computation of absolute risk reduction/absolute risk increase (ARR/ARI) and the Odds$_{ordinal}$ ratio. This improved RIDIT approach facilitates a detailed examination of the five dimensions of EQ-5D-5L, leading to enhanced accuracy in comprehending the impact of a specific condition on health status. In our investigation, we evaluated the influence of delivery mode on the HRQoL of postpartum women. Hence, for each EQ-5D-5L dimension, the impact of delivery mode was gauged using ARI and Odds$_{ordinal}$. Our findings suggest that a Caesarean delivery could elevate challenges related to mobility, autonomy, and usual activities, along with increased instances of anxiety/depression and pain/discomfort among postpartum women. This rise is then quantified for each EQ-5D-5L dimension in terms of ARI%. For instance, if a Caesarean section leads to an increase in anxiety/depression, we state that postpartum women experience an ARI% higher level of anxiety/depression (or the increase in anxiety/depression due to Caesarean section is ARI% among postpartum women). Using the improved RIDIT approach, we also calculated the Odds$_{ordinal}$ (hypothesis, women delivered via Caesarean section exhibit an Odds$_{ordinal}$ times greater likelihood of experiencing anxiety/depression compared to women delivered vaginally). The analysis of behavioral shifts due to delivery mode was conducted using the Stuart-Maxwell marginal homogeneity test for two interrelated samples. The p-values were appropriately adjusted using the Holm-Bonferroni correction.

**Table 1**

Characteristics of postpartum women by mode of delivery (n = 566).

| Variables | All participants (n = 566) | Vaginal birth (n = 446) | Cesarean Section (n = 120) | *p*-value |
|---|---|---|---|---|
| | n (%) | n (%) | n (%) | |
| *Sociodemographic and socioeconomic characteristics* | | | | |
| **Age** | | | | **0.003** |
| 17-24 | 237 (41.9) | 201 (45.1) | 36 (30.0) | |
| 25-34 | 237 (41.9) | 182 (40.8) | 55 (45.8) | |
| 35-44 | 92 (16.3) | 63 (14.1) | 29 (24.2) | |
| **Marital status** | | | | 0.508 |
| Single | 8 (1.4) | 7 (1.6) | 1 (0.8) | |
| Married | 556 (98.2) | 438 (98.2) | 118 (98.3) | |
| Widow | 2 (0.4) | 1 (0.2) | 1 (0.8) | |
| **Education level** | | | | **0.005** |
| Illiterate | 204 (36.0) | 144 (32.3) | 60 (50.0) | |
| Primary | 220 (38.9) | 184 (41.3) | 36 (30.0) | |
| Middle/High school | 123 (21.7) | 102 (22.9) | 21 (17.5) | |
| University | 19 (3.4) | 16 (3.6) | 3 (2.5) | |
| **Ethnicity** | | | | 0.183 |
| Amazigh | 78 (13.8) | 57 (12.8) | 21 (17.5) | |
| Arab | 488 (86.2) | 389 (87.2) | 99 (82.5) | |
| **Place of residence** | | | | 0.399 |
| Rural | 378 (66.8) | 294 (65.9) | 84 (70.0) | |
| Urban | 188 (33.2) | 152 (34.1) | 36 (30.0) | |
| **Husband presence** | | | | 0.181 |
| Oui | 483 (85.3) | 376 (84.3) | 107 (89.2) | |
| Non | 83 (14.7) | 70 (15.7) | 13 (10.8) | |
| **Number of children** | | | | 0.636 |
| <3 | 442 (78.1) | 349 (78.3) | 93 (77.5) | |
| 3-6 | 121 (21.4) | 94 (21.1) | 27 (22.5) | |
| >6 | 3 (0.5) | 3 (0.7) | 0 (0.0) | |
| **Presence of pets** | | | | **0.012** |
| Yes | 150 (26.5) | 129 (28.9) | 21 (17.5) | |
| No | 416 (73.5) | 317 (71.1) | 99 (82.5) | |
| **Internet access** | | | | 0.850 |
| Yes | 131 (23.1) | 104 (23.3) | 27 (22.5) | |
| No | 435 (76.9) | 342 (76.7) | 93 (77.5) | |
| **Job** | | | | 0.588 |
| Yes | 32 (5.7) | 24 (5.4) | 8 (6.7) | |
| No | 534 (94.3) | 422 (94.6) | 112 (93.3) | |
| **Monthly income (MAD)** | | | | 0.923 |
| <2500 | 213 (37.6) | 165 (37.0) | 48 (40.0) | |
| 2500-4999 | 288 (50.9) | 230 (51.6) | 58 (48.3) | |
| 5000-7499 | 48 (8.5) | 38 (8.5) | 10 (8.3) | |
| >7500 | 17 (3.0) | 13 (2.9) | 4 (3.3) | |
| *Pregnancy characteristics* | | | | |
| **Parity** | | | | 0.038 |
| Primipara | 211 (37.3) | 176 (39.5) | 35 (29.2) | |
| Multipara | 355 (62.7) | 270 (60.5) | 85 (70.8) | |
| **Antenatal consultation** | | | | 0.718 |
| Yes | 413 (73.0) | 327 (73.3) | 86 (71.7) | |
| No | 153 (27.0) | 119 (26.7) | 34 (28.3) | |
| **Pregnancy complication** | | | | **0.001** |
| Yes | 112 (19.8) | 68 (15.2) | 44 (36.7) | |
| No | 454 (80.2) | 378 (84.8) | 76 (63.3) | |
| *Childbirth characteristics* | | | | |
| **Episiotomy** | | | | – |
| Yes | 283 (50.0) | 283 (63.5) | 0 (0.0) | |
| No | 283 (50.0) | 163 (36.5) | 120 (100.0) | |
| **Childbirth complication** | | | | **0.001** |
| Yes | 52 (9.2) | 22 (4.9) | 30 (25.0) | |
| No | 514 (90.8) | 424 (95.1) | 90 (75.0) | |
| **Postpartum complication** | | | | 0.099 |
| Yes | 25 (4.4) | 23 (5.2) | 2 (1.7) | |
| No | 541 (95.6) | 423 (94.8) | 118 (98.3) | |
| *Health-related quality of life* | | | | |
| **EQ-5D Index** | 0.54 | 0.61 | 0.30 | **0.001** |
| **EQ-VAS** | 74.88 | 77.15 | 66.42 | **0.006** |

## 3. Results

### 3.1. Socioeconomic and obstetrical characteristics

The final sample comprised 566 women, of whom 446 (78.8 %) gave birth vaginally and 120 (21.2 %) by cesarean section. Socioeconomic, obstetric and newborn characteristics are presented in Table 1. Over 40 % (237) of participants were in the 17–24 age group. Five hundred fifty-six (98.2 %) were married, 220 (39 %) had a primary education, 378 (66.8 %) lived in rural areas, 68 (12.0 %) were of Amazigh ethnicity and 534 (94.3 %) were housewives (Table 1).

Regarding the pregnancy characteristics, 355 (62.7 %) women were multiparous, and 413 (73 %) mothers had at least two antenatal visits. Among VB women 283 delivered with episiotomy (63.5 % of VBs), 112 (19.8 %) reported having gestational complications, 52 (9.2 %) had a dystocic delivery and 25 (4.4 %) had immediate postpartum complications (Table 1).

### 3.2. Health-related quality of life

The EQ-VAS and EQ-5D utility mean values were 74.88 and 0.54, respectively. However, women delivered by CS had significantly lower HRQoL (EQ-VAS-mean = 66.42; $p < 0.0001$) and (EQ-Index-mean = 0.30; $p < 0.0001$) compared to women with VB.

Analyzing the EQ-5D-5L health dimensions separately, our results showed that the majority of immediate postpartum women reported health problems in four dimensions, namely mobility (57.80 %), autonomy (53.20 %), usual activities (70.70 %) and pain/discomfort (79.00 %). Concerning depression/anxiety, more than 83 % of women had no problems (Fig. S1). Comparing the HRQoL of women with VB and women with CS, we observed that women who underwent a CS indicated a higher number of challenges compared to those who had a VB across four out of the five health dimensions. The reported levels of anxiety or depression were generally minimal across all delivery modes. Experiencing an episiotomy during a VB was negatively associated with postpartum HRQoL in the same health dimensions as a CS, albeit to a lesser degree (Fig. 1).

To better understand the effect of the mode of delivery on HRQoL, we used RIDIT analysis to assess this effect. The results of the improved RIDIT approach showed a significant impact of the mode of delivery on all dimensions of the EQ-5D-5L, except for anxiety/depression. Indeed, HRQoL decreased when the mode of delivery was CS or episiotomy. The higher difference was observed between CS and VB without episiotomy, in all dimensions. When comparing HRQoL in women with VB without episiotomy and those with CS, autonomy was the dimension most affected (ARI = 67 % [57–80], $p < 0.0001$; i.e., CS increased problems in autonomy by about 67 %), followed by usual activities (ARI = 56 % [42–69], $p < 0.0001$), mobility (ARI = 55 % [42–67], $p < 0.0001$) and pain/discomfort (ARI = 47 % [34–60], $p < 0.0001$). When comparing HRQoL in women who had VB with episiotomy and those delivered by CS, autonomy was the dimension most affected (ARI = 52 % [40–64], $p < 0.0001$), followed by mobility (ARI = 37 % [26–49], $p < 0.0001$), usual activities (ARI = 30 [18–42], $p < 0.0001$) and pain/discomfort (ARI = 24 % [13–36], $p < 0.0001$) (Table 2).
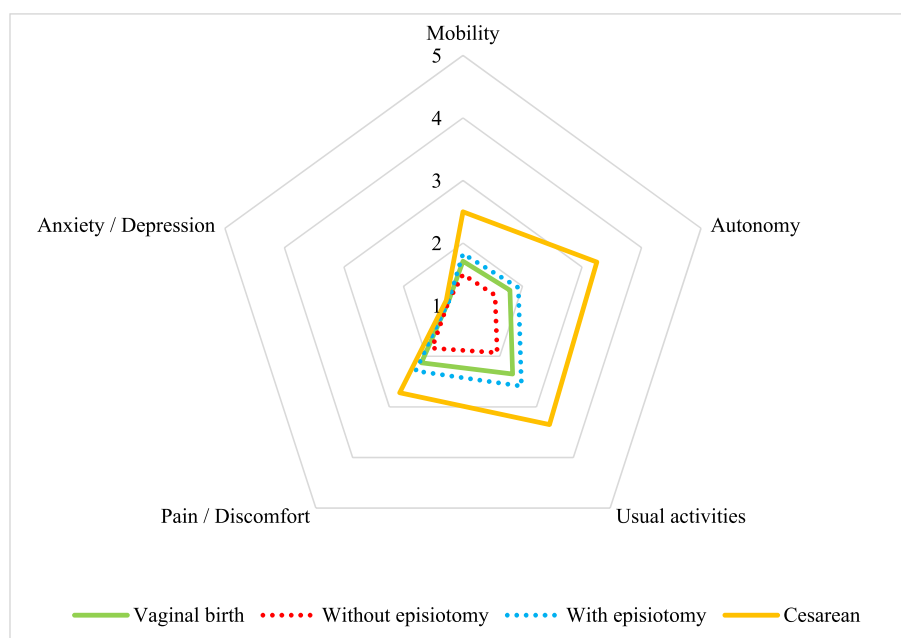


**Fig. 1.** Average level of HRQoL postpartum problems. It represents the level of postpartum problems in EQ-5D-5L health dimensions by mode of delivery.

**Table 2**

Improved RIDIT analysis of EQ-5D-5L dimensions of postpartum women's quality of life by mode of delivery.

| Dimension | Mode of delivery | ARI% [CI$_{min\%}$ – CI$_{max\%}$] | Odds$_{Ordinal}$ [CI$_{min}$ – CI$_{max}$] | p-value |
|---|---|---|---|---|
| **Mobility** | Without episiotomy/With episiotomy | 28 [18–39] | 2.61 [2.05–3.32] | **<0.0001** |
| | With episiotomy/Cesarean | 37 [26–49] | 3.10 [2.18–4.41] | **<0.0001** |
| | Without episiotomy/Cesarean | 55 [42–67] | 5.69 [4.21–7.67] | **<0.0001** |
| **Autonomy** | Without episiotomy/With episiotomy | 22 [12–32] | 2.15 [1.66–2.78] | **<0.0001** |
| | With episiotomy/Cesarean | 52 [40–64] | 4.51 [3.25–6.25] | **<0.0001** |
| | Without episiotomy/Cesarean | 67 [57–80] | 8.63 [6.38–11.65] | **<0.0001** |
| **Usual activities** | Without episiotomy/With episiotomy | 29 [18–40] | 2.28 [1.71–3.03] | **<0.0001** |
| | With episiotomy/Cesarean | 30 [18–42] | 2.22 [1.49–1] | **<0.0001** |
| | Without episiotomy/Cesarean | 56 [42–69] | 4.99 [3.48–7.14] | **<0.0001** |
| **Pain/Discomfort** | Without episiotomy/With episiotomy | 24 [14–35] | 2.15 [1.59–2.90] | **<0.0001** |
| | With episiotomy/Cesarean | 24 [13–36] | 2.06 [1.42–2.97] | **<0.0001** |
| | Without episiotomy/Cesarean | 47 [34–60] | 4.45 [3.07–6.42] | **<0.0001** |
| **Anxiety/Depression** | Without episiotomy/With episiotomy | 0.8 [-6–7] | 0.94 [0.55–1.60] | 0.38 |
| | With episiotomy/Cesarean | 4 [-4–12.1] | 1,31 [0.82–2.07] | 0.24 |
| | Without episiotomy/Cesarean | 3 [-5.80–12.6] | 1.23 [0.73–2.06] | 0.31 |

### 3.3. HRQoL associated factors

The determinants of postpartum women's HRQoL are illustrated in Table S1. The data showed no significant impact of age, marital status, ethnicity, level of education, employment, place of residence, presence of husband, number of children, parity, or antenatal visits on participants' HRQoL. However, mode of delivery and complications during delivery were significantly associated with EQ-5D scores (p < 0.0001 and p < 0.0001 respectively) as well as with VAS scores (p < 0.0001 and p = 0.005 respectively).

Women with VB had better HRQoL than women with CS (EQ-5D = 0.61 and VAS = 77.15 vs. EQ-5D = 0.30 and VAS = 66.42 respectively). Similarly, women who had no complications during delivery had a better HRQoL than women with complications (EQ-5D = 0.56 and VAS = 75.76 vs. EQ-5D = 0.32 and VAS = 66.15 respectively).

In addition, postpartum complications were identified as predictors associated with EQ-5D. Women experiencing postpartum complications exhibited the lowest HRQoL (EQ-5D = 0.39, p = 0.01). Furthermore, internet access, monthly income, and pregnancy complications were found to be associated with VAS scores (p < 0.0001, p = 0.001, and p < 0.0001 respectively).

Women with access to the internet, with a monthly income >7500 MAD, or with gestational complications had the lowest HRQoL (Table S1).

Table 3 shows the EQ-VAS, the EQ-5D index value, and the problems reported in all dimensions in postpartum women in different conditions, with and without complications. All conditions studied were associated with HRQoL, except for complications during childbirth. Whatever the conditions, the dimension that poses the most problems for postpartum women is pain/discomfort. Moreover, compared with other modes of delivery, women who gave birth by CS reported more problems in each dimension (Table 3).

Multiple linear regression showed that childbirth and postpartum complications, as well as cesarean section, were the main predictors of poor HRQoL in postpartum women (Table S2).

## 4. Discussion

### 4.1. Main findings

Using the EQ-5D-5L instrument, this cross-sectional study aimed to highlight the HRQoL of postpartum Moroccan women based on the mode of delivery, as well as the socio-economic and obstetric factors that influence it. The main findings indicated that childbirth can have a negative impact on women's HRQoL, even in the case of a normal delivery, leading to lower EQ-5D index and EQ-VAS scores. Additionally, it is after a CS that the EQ-5D index and EQ-VAS scores of pregnant women are the lowest. The results of our study demonstrate that the majority of women in immediate postpartum reported health issues in several dimensions of their HRQoL, including mobility, autonomy, usual activities, and pain/discomfort. These findings are consistent with other studies conducted in similar contexts [19]. These difficulties can be attributed to physiological changes and the traumas associated with childbirth, such as the impact of pain, exhaustion, and adapting to the new maternal responsibilities, on the health of postpartum women [20,21].

For instance, Petrou et al. (2016) found a significantly higher proportion of women delivering by CS reported moderate to extreme pain or discomfort compared to those undergoing spontaneous VB [22]. This aligns with our results, which showed a negative association with HRQoL dimensions such as mobility, autonomy, usual activities, and pain/discomfort among women who underwent CS. Similarly, Sadat et al. (2013) concluded that VB leads to better physical health at 2 months after delivery and better mental health at 4 months after delivery, highlighting the potential long-term implications of the mode of delivery on HRQoL [23]. These findings underscore the importance of minimizing unnecessary CS and promoting VB to optimize maternal well-being. Contrary to our findings and those of other studies, Kavosi et al. (2015) found no statistically significant differences in overall HRQoL between modes of delivery [11]. However, it's important to note that HRQoL is a multidimensional construct encompassing various physical, psychological, and social aspects, and differences may exist in the specific dimensions assessed across studies [2]. Additionally, Majzoobi et al. (2014) reported significantly higher HRQoL in women with VB compared to those with CS, emphasizing the importance of considering the

**Table 3**

EQ-VAS, EQ-5D index (standard deviation), and reported problems (percentage) in EQ-5D dimensions in postpartum women under different conditions for three modes of delivery.

| Condition | VB without episiotomy | VB with episiotomy | CS | All | P-value |
|---|---|---|---|---|---|
| Primiparous | N = 26 | N = 150 | N = 35 | N = 211 | |
| EQ-VAS | 77.12 (19.24) | 74.47 (25.39) | 70.86 (25.79) | 74.19 (24.74) | 0.604 |
| EQ-5D Index | 0.67 (0.33) | 0.57 (0.30) | 0.30 (0.28) | 0.53 (0.32) | **0.0001** |
| Mobility | 7 (26.92) | 91 (60.66) | 27 (77.14) | 125 (59.24) | **0.0001** |
| Autonomy | 12 (46.15) | 77 (51.33) | 30 (85.71) | 119 (56.39) | **0.0001** |
| Usual activities | 15 (57.69) | 106 (70.66) | 30 (85.71) | 151 (71.56) | 0.051 |
| Pain/Discomfort | 12 (46.15) | 113 (75.33) | 33 (94.28) | 158 (74.88) | **0.0001** |
| Anxiety/Depression | 3 (11.54) | 22 (14.66) | 8 (22.85) | 33 (15.63) | 0.406 |
| *Multiparous* | *N = 137* | *N = 133* | *N = 85* | *N = 355* | |
| EQ-VAS | 78.21 (19,75) | 79.10 (22.17) | 64.59 (26.20) | 75.28 (22.91) | **0.0001** |
| EQ-5D Index | 0.73 (0.29) | 0.51 (0.30) | 0.29 (0.28) | 0.54 (0.33) | **0.0001** |
| Mobility | 43 (31.38) | 89 (66.71) | 70 (82.35) | 202 (56.90) | **0.0001** |
| Autonomy | 36 (26.27) | 71 (53.38) | 75 (88.23) | 182 (51.26) | **0.0001** |
| Usual activities | 67 (48.90) | 104 (78.19) | 78 (91.76) | 249 (70.14) | **0.0001** |
| Pain/Discomfort | 86 (62.77) | 114 (85.71) | 77 (90.85) | 277 (78.02) | **0.0001** |
| Anxiety/Depression | 24 (17.52) | 22 (16.54) | 16 (18.82) | 62 (17.46) | 0.911 |
| *Pregnancy complication* | *N = 28* | *N = 40* | *N = 44* | *N = 112* | |
| EQ-VAS | 70.00 (19.10) | 71.75 (17.15) | 64.89 (14.40) | 68.62 (16.79) | 0.153 |
| EQ-5D Index | 0.63 (0.33) | 0.60 (0.31) | 0.40 (0.28) | 0.53 (0.31) | **0.002** |
| Mobility | 13 (46.40) | 21 (52.50) | 36 (81.80) | 70 (62.50) | **0.002** |
| Autonomy | 13 (46.40) | 20 (50.00) | 36 (81.80) | 69 (61.60) | **0.001** |
| Usual activities | 17 (60.70) | 22 (55.00) | 36 (81.80) | 75 (67.00) | **0.023** |
| Pain/Discomfort | 19 (67.90) | 36 (90.00) | 38 (86.40) | 93 (83.00) | **0.043** |
| Anxiety/Depression | 4 (14.30) | 2 (5.00) | 5 (11.40) | 11 (9.80) | 0.414 |
| *No pregnancy complication* | *N = 135* | *N = 243* | *N = 76* | *N = 454* | |
| EQ-VAS | 79.70 (18.86) | 77.45 (24.88) | 67.30 (31.02) | 76.42 (24.76) | **0.001** |
| EQ-5D Index | 0.74 (0.28) | 0.53 (0.30) | 0.23 (0.26) | 0.54 (0.33) | **0.0001** |
| Mobility | 37 (27.40) | 159 (65.40) | 61 (80.30) | 257 (56.60) | **0.0001** |
| Autonomy | 35 (25.90) | 128 (52.70) | 69 (90.80) | 232 (51.10) | **0.0001** |
| Usual activities | 65 (48.10) | 188 (77.40) | 72 (94.70) | 325 (71.60) | **0.0001** |
| Pain/Discomfort | 79 (58.50) | 191 (78.60) | 72 (94.70) | 342 (75.30) | **0.0001** |
| Anxiety/Depression | 23 (17.00) | 42 (17.30) | 19 (25.00) | 84 (18.50) | 0.279 |
| *Childbirth complication* | *N = 5* | *N = 17* | *N = 30* | *N = 52* | |
| EQ-VAS | 83.00 (9.74) | 75.88 (24.57) | 57.83 (23.84) | 66.15 (24.90) | **0.013** |
| EQ-5D Index | 0.43 (0.41) | 0.43 (0.25) | 0.25 (0.29) | 0.32 (0.30) | 0.104 |
| Mobility | 3 (60.00) | 15 (88.20) | 24 (80.00) | 42 (80.80) | 0.381 |
| Autonomy | 3 (60.00) | 12 (70.60) | 26 (86.70) | 41 (78.80) | 0.250 |
| Usual activities | 4 (80.00) | 14 (82.40) | 26 (86.70) | 44 (84.60) | 0.890 |
| Pain/Discomfort | 4 (80.00) | 16 [10,94] | 29 (96.7) | 49 (94.20) | 0.348 |
| Anxiety/Depression | 0 (0.00) | 3 (17.60) | 6 (20.00) | 9 (17.3) | 0.564 |
| *No childbirth complication* | *N = 158* | *N = 266* | *N = 90* | *N = 514* | |
| EQ-VAS | 77.88 (19.42]) | 76.69 (24.01) | 69.28 (26.35) | 75.76 (23.30) | **0.013** |
| EQ-5D Index | 0.72 (0.29) | 0.55 (0.31) | 0.31 (0.27) | 0.56 (0.32) | **0.0001** |
| Mobility | 47 (29.70) | 165 (62.00) | 73 (81.10) | 285 (55.40) | **0.0001** |
| Autonomy | 45 (28.50) | 136 (51.10) | 79 (87.80) | 260 (50.60) | **0.0001** |
| Usual activities | 78 (49.40) | 196 (73.70) | 82 (91.10) | 356 (69.30) | **0.0001** |
| Pain/Discomfort | 94 (59.50) | 211 (79.30) | 81 (90.00) | 386 (75.10) | **0.0001** |
| Anxiety/Depression | 27 (17.10) | 41 (15.40) | 18 (20.00) | 86 (16.70) | 0.595 |
| *Postpartum complication* | *N = 6* | *N = 17* | *N = 2* | *N = 25* | |
| EQ-VAS | 80.83 (16.85) | 75.59 (19.99) | 80.00 (28.28) | 77.20 (19.10) | 0.839 |
| EQ-5D Index | 0.62 (0.30) | 0.36 (0.20) | 0.03 (0.07) | 0.39 (0.26) | **0.011** |
| Mobility | 3 (50.00) | 16 (94.10) | 2 (100.00) | 21 (84.00) | **0.030** |
| Autonomy | 3 (50.00) | 15 (88.20) | 2 (100.00) | 20 (80.00) | 0.107 |
| Usual activities | 4 (66.70) | 16 (94.10) | 2 (100.00) | 22 (88.00) | 0.194 |
| Pain/Discomfort | 2 (33.30) | 17 (100.00) | 2 (100.00) | 21 (84.00) | **0.0001** |
| Anxiety/Depression | 0 (0.00) | 4 (23.50) | 0 (0.00) | 4 (16.00) | 0.356 |
| *No postpartum Complication* | *N = 157* | *N = 266* | *N = 118* | *N = 541* | |
| EQ-VAS | 77.93 (19.32) | 76.71 (24.26) | 66.19 (26.16) | 74.77 (23.79) | **0.0001** |
| EQ-5D Index | 0.72 (0.29) | 0.55 (0.31) | 0.30 (0.28) | 0.54 (0.33) | **0.0001** |
| Mobility | 47 (29.90) | 164 (61.70) | 95 (80.50) | 306 (56.60) | **0.0001** |
| Autonomy | 45 (28.70) | 133 (50.00) | 103 (87.30) | 281 (51.90) | **0.0001** |
| Usual activities | 78 (49.70) | 194 (72.90) | 106 (89.80) | 378 (69.90) | **0.0001** |
| Pain/Discomfort | 96 (61.10) | 210 (78.90) | 108 (91.50) | 414 (76.50) | **0.0001** |
| Anxiety/Depression | 27 (17.20) | 40 (15.00) | 24 (20.30) | 91 (16.80) | 0.437 |

long-term implications of the mode of delivery on maternal well-being [24]. Our study aligns with these findings, as we observed a negative association with HRQoL dimensions among women who underwent CS or episiotomy compared to those with VB. Furthermore, Mahumud et al. (2019) and Tola et al. (2021) highlighted CS as a factor negatively influencing changes in HRQoL, particularly in terms of physical and overall HRQoL. These studies underscore the need to address factors associated with lower HRQoL in postpartum women, such as CS, to improve maternal well-being [10,25].

While our study and Mousavi et al. (2013) identified a positive link between VB and HRQoL in primiparous women, the latter found no significant association between mode of delivery and HRQoL in multiparous women. This inconsistency highlights the intricate interplay of factors influencing HRQoL in multiparous women, such as prior childbirth experiences, parity-specific physiological alterations, and social support systems [26]. Our study did not find a significant relationship between the frequency of antenatal care visits and HRQoL among postpartum women. These results differ from previous studies that have shown an association between a lack of regular antenatal consultation and a decrease in HRQoL [10,27]. However, it's important to note that other factors can influence this complex relationship. Further research is needed to better understand the specific impact of antenatal care visits on HRQoL and potential moderating factors that might be involved.

Our study also explored the relationship between HRQoL among postpartum women and various socio-demographic factors. Regarding maternal age, our findings demonstrated that there was no significant relationship between the mother's age and HRQoL. However, this contrasts with studies conducted by Tola et al. (2021) and Bodhare et al. (2015) which reported a decrease in HRQoL among women under the age of 20 [25,28]. Conversely, other studies, such as Al Rehaili et al. (2023) and Rezaei et al. (2016), found that HRQoL was better among women under the age of 26 [29,27]. These discrepancies suggest that the association between maternal age and HRQoL is intricate and may be associated with other factors. Regarding education, our findings do not show any significant association between the mother's level of education and HRQoL. However, this differs from the conclusions of Khwepeya et al. (2020), who observed a decrease in HRQoL among women with a high level of education [30]. Conversely, other studies have noted an increase in HRQoL with higher levels of education. Concerning employment, our results do not confirm the general notion that women who work have a better HRQoL. In contrast to Jeong et al. (2021) and other researchers, we did not find a significant association between employment and HRQoL [31]. Nevertheless, it is important to note that Chinweuba et al. (2018) found a decrease in HRQoL among working women [32].

We found that ethnic background has no association with postpartum HRQoL among the participants. This can be explained by the fact that all Moroccan women, whether Amazigh or Arab, follow the same tradition after childbirth. Women receive a lot of assistance during the transitional period after giving birth and often spend the postpartum period, especially the first forty days, at their mother's or in-laws' home to receive the necessary support until their recovery, which is essential for a new mother in Morocco [33]. Regarding the presence of the husband, our findings do not demonstrate any significant relationship with HRQoL. However, Al Rehaili et al. (2023) and Negron et al. (2013) found that the presence of the husband was associated with better HRQoL [29,34]. Cultural and social factors specific to our study population may have influenced these differing outcomes. Traditional gender role expectations assign women the primary responsibility for maternity and postpartum care. In our society, women can be supported by an extended family network, particularly by other female family members such as mothers, sisters, or grandmothers.

In our study, we observed an inverse relationship between monthly income and HRQoL among postpartum women. As monthly income increases, HRQoL decreases. Our findings were in concordance with those of Bodhare et al. (2015) and Mahumud et al. (2019) reported a decrease in HRQoL as monthly income decreased [10,28]. However, Khwepeya et al. (2020) and Chinweuba et al. (2018) found a positive association of HRQoL with rising monthly income [30,32]. These contradictory results underline the complexity of the relationship between monthly income and postpartum HRQoL among women. Contextual factors specific to our study population, such as socio-economic conditions and cultural differences, could account for these disparities. Regarding Internet usage, we found that simply having access to the Internet was negatively associated with postpartum HRQoL compared to women who do not have Internet access. While Yang et al. (2022) observed that Internet addiction is common among pregnant and postpartum Chinese women and is significantly linked to lower HRQoL [35]. It's important to note that excessive or problematic internet use, including excessive screen time or engaging in negative online interactions, can have adverse effects on maternal HRQoL. This can lead to reduced social interactions, sleep disturbances, or a feeling of being overwhelmed due to an abundance of information or comparisons with others.

In our study, we found a significant association between pregnancy complications and poor postpartum HRQoL. These results are consistent with other studies, such as the one conducted by Rezaei et al. (2016), which also observed an improvement in HRQoL among women without complications during pregnancy [27]. Gestational complications can have long-term physical, emotional, and social consequences, impacting women's perception of health and overall well-being after childbirth. It is crucial to implement preventive measures, promptly detect complications, and provide appropriate management to enhance postpartum HRQoL. Within our research, a significant correlation was observed between complications during childbirth and poor HRQoL among postpartum women. Women who experienced complications during childbirth exhibited a decline in their HRQoL after delivery. This correlation between childbirth complications and HRQoL aligns with the common intuition that obstetric complications can have adverse effects on maternal health and postpartum well-being. Complications during childbirth can lead to physical, psychological, and emotional consequences, which can impact women's perception of health and HRQoL during the postpartum period.

### 4.2. Strengths and limitations

Our study significantly contributes to clinical practice and health policy by carefully examining the HRQoL of postpartum women in Morocco, an area previously unexplored. Through advanced statistical analysis, we thoroughly explored the impact of various delivery modes on different aspects of HRQoL, providing valuable insights for healthcare professionals. The findings highlight the

importance of customizing management programs to match specific birthing methods, thus improving women's well-being. Moreover, our study emphasizes the need for policymakers to recognize the influence of birth mode on women's HRQoL, supporting the implementation of supportive interventions and postnatal consultation programs. Integrating these findings into clinical practice and health policy, we can introduce a more comprehensive approach to caring for postpartum women, ultimately improving their overall well-being. As perspectives, e-PROMs (electronic-Patient-Reported Outcomes) will be implemented in healthcare services, which allow monitoring of the HRQoL in women during the postnatal period.

Various factors are taken into account for a comprehensive understanding of the HRQoL of women during the postpartum period. However, it should be noted that only healthy women were included in this study. As a result, the findings cannot be generalized to women with significant health issues, who may have differing levels of HRQoL. Additionally, conducting a prospective study to compare the HRQoL at different stages of the postpartum period would be preferable. In this approach, the same questionnaire would be administered to the same women on three occasions during the acute, subacute, and delayed phases. This methodology would allow for the comparison of the same group of women at each phase of the postpartum period, making the results more reliable.

## 5. Conclusion

This study marks the first exploration of postpartum HRQoL in Africa, encompassing a comprehensive evaluation without referencing a specific pathology. Our findings hold broader implications, enabling cross-country comparisons of post-childbirth HRQoL and its determinants. This information becomes pivotal for policymakers seeking to grasp the impact of birth mode on women's HRQoL. By enhancing postnatal consultation programs and introducing supportive interventions, a positive HRQoL trajectory can be facilitated, addressing the spectrum of changes spanning pregnancy, delivery, and postpartum phases.

Furthermore, the cross-mode comparison of HRQoL provides a foundation for tailored management programs. Specific interventions geared towards distinct modes of birth can be developed, enhancing women's well-being. This study empowers healthcare professionals to factor in the mode of delivery when devising therapeutic strategies or planned interventions for postpartum women, ushering in a comprehensive approach to holistic care.

## Disclosure of interests

We declare no competing interest.

## Details of ethics approval

The Hassan First University Scientific Research Commission granted ethical permission. The respondents were given a letter requesting their participation and permission to publish the results. This work is part of the objectives outlined in Hassan First University's institutional Project FP/01/2018, which was accepted by the research committee. The study was carried out in accordance with the Helsinki Declaration and was authorized by Hassan First University's ethical committee under the IRB number CERSBSS/UH1/P1/19. After being assured of the anonymity of the questionnaires, the confidentiality of their data, no impact on postpartum care for them or their newborns, and their freedom to withdraw at any moment during the interviews, postpartum women signed a formal consent form.

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## Data availability statement

All data generated or analyzed during this study are included in this article. Raw files and additional information will be available by the corresponding author upon reasonable request.

## CRediT authorship contribution statement

**Amal Boutib:** Writing – review & editing, Writing – original draft, Software, Resources, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Samia Chergaoui:** Visualization, Conceptualization. **Asmaa Azizi:** Formal analysis, Data curation. **Doha Achak:** Investigation, Data curation. **El Madani Saad:** Supervision, Software, Project administration, Methodology. **Abderraouf Hilali:** Visualization, Validation, Supervision, Project administration, Funding acquisition. **Chakib Nejjari:** Visualization, Validation, Supervision, Resources. **Ibtissam Youlyouz-Marfak:** Writing – review & editing, Visualization, Validation, Supervision, Resources, Project administration, Funding acquisition. **Abdelghafour Marfak:** Writing – review & editing, Visualization, Validation, Supervision, Software, Methodology, Data curation, Conceptualization.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2024.e32276.

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