

# Quality of Life During Pregnancy from 2011 to 2021: Systematic Review

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**Purpose:** Health-related quality of life (HRQoL) has emerged as a key concern in patient care. It has become one of the major objectives of clinical trials. Our study aims to describe the quality of life (QoL) during uncomplicated pregnancy and to assess its associated factors.

**Patients and Methods:** The search of articles was carried out using the online database of PUBMED and Web of Science with a limit of time between 2011 and 2021. Data were retrieved by two independent reviewers.

**Results:** 721 publications responding to keywords were identified, of which 73 articles on the topic were selected. The main countries that have published on this subject are Australia (n = 10) and China (n = 7). Twenty-three articles deal with QoL for pathological pregnancies. All the pathologies studied have a negative impact on the HRQoL of pregnant women, and its improvement depends on the type of treatment. Obesity, low back, and pelvic girdle pain, and hyperemesis gravidarum were the frequent pathologies during pregnancy. Socio-demographic characteristics related to improved well-being (favorable economic status, social support). Similarly, better sleep quality and moderate physical exercise were linked to an increased QoL. Physical and psychological factors were associated with a lower QoL.

**Conclusion:** The HRQoL refers to patients' subjective evaluation of physical, mental, and social components of well-being. Optimizing the QoL during pregnancy necessitates a deeper understanding of their issues as well as counseling which provides support wherever needed.

**Keywords:** quality of life, health-related quality of life, uncomplicated pregnancy, pregnant women

## Introduction

Most women have, to a greater or lesser extent, concerns about their well-being and that of their fetus during pregnancy, which is a specific condition that is not a disease or a normal state of a woman's health. During pregnancy, women's bodies undergo numerous biochemical, physiological, and anatomical changes. These are the first changes that make them vulnerable, both physically and mentally, and they are beyond their control. Also, hormonal changes can affect women's emotions, leading to psychological issues like anxiety and depression. Even during a normal pregnancy, these changes can impair any woman's ability to carry out her usual responsibilities. Changes occur in the physical, spiritual, and social dimensions as well as in the quality of life (QoL) of pregnant women at various gestational ages.<sup>1</sup>

In recent years, there has been an increase in the number of studies on QoL in worldwide literature, and it has become a popular topic in today's society.<sup>2</sup> It is defined by the World Health Organization as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns.<sup>3</sup> In the field of health, the term Health-Related Quality of Life (HRQoL) is frequently used, which considers aspects such as illnesses, disorders, and the need for therapeutic interventions.<sup>4</sup>

Women's perceived QoL is essential to the concept of perinatal health, which encompasses physical, psychological, and social domains and is influenced by clinical and non-clinical events that are significant for women during pregnancy.<sup>5</sup> The HRQoL is an important determinant of healthcare utilization and can be used to track medical outcomes.<sup>6</sup> It has long

been regarded as a significant outcome of nursing and medical interventions and research, to ameliorate the quality of life.<sup>7</sup> Moreover, measuring HRQoL during the prenatal period gives valuable insight into this important phase and can help anticipate the mother's early postnatal adjustment.<sup>8</sup>

Furthermore, the efficiency of nursing interventions to ameliorate women's HRQoL during pregnancy has been documented in international research and systematic reviews.<sup>9</sup> Hence, studying the scientific literature on the HRQoL in pregnancy might impact positively on the pregnant women's well-being, and perhaps promote health interventions that can provide holistic and humanized care to the woman. To our knowledge, there is no review of the literature to describe the quality of life of pregnant women in primary care over the past ten years. The objectives of this study were to describe the quality of life during uncomplicated pregnancy and to assess its associated factors.

## Quality of Life (QoL): Definition and Theory

Quality of life was defined by the WHO in 1993 as "the perception that an individual has of his place in life, in the context of the culture and of the value system in which he lives, in relation to his goals, expectations, standards, and concerns. It is a very broad concept that can be influenced in complex ways by the subject's physical health, psychological state, level of independence, social relationships, and relationship to essential elements of their environment". This definition describes QoL as satisfaction within different areas of existence. It is an individual notion: everyone, healthy or sick, has his perception of the QoL with his desires, wishes, satisfaction and a goal to be achieved.

Researchers have increasingly used the concept of QoL in the last five decades, particularly in the field of health care.<sup>10</sup> As one of life's most important aspects, health is a factor that has a significant impact on general QoL. It is then considered synonymous with "perceptual health" or "subjective health". The HRQoL remains multi-dimensional and takes into account the physical, psychological, relational, symptomatic areas as well as sexuality and self-image.<sup>11</sup>

The factors that go into determining the indicators of QoL are material living conditions, which are divided into degraded housing conditions and financial constraints, psychosocial risks at work or ill-being at work, lack of confidence in society, weak social ties, economic and physical insecurities, as well as health which presents itself by two factors; the first is emotional discomfort or stress in everyday life due to the existence of mood disorders, lack of energy, lack of calm and tranquility or fatigue at the time of awakening. And the second is the poor physical health which is explained by the perception of the individual of his state of health, the existence of chronic disease, or discomfort to perform daily activities such as pregnancy for example, which is the case studied in our research.<sup>12</sup>

## Health-Related Quality of Life (HRQoL): Measurement Instruments

The subjective HRQoL measure has been established as a legitimate dimension for evaluating the benefits of health interventions, in addition to clinically objective measures, to assess the impact of a disease or a health intervention from the patient's perspective.<sup>13</sup> The HRQoL is measured through the use of a questionnaire administered to patients. These questionnaires are multidimensional, and each dimension is indirectly measured by a set of items to respond to the characteristics of the measured concept.<sup>14</sup> The method of assessment varies depending on the study: the scale can be self-administered by giving the participant a questionnaire to fill out so that he can complete each item without assistance, or administered by a researcher who asks questions about the patient's entire life.

Many instruments for measuring the QoL have been developed to aid in the assessment of a patient's health. In this regard, there are two types of instruments to assess the HRQoL: generic instruments (Table 1) and specific instruments. Generic instruments provide data on health status and QoL, regardless of pathology or even in the absence of pathology and can be used in general population. Also, their broader nature makes them preferable when the goal of measurement is to compare groups or individuals who have different health conditions. Specific QoL measurements focus on providing data that is specific to a disease. Patients cannot be compared to others suffering from other pathologies. These specific instruments are dedicated to a specific population of patients suffering from a specific pathology.

**Table 1** The Most Used Generic Questionnaires to Assess the Quality of Life of Pregnant Women Between 2011 and 2021

HRQoL Measuring Tool	Number of Items	Number of Dimensions	Time of Administration (min)	Dimensions
SF-36	36	8	7–10	<ul style="list-style-type: none"> <li>- Physical functioning</li> <li>- Role limitations due to physical problems</li> <li>- Role limitations due to emotional problems</li> <li>- Vitality</li> <li>- Emotional well-being</li> <li>- Social functioning</li> <li>- Bodily pain</li> <li>- Perception of health</li> </ul>
SF-12	12	8	2–3	
WHOQOL-BREF	26	4	10–15	<ul style="list-style-type: none"> <li>- Physical health</li> <li>- Psychic well-being</li> <li>- Social relations</li> <li>- Environment</li> </ul>
EQ-5D-3L	5	5	5–10	<ul style="list-style-type: none"> <li>- Mobility</li> <li>- Autonomy</li> <li>- Usual activities</li> <li>- Pain/discomfort</li> <li>- Anxiety/depression</li> </ul>
EQ-5D-5L				

## Materials and Methods

The focus of this bibliography review is on the evaluation of articles about the QoL related to pregnant women's health. The search of articles was carried out using the online database of PUBMED and Web of Science with a limit of time between June 18, 2011 to July 17, 2021.

The keywords "Quality of life", "pregnancy" and "pregnant" were searched in the titles or/and the abstracts in the articles written in English or French. The exclusion criteria were: 1) Literature reviews, meta-analysis, case reports, case series, and conference abstracts; 2) Pre-pregnancy, miscarriages, voluntary interruptions of pregnancy, childbirth, post-partum, and specific HRQoL questionnaires.

As shown in the flow chart (Figure 1), seven hundred twenty-one (721) articles were selected for initial abstract review (330 from PUBMED database and 391 from Web of Science) using advanced search provided by the two websites for the exclusion criteria (1). 97 abstracts were identified for the full article review after the title and abstract screening, of which 19 did not meet the inclusion criteria (2) and 20 articles were duplicated. Finally, 73 articles were included in the bibliography review.

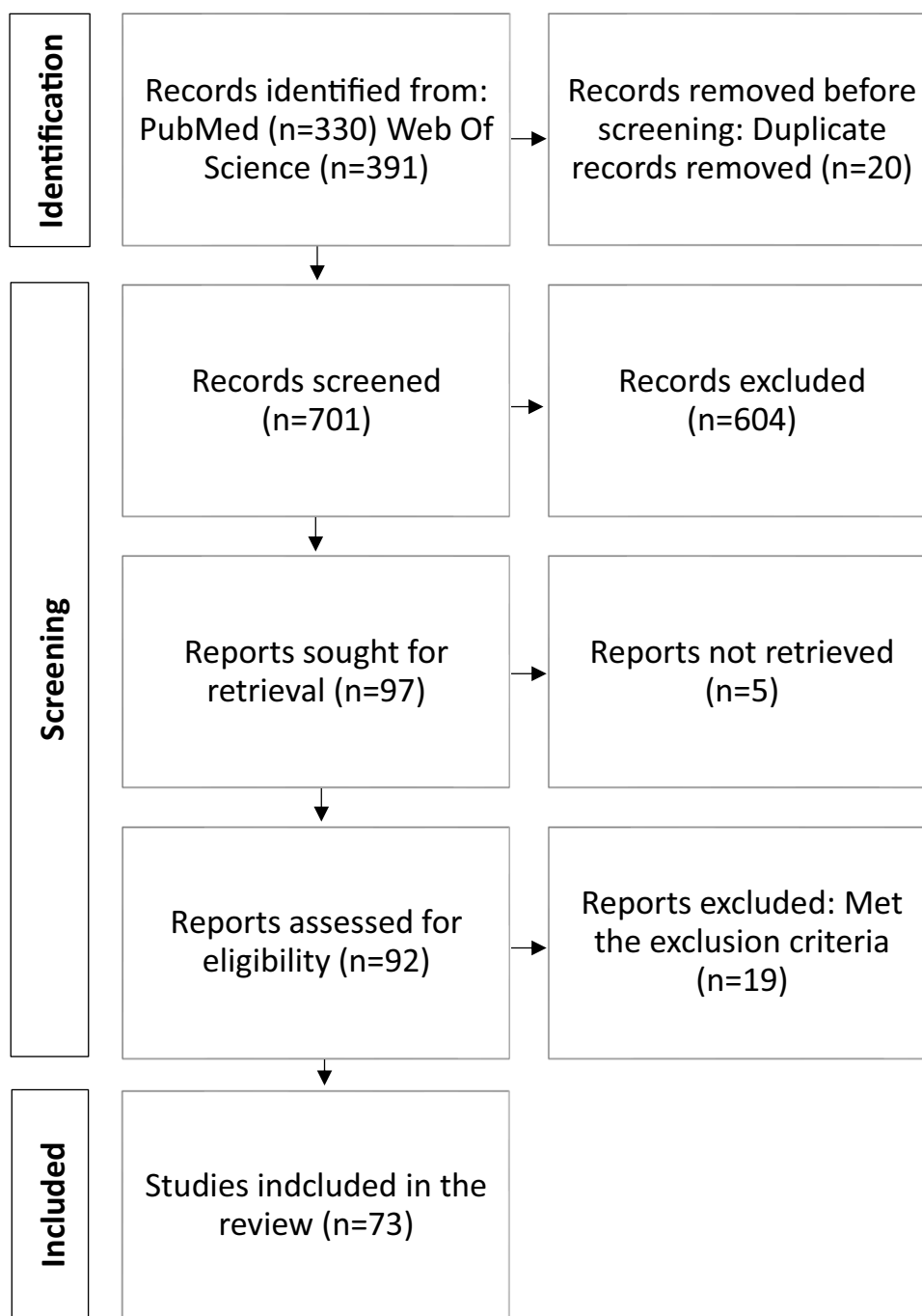
The articles are listed with details about the first author and the year of publication, country/continent, the aim of the study and the participants, the instrument used for the evaluation of the QoL and the number of assessment points, and finally the findings. The articles are grouped into 4 categories: Physiological pregnancy, pregnancy with pre-existing pathology, pregnancy with gestational pathology, and pregnancy with IVF.

## Results

### Article Selection

As mentioned before, 721 publications responding to keywords were identified and 73 articles on the QoL in pregnant women were selected (Table 2).

Since 18th June 2011 there was a slight decrease in interest in research on the QoL during pregnancy, passing from 6 publications in 2011–2012 to 4 publications in 2012–2013 and 2013–2014, then increased to 11 articles published in 2015–2016. Afterward, the number of publications dropped to 5 and 6 in 2016–2017 and 2017–2018 respectively and



**Figure 1** Flow chart showing the methodology for selecting articles on the quality of life in pregnant women.

rose to 12 publications in 2018–2019. The next year the number declined to 7 publications but increased again to 12 publications in 2020–2021 (Figure 2). The geographical distribution of publications by continents showed that Europe and Asia are more interested in this subject (39% and 35% respectively) (Figure 3).

The main countries that have published on this subject between 32 countries are Australia (n = 10), China (n = 7), Iran (n = 7) and Turkey (n = 7) (Table 3). Looking closer in Africa, there were just 2 articles published from Egypt and Tunisia representing the North Africa. There was no publication from Morocco during the 10 years.

**Table 2** The Summary of Studies Assessing the Quality of Life of Pregnant Women Between 2011 and 2021

Author, Year, Reference	Country	Aim of the Study	Number of Participants	QoL Scale Used	Points of Measurements	QoL Findings
Sonmezer et al (2021) <sup>74</sup>	Turkey	Determining the effects of clinical Pilates exercises on lumbopelvic stabilization, pain, disability and QoL in pregnant women with LBP	40	The Nottingham Health Profile (NHP)	2	Sleep and physical mobility sub-parameters were significantly improved in the Pilates exercises group
Naghizadeh et al (2021) <sup>65</sup>	Iran	Determining the relationship between fear of COVID-19 and QoL in Iranian pregnant women during the COVID-19 pandemic	250	Pregnant women's quality of life (QOL-GRAV)	1	The greater the fear of COVID-19 in pregnant women, the less their QoL
Moghaddam Hosseini et al (2021) <sup>61</sup>	Hungary	Assessing HRQoL and specify its predictors among expectant women in Hungary through PROMIS-43	477	Patient Reported Outcomes Measurement Information System (PROMIS-43)	1	The mean score of subscale "anxiety" was significantly higher in nulliparous than multiparous women Parity, anxiety and depression were the most common predictors for the poor HRQoL Social support was significant predictor for better HRQoL in depression, fatigue and pain intensity domains
Khalifa et al (2021) <sup>82</sup>	Egypt	Assessing the role of Dienogest pre-treatment for endometriosis suppression as compared to Gonadotropin-releasing hormone agonist (GnRHa) in patients with endometriosis pursuing IVF treatment	134	The FertiQoL questionnaire	1	FertiQoL treatment scores for the Dienogest group are significantly better than GnRHa group
Keulen et al (2021) <sup>83</sup>	Netherlands	Exploring maternal preference for either strategy and the influence on QoL and maternal anxiety on this preference	604	EuroQol questionnaire (EQ-6D)	2	Women who preferred IOL were more anxious and reported more problems in different aspect of QoL
Du et al (2021) <sup>63</sup>	China	Assessing the prevalence of poor sleep quality during early pregnancy and its risk factors, and exploring the association between sleep quality and adverse pregnancy outcomes	4352	The EuroQoL 5 Dimensions 3 Level (EQ-5D-3L)	1	The prevalence of poor sleep quality was higher in women with poor or general HRQoL compared with women who had good HRQoL
Dinmohammadi et al (2021) <sup>77</sup>	Iran	Comparing the two groups of intervention based on solution-focused counselling and control in terms of violence and QoL amounts in women who had experienced domestic violence	90	The 36-Item Short-Form Health Survey (SF-36)	2	The QoL increased significantly in the intervention group at the follow-up period in comparison to baseline phase

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Table 2 (Continued).

Author, Year, Reference	Country	Aim of the Study	Number of Participants	QoL Scale Used	Points of Measurements	QoL Findings
Alizadeh et al (2021) <sup>84</sup>	Iran	Investigating the effects of a sexual health education package on the dimensions of sexual health in pregnant women	154	The Sexual Quality of Life-Female (SQOL-F)	5	The mean score of the overall sexual QoL increased in the group training group with gestational age, and the maximum score was achieved in the 3rd trimester of pregnancy
Rodríguez-Blancue et al (2020) <sup>71</sup>	Spain	Analysing the QoL in pregnant women who complete a programme of moderate physical activity in water	129	The 36-Item Short-Form Health Survey (SF-36-v2)	2	The decrease in mean HRQoL scores between weeks 12 and 35 of pregnancy was significantly less among the Exercise group participants than in the control group
Liu et al (2020) <sup>59</sup>	China	Examining impacts of gestational diabetes mellitus (GDM) on QoL domains in Chinese pregnant women	13,358	The 36-Item Short-Form Health Survey (SF-36)	1	GDM and advanced maternal age were associated with reducing general health, and presence of advanced maternal age markedly increased the effect of GDM on general health
Liang et al (2020) <sup>75</sup>	Taiwan	Evaluating the effects of pre-pregnancy body mass index (BMI) on pregnancy outcomes, prevalence of urinary incontinence, and QoL	2210	The 12-Item Short-Form Health Survey (SF-12)	1	The physical function score was significantly higher for those who had a BMI $\geq$ 25 compared with those with a BMI < 25 The other components of the SF-12 were not significantly different There was no significant change in the PCS and MCS of the SF-12 in each group
Hirose et al (2020) <sup>68</sup>	Japan	Clarifying the patterns of NVP and QOL during early pregnancy and to elucidate the independent association NVP and social support have with QOL among early pregnant women	153	The 12-Item Short-Form Health Survey (SF-12)	3	The severity of nausea and vomiting significantly impacts physical QoL during early pregnancy Both nausea and vomiting and social support significantly and independently affect mental QoL

Yikar et al (2019) <sup>85</sup>	Turkey	Determining the effects of prenatal education on QoL and complaints during pregnancy	60	Scale of complaints during pregnancy and effects on quality of life (SCPEQL)	3	In the 2nd and the 3rd trimesters, the total score on the scale of the women in the experimental group was found to be lower than the control group The decrease in the mean scores obtained by the women on the SCPEQL and being statistically significant implies that the education given on the complaints during pregnancy was effective
Vas et al (2019) <sup>36</sup>	Spain	Assessing the effect of ear acupuncture associated with standard obstetric care, in the primary-care setting, on LBPGP experienced by pregnant women	205	The 12-Item Short-Form Health Survey (SF-12)	2	There were significant changes at T2 with respect to the baseline assessment in higher scores for the SF-12 physical scale
Sahrakorpi et al (2019) <sup>48</sup>	Finland	Evaluating the effect of lifestyle counselling on HRQoL during and after pregnancy within the study population recruited in early pregnancy	378	HRQoL 15D instrument	6	The 15D scores of all pregnant women decreased similarly towards the 3rd trimester with no significant difference between the intervention and the control group The mean 15D-scores of women in the intervention and control group were also similar despite their GDM-status
Pekçetin et al (2019) <sup>35</sup>	Turkey	Investigating the effect of telephone-supported ergonomic education on pregnancy-related low back pain	110	The 12-Item Short-Form Health Survey (SF-12)	2	Seven dimensions of the SF-36 (all except physical functioning) increased significantly between pre- and post-intervention assessments in the intervention group In the control group, no statistically significant change was observed in any of the eight dimensions of the SF-36 between pre- and post-intervention assessments

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Table 2 (Continued).

Author, Year, Reference	Country	Aim of the Study	Number of Participants	QoL Scale Used	Points of Measurements	QoL Findings
Noorbala et al (2019) <sup>86</sup>	Iran	Determining the effectiveness of psychiatric interventions in the mental health of pregnant women in Kashan, Iran	102	The General Health Questionnaire-28 (GHQ28)	4	There was no significant difference between groups at baseline in terms of GHQ-28 between the two groups There were significant differences between the groups in all three post-intervention follow-ups (35–37 weeks, 6 weeks PP and 6 months PP) GHQ-28 scores were lower in the intervention group than the control group (lower GHQ-28 scores imply greater mental health)
Morin et al (2019) <sup>18</sup>	France	Evaluating the QoL of pregnant women with a full-term birth from the first trimester to the 9th month using the EQ5D-3L questionnaire, comparing physiological, simple pathological, or complex pathological pregnancies	500	The EuroQoL 5 Dimensions 3 Level (EQ-5D-3L)	7	The QoL decreased over time between the 4th and the 8th months of pregnancy The perceived health status was lower at the 9th month than the 3rd Between the 3rd and 9th months of pregnancy, the mobility, self-care and physical activity decreased, while the pain/discomfort increased The level of anxiety/depression was high and stay stable during the pregnancy The QoL was lower for pathological pregnancies than for physiological ones
Ming et al (2019) <sup>39</sup>	China	Evaluating several parameters: determine the HRQoL in pregnancies with Uterine Fibroids; provide a utility-based case value in pregnancies with UF; and understand whether HRQoL is associated with the clinical outcomes of pregnant women with UFs	767	The EuroQoL 5 Dimensions 5 Level (EQ-5D-5L)	1	Pain and discomfort during pregnancy were major problems for pregnant women, while problems with self-care were of the least concern Women in their 2nd or 3rd trimester reported more problems with mobility and pain/discomfort than those in their 1st trimester More gravidity was associated with problems regarding usual activities, and less parity was associated with problems in usual activities and anxiety/depression



Ali et al (2019) <sup>58</sup>	Bangladesh	Measuring the HRQoL among pregnant women in the perinatal and postpartum periods and determine influencing factors that predict their HRQoL	465	The EuroQoL 5 Dimensions 3 Level (EQ-5D-3L)	2	The HRQoL scores improved significantly from the perinatal to post-partum period Approximately 58% of women experienced moderate or extreme levels of health problems during the perinatal period regardless of their health status
Loughnan et al (2019) <sup>87</sup>	Australia	Examining the efficacy and acceptability of a brief, unguided iCBT intervention and the MUMentum Pregnancy program in pregnant women with anxiety and/or depression	77	The World Health Organization Quality of Life Instrument Bref (WHOQOL-BREF)	3	TAU experienced moderate to large improvements between pre- and post-treatment in the psychological and QoL domain with gains maintained at follow-up Those in iCBT experienced moderate to large improvements only between pre-treatment and follow-up
Dodd et al (2019) <sup>88</sup>	Australia	Evaluating the effects of antenatal metformin as an adjuvant therapy to dietary and lifestyle advice among overweight and obese pregnant women on maternal and infant outcomes	524	The 12-Item Short-Form Health Survey (SF-12)	3	Self-reported maternal QoL did not differ between groups receiving Metformin or placebo
Chen et al (2019) <sup>24</sup>	Taiwan	Investigating patterns of depression, anxiety, and HRQoL scores in both women and men from early pregnancy until 1 year postpartum, with parity effects specifically examined	531	The World Health Organization Quality of Life Instrument Bref (WHOQOL-BREF)	3	The HRQoL social relations domain exhibited a significant decrease from 1st trimester to 3rd trimester
Alzboon et al (2019) <sup>26</sup>	Jordan	To examine the differences in QOL according to the socio-demographic and obstetric factors, perceived stress, and perceived social support of pregnant women	218	The 36-Item Short-Form Health Survey (SF-36)	1	Low parity women had higher QoL scores than high parity women No difference in QoL between women in different trimesters of pregnancy
Dağlar et al (2019) <sup>60</sup>	Turkey	Determining the factors affecting the QoL pregnant women during the third trimester of pregnancy	742	World Health Organisation Quality of Life Questionnaire-short form (WHOQoL-BREF)	1	13.1%, 15.9%, 10.4% and 17.4% of the pregnant women were found to have low physical, psychological, social and environmental domain QoL sub dimensions, respectively During the 3rd Trimester of pregnancy, QoL is affected by the perception of health condition, educational level, the number of gestations and deliveries, the perception of fiscal situation, and the preparedness for parenthood

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Table 2 (Continued).

Author, Year, Reference	Country	Aim of the Study	Number of Participants	QoL Scale Used	Points of Measurements	QoL Findings
Ali et al (2019) <sup>58</sup>	Bangladesh	Measuring the HRQoL among pregnant women in the perinatal and postpartum periods and determine influencing factors that predict their HRQoL	465	The EuroQoL 5 Dimensions 3 Level (EQ-5D-3L)	2	The HRQoL scores improved significantly from the perinatal to postpartum period Approximately 58% of women experienced moderate or extreme levels of health problems during the perinatal period regardless of their health status Factors affecting QoL: adolescent motherhood, caesarean delivery, inadequate antenatal care consultations and living in a poor household
Altazan et al (2019) <sup>67</sup>	United States	Quantifying changes in mental and physical QoL and depressive symptoms across pregnancy and the PP period, to determine if gestational weight gain was associated with changes in mood and QoL, to assess the effect of a behavioural intervention targeting excessive gestational weight gain on mood and QoL	54	The 12-Item Short-Form Health Survey (SF-12)	4	Physical health aspects of QoL significantly decreased in both the SmartMoms <sup>®</sup> intervention and the Usual Care groups from early to late pregnancy There were no observed associations between poverty to income ratio and physical or mental QoL or mood in early pregnancy or changes from early to late pregnancy Higher overall gestational weight gain was associated with worsened mood and lower physical QoL from early to late pregnancy
Zarei et al (2018) <sup>62</sup>	Iran	Determining the predictors of QoL among Iranian pregnant women	565	Quality Of Life Gravidarum (QOL-GRAV)	1	Significant correlation between depressive symptoms and QoL Depressive symptoms, gestational age and place of receiving prenatal care affect pregnant women's QoL

Van den Bosch et al (2018) <sup>25</sup>	Netherlands	Evaluating the changes in maternal QoL from pregnancy to 6 weeks after delivery between routine labor epidural analgesia (EA) and pain relief on maternal request only	488	The 36-Item Short-Form Health Survey (SF-36)	2	<p>QOL increased in six domains between antepartum and PP, but decreased for the domain role limitations due to emotional problems, general health perception, and general health change</p> <p>No significant differences in score changes between the routine EA and the control group</p> <p>There were no significant differences in the change scores between the subgroup of women who received analgesia on request and those who delivered without any analgesia</p> <p>Maternal age and the incidence of adverse events related to EA, which were both higher in the routine EA group, had no influence on the changes in QOL</p>
Peng et al (2018) <sup>64</sup>	Australia	To examine the health seeking behaviours regarding conventional medicine and CAM modalities; and HRQoL among women suffering headache or migraine during pregnancy	1835	The 36-Item Short-Form Health Survey (SF-36)	1	<p>Women who sought help for their headache or migraine had lower average scores for all of the remaining SF-36 domains compared to women who did not have headache or migraine</p> <p>Women who did not seek help for their headache or migraine had a lower average score for the domain vitality compared to women who did not have headache or migraine</p> <p>Women with headache or migraine had worse HRQoL than those without</p>
O'Connor et al (2018) <sup>72</sup>	South-eastern United States	Testing if the adoption of twice weekly, low-to-moderate intensity resistance training during weeks 22–34 of pregnancy can improve QoL and mood	134	The 36-Item Short-Form Health Survey (SF-36)	2	<p>Vitality scores decreased significantly over time for the education and wait list groups but not the exercise group</p> <p>At the post-test vitality scores were significantly higher for the exercise group compared to the wait list group</p> <p>Adverse changes in symptoms of energy and fatigue during pregnancy are attenuated by adopting low-to-moderate intensity resistance training</p>

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Table 2 (Continued).

Author, Year, Reference	Country	Aim of the Study	Number of Participants	QoL Scale Used	Points of Measurements	QoL Findings
Mazuchova et al (2018) <sup>15</sup>	Slovak Republic	Finding out the QoL of women during pregnancy, which areas of QoL are the riskiest, and to determine the impact of age, parity and period of pregnancy on the QoL of pregnant women	304	Quality Of Life Gravidarum (QOL- GRAV)	1	QoL during pregnancy has proven to be good and excellent Risky areas of QoL: partner satisfaction, physical changes causing limitations, physical activity limitations, fear of managing labor
Lin et al (2018) <sup>40</sup>	Taiwan	Investigating the prevalence and risk factors of stress urinary incontinence (SUI) and its impact on the QoL during pregnancy and 12 months after delivery	866	The 12-Item Short-Form Health Survey (SF-12)	3	Women with SUI during pregnancy featured worse MCS score of SF-12, compared to women without SUI
Krzepota et al (2018) <sup>73</sup>	Poland	To analyse the relationships between Physical Activity and QoL among pregnant women	346	World Health Organisation Quality of Life Questionnaire-short form (WHOQoL-BREF)	1	Significant correlation between QoL in the physical health domain and the intensity and type of physical activity Pregnant women who had Higher QOL had Higher Energy Expenditures (vigorous activity, occupational activity and sport/exercise activity) Positive correlation between Psychological/Social relationship domains and EE related to vigorous activity
Khalafallah et al (2018) <sup>44</sup>	Australia	Comparing the efficacy and safety of a newly available intravenous (IV) iron preparation, ferric carboxymaltose (FCM), against IV iron polymaltose (IPM) and standard oral iron (ferrous sulphate) for the treatment of Iron Deficiency Anemia (IDA) in pregnancy	246	The 36-Item Short-Form Health Survey (SF-36)	1	Significant improvement in overall QoL scores was observed in both IV iron supplement groups by achieving normal ferritin following effective and prompt repletion of iron stores, compared to the oral iron group Social functioning at time of delivery was improved in the higher ferritin group
Haemmerli Keller et al (2018) <sup>57</sup>	Switzerland	Comparing treatment-related psychological stress in IVF treatments with (cIVF) and without (NC-IVF) gonadotropin stimulation, as cIVF includes potentially stressful factors such as ovarian stimulation, anaesthesia, embryo selection and cryopreservation, whereas NC-IVF does not	119	World Health Organisation Quality of Life Questionnaire-short form (WHOQoL-BREF)	2	Following three NC-IVF treatment cycles, women showed significantly fewer depressive symptoms and QoL was better compared with that in women undergoing one cIVF treatment

Turkstra et al (2017) <sup>89</sup>	Australia	Testing an antenatal psycho-education intervention by midwives in reducing women's childbirth fear	339	The EuroQoL 5 Dimensions 3 Level (EQ-5D-3L)	2	The EQ-5D-3L scores between the groups were similar at baseline and 6 weeks postpartum The proportion of women who described their health state as moderately or extremely anxious or depressed was reduced from baseline to six weeks postpartum
Meteerattanapit et al (2017) <sup>29</sup>	Thailand	Comparing the therapeutic efficacy of alginate-based reflux suppressant and magnesium-aluminium antacid gel for treatment of heartburn in pregnancy	100	The 12-Item Short-Form Health Survey (SF-12-v2)	1	QoL after treatment was improved but not statistically different between both groups, this might be due to the treatment efficacy of both drugs
Grooten et al (2017) <sup>33</sup>	Netherlands	To investigate the effect of enteral tube feeding on maternal and perinatal outcomes in Hyperemesis gravidarum HG	116	The 36-Item Short-Form Health Survey (SF-36)	3	Lower SF-36 scores at baseline Early enteral tube feeding in addition to standard care with intravenous rehydration and antiemetic treatment did not affect the QoL
Garipey et al (2017) <sup>78</sup>	United States	To quantify the association of pregnancy context and HRQoL	161	The Patient Reported Outcomes Measurement Information System Global Short Form (PROMIS10)	1	Women reporting mixed feelings about wanting to have a baby, an undesired pregnancy or feeling unhappy about learning of their pregnancy more frequently had low mental and physical HRQoL compared to women reporting wanted, desired, happy pregnancies Women with an unplanned pregnancy or pregnancy occurring at the wrong time also had lower physical HRQoL than women reporting pregnancies that were planned or happened at the right time History of depression and pregnancy contexts were not associated with low mental or physical HRQoL
Ellouze et al (2017) <sup>90</sup>	Tunis	Exploring the links of a pregnant woman's sexuality with depression and with QoL	100	The 12-Item Short-Form Health Survey (SF-12)	1	Mental QoL improves when women's sexual satisfaction increases Less than half of the patients had a PCS and MCS rate $\geq$ 50

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Table 2 (Continued).

Author, Year, Reference	Country	Aim of the Study	Number of Participants	QoL Scale Used	Points of Measurements	QoL Findings
Breymann et al (2017) <sup>45</sup>	Australia; Russia; Sweden; Switzerland; Turkey; Singapore; South Korea	Comparing the efficacy and safety of intravenous ferric carboxymaltose (FCM) with first-line oral ferrous sulfate (FS) in pregnant women with iron deficiency anaemia	252	The 36-Item Short-Form Health Survey (SF-36)	1	FCM treatment led to significant, clinically relevant improvements over FS in vitality prior to delivery Significant improvements in social functioning were also evident prior to delivery following FCM vs FS treatment
Zare et al (2016) <sup>91</sup>	Iran	To examine the QoL of pregnant women and factors associated with it	400	The 36-Item Short-Form Health Survey (SF-36)	1	Mental health and social functioning had the highest mean scores Physical problems and psychological problems had the lowest scores There were significant differences in terms of mean score of QOL between different age group (age of mother)
Tsai et al (2016) <sup>76</sup>	Taiwan	To examine the cross-sectional and longitudinal association between sleep and HRQoL in pregnant women	164	The 12-Item Short-Form Health Survey (SF-12-v2)	3	More actigraphic daytime sleep and better subjective sleep quality were associated with better physical HRQoL in 1st trimester pregnant women Better actigraphic sleep efficiency and better subjective sleep quality were associated with better mental HRQoL in 2nd trimester pregnant women Longer actigraphic total night-time sleep and better subjective sleep quality were associated with better mental HRQoL in 3rd trimester pregnant women
Seneviratne et al (2016) <sup>50</sup>	New Zealand	To assess whether antenatal exercise in overweight/obese women would improve maternal and perinatal outcomes	75	The World Health Organization Quality of Life Instrument Bref (WHOQOL-BREF)	2	There were no differences in post-intervention QoL scores between 16-week moderate intensity stationary cycling program group and the control group

McParlin et al (2016) <sup>31</sup>	United Kingdom	To assess the feasibility of implementing a complex intervention involving rapid intravenous rehydration and ongoing midwifery support as compared to routine in-patient care for women suffering from severe NVP/HG	53	The 36-Item Short-Form Health Survey (SF-36-v2)	2	There were no differences between the groups in any of the eight health domains of the SF36 score, the physical and mental health summary scores or satisfaction with care
McCarthy et al (2016) <sup>51</sup>	Australia	To determine the effect of serial weighing and dietary advice compared with standard antenatal care on obstetric outcomes	382	The World Health Organization Quality of Life Instrument Bref (WHOQOL-BREF)	1	There were no differences in QoL scores, as measured by the WHOQOL-BREF at 36 weeks, between the intervention groups
Li et al (2016) <sup>56</sup>	China	To investigate the effectiveness of a mindfulness-based intervention (MBI) among women subjected to first IVF treatment	58	The FertiQoL questionnaire	2	The scores on FertiQoL and all subscales significantly increased after finishing the MBI sessions The experiment group had higher pregnancy rates than the control group
Haakstad et al (2016) <sup>70</sup>	Norway	To examine the effects of supervised group exercise on maternal psychological outcomes and commonly reported pregnancy complaints	105	The 36-Item Short-Form Health Survey (SF-36)	2	Women randomized to exercise rated their health significantly higher compared to women in the control group, and reported less fatigue related to everyday activities Women with high exercise adherence had significantly better scores on feelings related to sadness, hopelessness or anxiety No one in the exercise group reported nausea/vomiting versus 12 in the control group or numbness/poor circulation in legs versus 16 among controls
Gustafsson et al (2016) <sup>79</sup>	Norway	To investigate whether a customised exercise programme influences pregnant women's psychological wellbeing and general health perception reflecting HRQoL in late pregnancy	855	The questionnaire Psychological General Wellbeing Index (PGWBI)	2	No change in any aspects of psychological wellbeing or in general health Offering women an exercise program during pregnancy does not seem to influence healthy pregnant women's psychological wellbeing and self-perceived general health

(Continued)

Table 2 (Continued).

Author, Year, Reference	Country	Aim of the Study	Number of Participants	QoL Scale Used	Points of Measurements	QoL Findings
Dodd et al (2016) <sup>22</sup>	Australia	To evaluate the effect of dietary and lifestyle advice given to women who were overweight or obese during pregnancy on maternal QoL, anxiety, risk of depression, and satisfaction with care	2142	The 36-Item Short-Form Health Survey (SF-36)	3	No statistically significant differences between treatment groups for any of the domains assessing HRQoL Among women in both groups, physical functioning, physical role, bodily pain, and overall physical component deteriorated between trial entry and 36 weeks' gestation. For mental health, the improvement in mean scores was seen earlier in the Lifestyle Advice group (between trial entry and 28 weeks) than in the Standard Care group (between 28 and 36 weeks) but, once achieved, the improvement was maintained in both groups.
Vinturache et al (2015) <sup>54</sup>	Canada	To study the effects of mode of conception (spontaneous vs assisted) on HRQoL throughout pregnancy and in the postpartum period	243	The 12-Item Short-Form Health Survey (SF-12)	2	The physical PCS scores were lower during pregnancy among women with assisted conception. The mental MCS scores were higher at <25 weeks among women with assisted conception. Women with assisted conception may report lower physical and better mental health during pregnancy than women with spontaneous conception.
Segre et al (2015) <sup>52</sup>	United States	To evaluate the effectiveness of Listening visits (LV) delivered to depressed pregnant women at a woman's usual point-of-care, including home-visits or an ob-gyn office	66	The Quality of Life, Enjoyment and Satisfaction Questionnaire (Q-LES-Q)	2	There was greater improvement in QoL from the baseline to 8-week assessment for the LV group compared to women receiving standard social/health services.
Petrov Fieril et al (2015) <sup>92</sup>	Sweden	To assess the effect and safety of moderate-to-vigorous resistance exercise during pregnancy	92	The 36-Item Short-Form Health Survey (SF-36)	2	HRQoL did not differ between the intervention group (supervised resistance exercise twice a week) and controls (generalized exercise recommendation).



Fletcher et al (2015) <sup>32</sup>	United Kingdom	To test where using a validated questionnaire, the Hyperemesis Impact of Symptoms tool, delivered by a nurse to assess the overall effect of hyperemesis on an individual woman's life and to provide advice tailored to her specific needs, will help her cope better with her symptoms and reduce admissions to hospital	273	The 36-Item Short-Form Health Survey (SF-36)	4	Using the Hyperemesis Impact of Symptoms questionnaire to tailor a care plan to address women's individual needs was not associated with any significant improvements in the QoL
Dal'alba et al (2015) <sup>28</sup>	Brazil	To measure HRQoL of 3rd trimester pregnant women with heartburn and regurgitation	82	The 36-Item Short-Form Health Survey (SF-36)	1	During the 3rd trimester HRQOL score was lower for pregnant women with heart burn and or regurgitation than for asymptomatic pregnancies For Heart Burn: physical problems and social functioning were affected For Regurgitation: physical problems and emotional problems were affected Heart Burn and Regurgitation in 3rd trimester were found to affect the QoL of pregnant women
Martinez Franco et al (2014) <sup>41</sup>	Spain	To determine the prevalence and severity of urinary incontinence and to see if there are any differences between 1st and 3rd trimester of pregnancy	224	The 36-Item Short-Form Health Survey (SF-36)	1	Leakage was slight-moderate that did affect their physical, mental and social domains of their QoL The increase in urinary frequency, affecting 41.25% of the pregnant women caused discomfort/distress in the 68.8% of women
Claesson et al (2014) <sup>49</sup>	Sweden	To compare the differences in psychological well-being and QoL during pregnancy and PP of obese physically active women and obese physically inactive women enrolled in a weight gain restriction program, and also to explore whether physical activity influences weight change or health status during pregnancy	143	The 36-Item Short-Form Health Survey (SF-36)	2	The physically active women experienced fewer depressive symptoms and estimated an improved QoL during their pregnancies as measured by physical functioning, bodily pain, social functioning, role limitations due to emotional problems and general mental health as compared with the physically inactive women Physical activity among obese pregnant women provides better psychological well-being and improved QoL

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Table 2 (Continued).

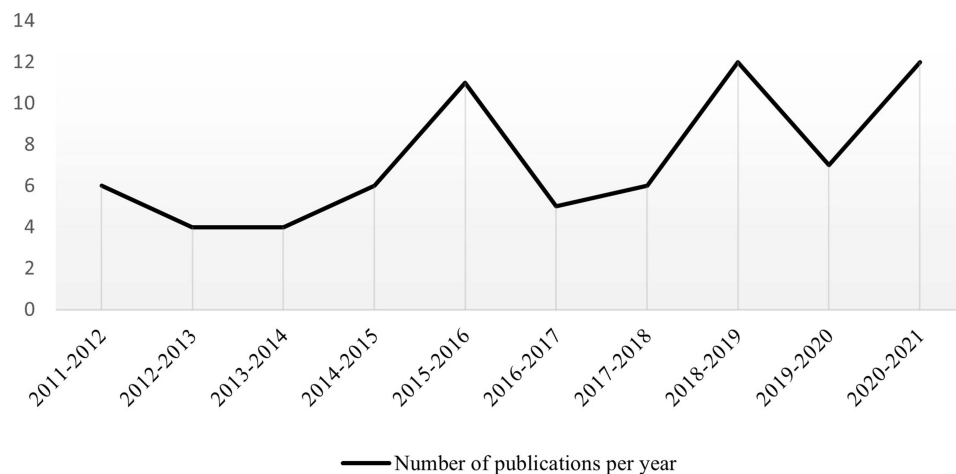
Author, Year, Reference	Country	Aim of the Study	Number of Participants	QoL Scale Used	Points of Measurements	QoL Findings
Chang et al (2014) <sup>17</sup>	Taiwan	To examine changes in HRQoL throughout the course of pregnancy and among three pairs of consecutive periods and to identify associated obstetric factors during the entire period of pregnancy	358	The 36-Item Short-Form Health Survey (SF-36)	3	PCS and physical functioning decreased from 1st to 3rd trimester Role-physical and bodily pain decreased from 2nd to 3rd trimester General Health increased from 1st to 2nd trimester MCS and mental health increased from 1st to 2nd trimester The vitality scores increased from 1st to 2nd trimester but decreased from 2nd to 3rd trimester The scores for social functioning and role emotional increased from 1st to 2nd trimester but decreased from 2nd to 3rd trimester
Akmese et al (2014) <sup>34</sup>	Turkey	To investigate the effects of progressive muscle relaxation PMR training accompanied by music on perceived pain and QOL in pregnant women with low back pain (LBP)	66	The 36-Item Short-Form Health Survey (SF-36)	3	In the 2nd trimester the scores on all SF36 subscales increased gradually in the PMR group The scores decreased in the control group LBP affects negatively the QoL of pregnant women, while PMR exercises accompanied by music increase their QoL
Vachkova et al (2013) <sup>23</sup>	Czechia	To evaluate psychometric characteristics of a newly developed, specific QoL	225	Pregnant women's quality of life (QOL-GRAV)	1	Lowest QOL in the 3rd trimester is connected with the lowest score of physical and psychological health No difference between trimesters in the assessment of QOL and satisfaction of state of health
Lau et al (2013) <sup>21</sup>	China	To estimate the prevalence of preterm birth and low-birth-weight in Macao and evaluate the effects of maternal perceived stress and HRQoL on preterm birth and low-birth-weight	581	The 12-Item Short-Form Health Survey (SF-12)	1	At the 2nd trimester 47.3% of pregnant women had poor HRQoL in the Physical domain and 51.5% had poor HRQoL in the Mental domain

Kordi et al (2013) <sup>37</sup>	Iran	To compare the effect of lumbopelvic belt plus information, home based pelvic girdle stabilizing exercises plus information and information alone on pain intensity, functional status and QoL of pregnant women with PGP	105	The World Health Organization Quality of Life Instrument Bref (WHOQOL-BREF)	3	QoL of the patients of both exercise and belt groups were improved more than control group in this study
Elden et al (2013) <sup>38</sup>	Sweden	To investigate the efficacy of craniosacral therapy as an adjunct to standard treatment compared with standard treatment alone for PGP during pregnancy	123	The EuroQoL 5 Dimensions 3 Level (EQ-5D-3L)	1	No significant differences in QoL between intervention group and control group
Nakamura et al (2012) <sup>69</sup>	Japan	To explore the comfort and QoL in hospitalized, preterm, pregnant women compared with pregnant outpatients, and identify the relationship between comfort, QoL, and hospitalization	692	The 36-Item Short-Form Health Survey (SF-36)	1	All six domains of HRQoL showed significantly lower scores for hospitalized women than outpatient women and non-pregnant group Outpatient group had a significantly higher score for general health than women in both the hospitalized group and the reference group Pregnant women outpatients have an improved perception of their health status The scores for depression were similar in both outpatient pregnant women and non-pregnant women
Moccellin et al (2012) <sup>20</sup>	Brazil	To evaluate static and dynamic postural control during the three trimesters of pregnancy and to check the QoL in each trimester	13	The World Health Organization Quality of Life Instrument Bref (WHOQOL-BREF)	3	Significant difference between control group and the 1st trimester group for the physical domain This domain was the most affected of the four domains and decreased further from the 1st to the 3rd trimester of pregnancy
Lau et al (2012) <sup>66</sup>	China	To identify the prevalence and rationales of traditional Chinese pregnancy restrictions and to investigate the relationship between pregnancy restriction, HRQoL, and perceived stress level at a two-stage design	1151	The 12-Item Short-Form Health Survey (SF-12)	1	Pregnant women who adhered to behavioural restrictions were more likely to associate with poor physical component of HRQoL

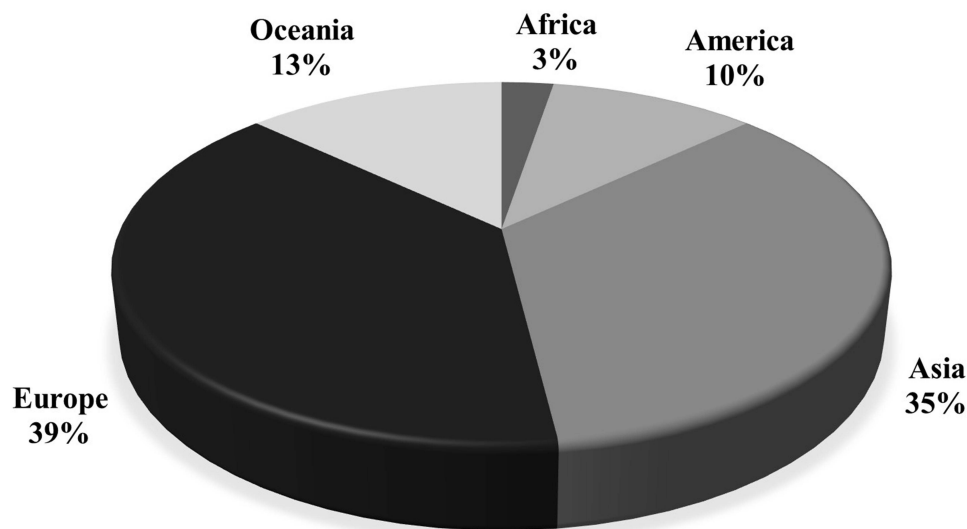
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Table 2 (Continued).

Author, Year, Reference	Country	Aim of the Study	Number of Participants	QoL Scale Used	Points of Measurements	QoL Findings
Emmanuel et al (2012) <sup>16</sup>	Australia	To explore demographic and social support predictors of HRQoL for childbearing women in the perinatal period	473	The 12-Item Short-Form Health Survey (SF-12-v2)	1	Mean scores for the mental and physical domains of HRQoL were lower than population norms Social support was a significant and consistent predictor of higher HRQoL scores particularly in mental domain during the perinatal period
De Pascalis et al (2012) <sup>53</sup>	Italy	To compare the levels of and changes in QoL during pregnancy between couples who conceived spontaneously and couples who underwent successful treatment by assisted reproductive technology (ART)	115	The 36-Item Short-Form Health Survey (SF-36)	2	QoL decrease gradually with progress of pregnancy Decrease in QoL scores from 22 to 32 weeks of gestation
Powell et al (2011) <sup>42</sup>	Australia	To assess the perception of asthma control, QoL, and perceived risks of therapy in pregnant women with asthma	125	The 12-Item Short-Form Health Survey (SF-12)	1	Women reported good QoL
Nascimento et al (2011) <sup>19</sup>	Brazil	To evaluate the effectiveness and safety of physical exercise in terms of maternal/perinatal outcomes and the perception of QoL in pregnant obese and overweight women	82	The World Health Organization Quality of Life Instrument Bref (WHOQOL-BREF)	2	The physical and social domains of QoL had significantly lower scores at the end of pregnancy
Lau et al (2011) <sup>93</sup>	China	To identify associations between demographic, socio-economic and obstetric variables and HRQoL with perceived stress among Macao Chinese pregnant women	1151	The 12-Item Short-Form Health Survey (SF-12)	1	Pregnant women who had poor physical or mental QoL had higher levels of perceived stress
Gameiro et al (2011) <sup>55</sup>	Portugal	To investigate the relationship between changes in marital congruence and QoL across the transition to parenthood in couples who conceived spontaneously and with assisted reproduction technology (ART)	66	The World Health Organization Quality of Life Instrument Bref (WHOQOL-BREF)	1	An increase in satisfaction with the marital relationship was associated with increase in all QoL domains Couples who conceived with ART only, the existence of conflicts from pregnancy to the postpartum period and how to solve them was associated with a decrease in psychological-QoL



**Figure 2** Distribution of number of articles published per year from 18/06/2011 to 17/06/2021.



**Figure 3** Geographical distribution by continent of publications dealing with the quality of life of pregnant women between 18/06/2011 and 17/06/2021.

The articles that were selected were classified into four categories of obstetrics. 44 articles concern physiological pregnancies (60.27%), 16 articles concern pregnancies with gestational pathology (21.91%), 7 articles for pregnancies with pre-existing pathology (9.6%) and 6 articles are dealing with In Vitro Fertilization pregnancies (8.22%) (Figure 4).

Among the articles on the QoL during pregnancy related to pathology, a variety of pathologies have been explored namely the obesity, low back and pelvic girdle pain, and hyperemesis gravidarum (Table 4).

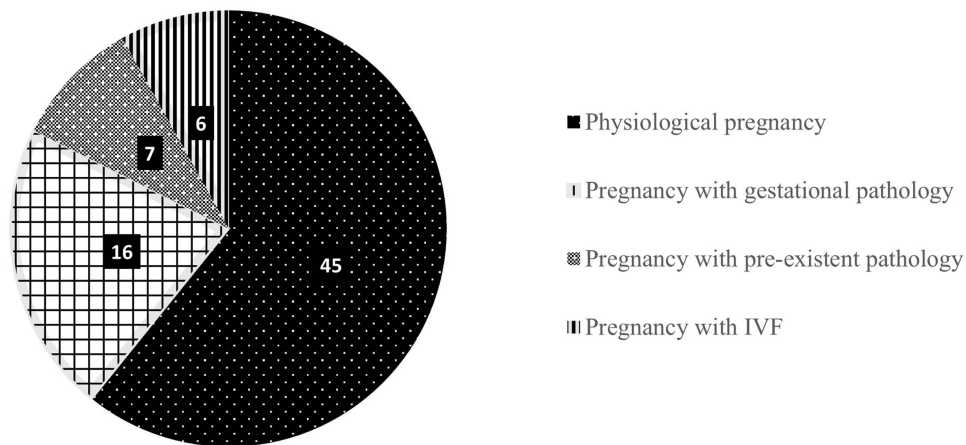
17 different questionnaires were used in the articles of our review, the most used are The Short Form 36 Health Survey Questionnaire (SF-36) in 23 studies, The Short Form 12 Health Survey Questionnaire (SF-12) in 15 studies, and The World Health Organization Quality-of-Life Scale (WHOQOL-BREF) was used in 11 studies (Table 5).

From the 73 articles studied, 54 are based on no more than 2 points of measurements of QoL during pregnancy, 31 of which are based on just one point of measurement (Figure 5).

After reviewing the publications of our bibliography, we can summarize the results of the QoL in pregnant women in the physiological, pathological, and assisted pregnancies, also the factors impacting the QoL during pregnancy.

**Table 3** Geographical Distribution by Country of Publications Dealing with the Quality of Life of Pregnant Women Between 18/06/2011 and 17/06/2021

Country	Number of Articles
Australia	10
China	7
Iran	7
Turkey	6
Taiwan	5
United states	4
Sweden	4
Brazil	3
Spain	3
Netherlands	3
Switzerland	2
United Kingdom	2
Norway	2
Bangladesh	2
Japan	2
Poland	1
Egypt	1
Russia	1
Tunis	1
New Zealand	1
Slovak Republic	1
Portugal	1
Thailand	1
Singapore	1
South Korea	1
Czechia	1
Canada	1
Finland	1
France	1
Hungary	1
Italy	1
Jordan	1



**Figure 4** Number of articles evaluating the quality of life in pregnancy by the category of obstetrics from 18/06/2011 to 17/06/2021.

## The Quality of Life of Pregnant Women

### Physiological Pregnancies

For the physiological pregnancies, the QoL has proven to be good and excellent.<sup>15</sup> However, Emmanuel et al found that the mean scores for the mental and physical domains of the QoL were lower than population norms.<sup>16</sup> During the stages of pregnancy, general health increased from the 1st to the 2nd trimester<sup>17</sup> and then the HRQoL decreased over time at the 2nd and the 3rd trimesters,<sup>18</sup> mainly in the physical health,<sup>17–22</sup> the mental health<sup>18,21,23</sup> and the social functioning.<sup>17,19,24</sup> The perceived health status was lower at the 9th month than the 3rd month of gestation<sup>18</sup> and it was in the domains of “role limitations due to emotional problems”, “general health perception”, and “general health change”.<sup>25</sup> On the contrary, Vachkova et al and Alzbon et al highlighted in their study that there was no difference in QoL between women in different trimesters of pregnancy.<sup>23,26</sup>

### Pathological Pregnancies

Passing to publications with pathological pregnancies, eleven pathologies affecting the QoL were studied (Table 2).

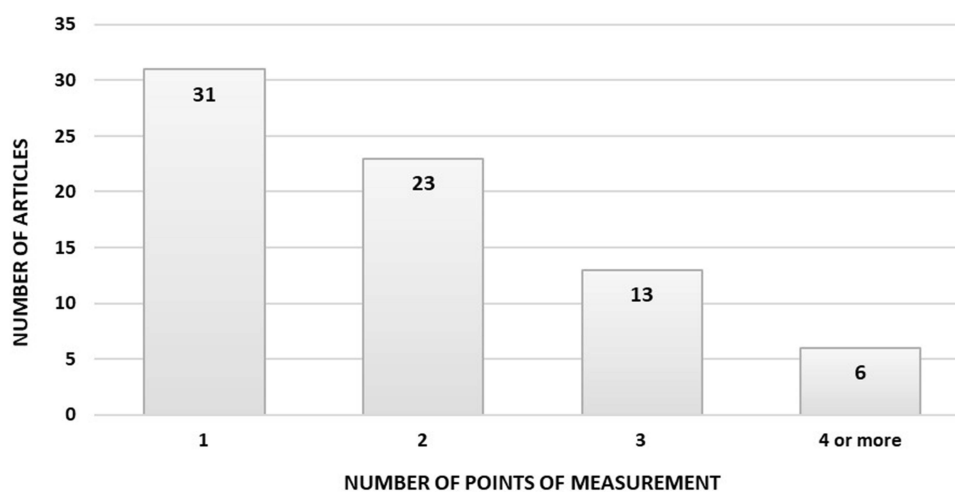
**Table 4** Pathologies Studied in Relation to Quality of Life During Pregnancy

Pathology	Number of Articles
Obesity	3
Hyperemesis Gravidarum	3
Low Back Pain	3
Pelvic Girdle Pain	3
Urinary Incontinence	2
Gestational Diabetes Mellitus	2
Heartburn	2
Iron Deficiency Anemia	2
Asthma	1
Depression	1
Uterine Fibroid	1

**Table 5** Distribution of the Instruments of Quality of Life Used in the Review

Instrument of QoL	Number of Studies
The Short Form 36 Health Survey Questionnaire (SF-36)	23
The Short Form 12 Health Survey Questionnaire (SF-12)	15
World Health Organization Quality-of-Life Scale (WHOQOL-BREF)	11
EuroQoL 5-Dimension 3-Level (EQ-5D-3L)	6
Pregnant women's quality of life (QOL-GRAV)	4
The Fertility Quality of Life (FertiQoL) questionnaire	2
EuroQoL 5-Dimension 5-Level (EQ-5D-5L)	2
The Nottingham Health Profile (NHP)	1
Patient Reported Outcomes Measurement Information System (PROMIS-43)	1
EuroQoL 6-Dimension (EQ-6D)	1
The Sexual Quality of Life-Female (SQOL-F)	1
Scale of complaints during pregnancy and effects on quality of life (SCPEQL)	1
The 15D instrument of health-related quality of life (HRQoL 15D)	1
The General Health Questionnaire-28 (GHQ28)	1
The Patient Reported Outcomes Measurement Information System Global Short Form (PROMIS10)	1
The questionnaire Psychological General Wellbeing Index (PGWBI)	1
The Quality of Life, Enjoyment and Satisfaction Questionnaire (Q-LES-Q)	1

Heartburn and regurgitation are common pregnancy symptoms, affecting up to 80% of women in their late pregnancy. This symptom is caused by increased reflux of gastric contents into the esophagus, which is facilitated by pregnancy-related hormonal changes.<sup>27</sup> Dal Alba et al found that heartburn and regurgitation affect physical health, emotional health, and the social functioning of pregnant women and decrease their QoL.<sup>28</sup> In contrast, the treatment of heartburn in pregnancy by receiving an alginate-based reflux suppressant or magnesium-aluminum antacid gel showed an

**Figure 5** Number of points of measurement used to assess the quality of life during pregnancy.



improvement in the QoL of pregnant women.<sup>29</sup> Hyperemesis gravidarum (HG) is characterized by severe nausea and excessive vomiting starting before the end of the 22nd week of gestation.<sup>30</sup> For the treatment, there was no difference in QoL between rapid intravenous rehydration and routine care in pregnant women suffering from Nausea and Vomiting (NV) and/or HG.<sup>31</sup> Also, using the Hyperemesis Impact of Symptoms questionnaire to tailor a care plan to address women's individual needs was not associated with any significant improvements in the QoL,<sup>32</sup> also the early enteral tube feeding in addition to standard care with intravenous rehydration and antiemetic treatment did not affect the QoL in women with Hyperemesis gravidarum.<sup>33</sup>

Low back pain (LBP) has a negative impact on pregnant women's QoL, whereas Progressive Muscle Relaxation exercises accompanied by music improve their QoL.<sup>34</sup> This is also true for the QoL of women receiving telephone-supported ergonomic education on pregnancy-related low back pain, except for physical functioning<sup>35</sup> which can be increased by receiving ear acupuncture for pregnancy-related LBP and/or posterior pelvic girdle pain (PGP).<sup>36</sup> Also, the lumbopelvic belt helps increasing the overall QoL in pregnant women with PGP,<sup>37</sup> but no significant difference in QoL between pregnant women receiving craniosacral therapy and those with standard treatment.<sup>38</sup>

The most frequent benign tumors in women are uterine fibroids (UFs). They are likely to cause numerous clinical symptoms in pregnant women, including pain, menorrhagia, and other obstetric problems. And impacts their QoL in physical health (mobility, pain and discomfort) and mental health (anxiety and depression) especially in pregnant women with less parity.<sup>39</sup> Stress urinary incontinence (SUI) is the involuntary loss of urine on effort or physical exertion, sneezing, or coughing. And the most frequent type of urinary incontinence (UI) in pregnant women. Lin et al showed that women with SUI during pregnancy featured worse mental component summary scores.<sup>40</sup> In addition, leakage in pregnant women with UI affects their physical, mental and social HRQoL domains.<sup>41</sup>

One of the most common chronic medical disorders that might make pregnancy more difficult is asthma. Its severity and exacerbations have both been associated with worse perinatal outcomes. However, in the study of Powell et al pregnant women with asthma reported good QoL.<sup>42</sup>

In obstetrics and perinatal care, anemia is a common issue. True anemia is defined as a hemoglobin level of less than 10.5 g/dL, regardless of gestational age. Nutritional deficits, parasite and bacterial infections, and inborn red blood cell disorders are the most common causes of anemia during pregnancy.<sup>43</sup> For the HRQoL of life outcomes, Khalfallah et al found that pregnant women with Iron Deficiency Anemia receiving intravenous iron had significant improvement in QoL than those receiving oral treatment.<sup>44</sup> Additionally, intravenous ferric carboxymaltose treatment improves vitality and social functioning.<sup>45</sup>

During pregnancy, both maternal obesity and gestational diabetes mellitus (GDM) are frequent. Both of these diseases have been linked to adverse pregnancy outcomes.<sup>46</sup> GDM is a condition in which pregnant women who have never had diabetes have high blood glucose levels. Although all women have some insulin resistance during pregnancy, only a small percentage develop GDM.<sup>47</sup> In 2019, a study found that there was no significant difference in HRQoL between the group of women receiving lifestyle counseling and the control group despite their GDM status.<sup>48</sup> For obese pregnant women, in 2014 Claesson et al reported that physical activity among obese pregnant women provides better psychological well-being and improved QoL.<sup>49</sup> Contrastingly, Seneviratne et al found that the antenatal exercise in overweight/obese women does not improve QoL in pregnancy.<sup>50</sup> Also, there was no difference in QoL in obese pregnant women receiving serial weighing and dietary advice and women receiving standard antenatal care.<sup>51</sup>

Like obesity, depression is also one of the most common complications in pregnancy and it's associated with severe health risks for both the mother and the child. For the HRQoL, a study evaluated the effectiveness of listening visits (LV) delivered at a woman's usual point-of-care, including home visits or an ob-gyn office, and there was a greater improvement in QoL in depressed pregnant women receiving LV compared to women receiving standard social/health services.<sup>52</sup>

### Assisted Pregnancies

For pregnant women with assisted conception or in vitro fertilization (IVF), the QoL decreases gradually with the progress of pregnancy,<sup>53</sup> and they may report lower physical and better mental health during pregnancy than women with spontaneous conception.<sup>54</sup> In the couple's life, the existence of conflicts from pregnancy to the postpartum period and

how to solve them was associated with a decrease in psychological QoL, whereas an increase in satisfaction with the marital relationship was associated with increases in all QoL domains.<sup>55</sup> Additionally, the QoL significantly increases in women subjected to their first IVF treatment after receiving a mindfulness-based intervention (MBI),<sup>56</sup> and among women having an assisted conception without gonadotropin stimulation.<sup>57</sup>

## Factors Influencing the QoL in Pregnancy

### Factors Decreasing the QoL in Pregnancy

Adolescent motherhood,<sup>58</sup> advanced maternal age,<sup>59</sup> high parity women,<sup>26,60,61</sup> low educational level, the perception of fiscal situation,<sup>60</sup> physical changes causing limitations, physical activity limitations, fear of managing labor,<sup>15</sup> the preparedness for parenthood,<sup>60</sup> place of receiving prenatal care,<sup>62</sup> inadequate antenatal care consultations and living in a poor household,<sup>58</sup> partner satisfaction,<sup>15</sup> poor sleep quality,<sup>63</sup> headache or migraine,<sup>64</sup> anxiety and depression,<sup>61</sup> fear of COVID-19,<sup>65</sup> adherence to behavioral restrictions,<sup>66</sup> the perception of health condition,<sup>60</sup> higher overall gestational weight gain,<sup>67</sup> gestational diabetes mellitus,<sup>59</sup> the severity of nausea and vomiting,<sup>68</sup> heart burn and regurgitation,<sup>28</sup> low back pain,<sup>34</sup> urinary incontinence,<sup>40,41</sup> pathological pregnancies<sup>18</sup> and hospitalization<sup>69</sup> were factors frequently indicating a poor QoL during pregnancy.

### Factors Increasing the QoL in Pregnancy

The following factors were strongly associated with a better quality of life: Exercise,<sup>70</sup> moderate physical activity in water,<sup>71</sup> high exercise adherence,<sup>70</sup> adopting low-to-moderate intensity resistance training,<sup>72</sup> Higher Energy Expenditures,<sup>73</sup> clinical pilates exercises,<sup>74</sup> having a body mass index BMI  $\geq 25$ ,<sup>75</sup> better sleep quality,<sup>76</sup> increase of sexual satisfaction,<sup>45</sup> receiving a lifestyle advice,<sup>22</sup> social support<sup>16,61</sup> and receiving the solution-focused counselling in terms of violence.<sup>77</sup>

In contrast, planned pregnancies and history of depression were not associated with low mental or physical QoL,<sup>78</sup> and offering an exercise program during pregnancy does not seem to influence healthy pregnant women's psychological wellbeing and self-perceived general health.<sup>79</sup>

## Discussion

### Summary of Results

Quality of life is increasingly a prominent consideration in patient care. It was demonstrated by the 261% growth in the number of scientific publications related to this topic over the previous 10 years. Such tendency has reached the realm of obstetrics as well. As shown in our results, the number of articles studying the HRQoL in pregnant women increased over the past ten years, illustrating the current interest of the prenatal care. The publications were classified into four categories (physiological pregnancy, pathological pregnancy, assisted pregnancy and pregnancy with gestational pathology) to simplify the processing of articles from homogenous populations. The studies focusing on the physiological pregnancies are on the rise. Morin et al found in their research a low number of articles focusing on QoL in physiological pregnancies (21 articles from 2005 to 2015), in contrast, we found 44 articles in the same category at the last ten years.<sup>80</sup>

The specific HRQoL instruments were not included in our study because they are more focused on specific problems in pregnancy. We used the generic HRQoL questionnaires only in the inclusion criteria to focus on women's overall well-being and their QoL. The most HRQoL instruments used are the SF-36, the SF-12 and the WHOQOL-BREF in 23, 15 and 11 articles respectively, since their time of administration is short (2–15 min), and the questions occupy multiple dimensions. Moreover, our detailed analysis reveals that the authors relied on only few points of measurement to estimate the QoL of pregnant women in most of cases. 31 articles used 1 point of measurement, 23 articles used 2 and 13 articles used 3. However, the pregnant woman's physiological state changes frequently, which might modify her QoL on various occasions.

The HRQoL has been found to be good and excellent in physiological pregnancies. In spite of that, the mean mental and physical domain scores, were lower than population norms. During pregnancy, the QoL increased from the 1st to the 2nd trimester, then decreased in the 2nd and 3rd trimesters, notably in physical health, mental health, and social functioning. The 9th month of pregnancy had a lower perceived health status than the 3rd month. On the other hand, other researchers, found no variation in QoL among women in different trimesters of pregnancy in their trials. In our review we found that all the pathologies studied have a negative impact on the HRQoL of pregnant women, and its

improvement depends on the type of the treatment. Obesity, low back and pelvic girdle pain, and hyperemesis gravidarum were the frequent pathologies during pregnancy.

## Strengths and Limitations of the Study

To the best of our knowledge, this is the only systematic review of literature aiming at synthesizing data on pregnant women's quality of life during the past 10 years. Many factors influencing the QoL during pregnancy have been studied. Our work also has its limitations: Only articles written in English or French were included in the study. As a result, the question of generalizability should be addressed. Specific HRQOL instruments were not included since they focus more on specific pregnancy issues than on women's general well-being and QoL. Thus, the absence of a longitudinal QoL study and the unavailability of coverage of the full gestational period in terms of QoL, would very certainly cause us to reconsider the conclusions reached in most of the studies in our review.

## Recommendations

Europe was the first continent interested in QoL during pregnancy, which can be explained as a result of the European strategic approach for making pregnancy safer, developed by WHO/Europe in 2008.<sup>81</sup> While in some countries, the QoL in pregnancy has been little studied. In Morocco, there is no information provided on pregnant women's QoL.

It should be emphasized that in many of the studies selected, the time of data collection on QoL does not span the whole pregnancy. Knowing that a woman's physiological condition varies regularly during pregnancy, which might affect her QoL on several times, and to try to develop a standard of QoL in pregnant women in the most complete way possible, it is important to evaluate QoL with a significant number of points of measurement, encompassing the whole duration of pregnancy. This would allow the identification of critical phases of pregnancy that necessitate a change in prenatal care and would serve as a reference for assessing the impact of a specific pregnancy-related disease on QoL during this period.

Many factors were linked to pregnant women's QoL. Socio-demographic characteristics related to improved well-being (favorable economic status, social support). Similarly, better sleep quality and moderate physical exercise were linked to an increased QoL. Physical and psychological factors were associated with a lower QoL. Noting that there are more factors reducing the QoL than those that improve it in pregnant women, and given the variety of elements influencing the QoL, the medical and paramedical professions must collaborate with social agencies, networks, and associations.

## Conclusion

The most significant findings in our study were the variety of factors associated with poor quality of life in pregnant women. These include socio-demographic, economic, and obstetrical characteristics, as well as in vitro fertilization and the presence of pathologies during pregnancy. Another important finding is the lack of studies assessing the HRQoL with a significant number of points of measurement, encompassing the whole duration of pregnancy.

To conclude, even though the evaluation of the health-related quality of life in pregnancy is a growingly universal issue, it would be fascinating to develop a standardized curve for the change in the quality of life in pregnant women and to investigate the factors that might affect their quality of life. This would allow us to emphasize important phases of pregnancy and try to repair or remove issues impacting the quality of life, or even go so far as to question the influence of poor quality of life during pregnancy has on women's childbirth, the postpartum, and the mother-child attachment in general.

## Abbreviations

BMI, body mass index; COVID-19, coronavirus disease of 2019; EE, energy expenditures; GDM, gestational diabetes mellitus; HG, Hyperemesis Gravidarum; HRQoL, Health-related Quality of Life; IVF, in vitro fertilization; LBP, low back pain; LV, listening visits; MBI, mindfulness-based intervention; MCS, mental component summary; NV, nausea and vomiting; NVP, nausea and vomiting of pregnancy; PCS, physical component summary; PGP, pelvic girdle pain; PP, post-partum; QoL, quality of life; SF-12, the short form 12 health survey questionnaire; SF-36, the short form 36 health survey questionnaire; SUI, stress urinary incontinence; UFs, uterine fibroids; UI, urinary incontinence; WHO, world health organization; WHOQOL-BREF, the world health organization quality-of-life scale.

## Data Sharing Statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Funding

There is no funding to report.

## Disclosure

The authors report no conflicts of interest in this work.

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