

RESEARCH REPORTS

Knowledge, Attitude, and Practices Regarding Exercise During and After Pregnancy Among Women Aged 18-49 in Kulhudhffushi city: A Cross-sectional Study

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ABSTRACT *Exercise during and after pregnancy is widely recognized as beneficial for maternal and fetal health, yet little is known about women's knowledge, attitudes, and practices in the Maldivian context. This study aimed to assess knowledge, attitudes, and practices related to exercise during and after pregnancy among women of reproductive age (18-49) in Kulhudhffushi City, and to examine the influence of demographic factors. A descriptive cross-sectional survey was conducted from July to August 2025 using a validated, structured questionnaire administered through face-to-face interviews. A total of 353 women participated, selected through simple random sampling. Knowledge and attitude were assessed among all participants, whereas practice-related items were evaluated only among women who had experienced pregnancy. The findings showed that 68.2% reported engaging in antenatal exercise, most commonly walking, while participation declined to 49% in the postpartum period. The mean knowledge score was 20.3 (SD = 5.43) out of 37, with less than half of participants demonstrating adequate knowledge. The mean attitude score was 9.34 (SD = 2.09) out of 14, with generally positive perceptions. However, many participants reported never receiving appropriate guidance on safe exercise during pregnancy. Motivators for antenatal exercise included preparing for normal delivery, reducing risks, and maintaining activity, while postpartum motivations centered on weight loss, regaining strength, and improving mental health. Reported barriers included fatigue, childcare responsibilities, lack of support, and limited awareness about safety. Inferential analysis using the Kruskal-Wallis test revealed no statistically significant differences in knowledge or attitude scores across marital status, literacy levels, number of children, or delivery type. These findings highlight important gaps in awareness and practice, underscoring the need for targeted educational strategies and stronger professional guidance to promote safe maternal exercise in the Maldives.*

Keywords: *Exercise, Pregnancy, Knowledge, Attitude, Practice, Maternal Health*

Introduction

Exercise during pregnancy is suggested to be essential to a healthy pregnancy. Exercises during and after pregnancy, like breathing exercises, strengthening exercises, and Kegel exercises, play a major role in strengthening the pelvic floor, improving cardiovascular fitness, and day to day functions (Budler & Budler, 2022). Literature has shown that exercises during and after pregnancy have a positive outcome on the psychological well-being of mothers, preventing postpartum psychosis and facilitating natural birth (Alharbi, 2019).

Exercises during pregnancy are considered to significantly contribute to the well-being of both the mother and child. Moreover, safe maternity exercises are a crucial part of health promotion and it promotes positive neonatal outcomes (Sujindra et al., 2015). Prolonged inactivity during pregnancy may increase the risk of complications such as excessive gestational diabetes, gestational weight gain, and hypertension, and negatively impact neonatal health (Fazzi et al., 2017). In addition to antenatal benefits, physical activity in the postpartum period plays a crucial role in maternal recovery and long-term health.

Exercises during postpartum period has been associated with improvements in cardiovascular fitness, weight management, and metabolic health, as well as enhanced psychological well-being, including reductions in symptoms of postpartum depression (Ranjan et al., 2022). Regular physical activity after childbirth also supports recovery of musculoskeletal function, particularly in relation to core stability and pelvic health, which are often affected during pregnancy and delivery (Davenport et al., 2019). Furthermore, sustained engagement in exercise during the postpartum period may contribute to the establishment of long-term healthy behaviours, benefiting both maternal and family health outcomes (Brown et al., 2022). Physical activity throughout all stages of pregnancy helps maintain and enhance cardiorespiratory fitness, lowers the likelihood of obesity and related health conditions, and contributes to increased lifespan (ACOG, 2020). This suggests in the complete absence of contraindications, pregnant women should practice exercises during pregnancy that are safe and vital (ACOG, 2020).

Despite the numerous advantages of exercise during and after pregnancy, many women hold a negative perception of it, with insufficient engagement, primarily due to the fact that a small percentage of the population is aware of the benefits (Temtanakitpaisan et al., 2020). This gap between known benefits and actual engagement reflects a missed opportunity for preventive health and early intervention in maternal care. It also suggests that awareness alone may be insufficient to translate into sustained behavioural change. This leads to common misconceptions that exercises during pregnancy can lead to negative impacts on the foetus, cause miscarriage, premature birth, musculoskeletal injuries, and poor foetal growth (Janakiraman et al., 2021) .

Exercises during and after pregnancy have been linked to numerous health benefits for both the mother and the baby. However, the extent to which women engage in these exercises, as well as the barriers they face, remains unclear in the Maldivian context. Therefore, the aim of the study assess the knowledge, attitude, and practice (KAP) related to exercises during and after pregnancy among women of reproductive age in Kulhudhuffushi City.

Problem Statement

According to Maldives Health Statistics, in (2021), there has been increase in the prevalence of non-communicable diseases (NCDs). The report indicate that maternal conditions comprise approximately 50% of admissions within the combined category of communicable, maternal, perinatal, and nutritional conditions, and this figure should not be interpreted as representing total hospital admissions.(Ministry of Health, 2021) . Recent demographic estimates indicate that approximately 6,000–5,000 births occur annually in the Maldives, highlighting

a substantial population of women who may benefit from evidence-based guidance on physical activity during and after pregnancy (Population Pyramid, 2024).

Despite Maldives having a physical activity guideline, there is limited evidence on the practice of exercise during and after pregnancy in the Maldivian context. Although awareness about the importance of exercise during and after pregnancy is gradually increasing, there remains a substantial gap in understanding the knowledge, attitudes, and perceptions of Maldivian women of reproductive age. The absence of a comprehensive understanding obstructs the creation of effective interventions and policies designed to enhance Maldivian women's health. Without precise data on individuals' knowledge, beliefs, and behaviours, initiatives aimed at tackling the misconceptions regarding exercise during and after pregnancy may be misguided or ineffective.

In this context, the present study was designed to assess the knowledge, attitudes, and practices (KAP) related to exercise during and after pregnancy among women of reproductive age in Kulhudhuffushi City, and to examine the socio-demographic factors associated with these outcomes. Specifically, the study evaluates the level of knowledge regarding exercise during and after pregnancy, examines women's attitudes towards physical activity in this period, and describes the practices they adopt. In addition, it investigates the demographic factors influencing variations in KAP within the study population.

Accordingly, the study addresses the following research questions: (1) What is the level of knowledge regarding exercise during and after pregnancy among women of reproductive age? (2) What are their attitudes towards exercise in this period? (3) What practices are currently adopted? and (4) Which socio-demographic factors are associated with knowledge, attitudes, and practices?

Hence, the study aimed to achieve the following objectives: (1) to assess the level of knowledge regarding exercise during and after pregnancy among women of reproductive age; (2) to examine their attitudes towards exercise during this period; (3) to identify the exercise practices currently adopted during and after pregnancy; and (4) to determine the association between socio-demographic factors and knowledge, attitudes, and practices. Objective 1 was addressed through the computation of a knowledge (K) score, while Objective 2 was examined using an attitude (A) score derived from participant responses. Objective 3 was explored by analysing the types of exercises performed and the barriers reported by participants. Finally, Objective 4 was investigated using the Kruskal–Wallis test to assess associations between socio-demographic variables and the composite knowledge, attitude, and practice (KAP) scores.

By addressing these questions, the study will provide insights into the current gaps and misconceptions that exist in the Maldivian context. A thorough understanding of KAP patterns is expected to contribute to better maternal health outcomes by informing more effective health education, policy design, and resource allocation, ultimately ensuring that women receive the support they need during and after pregnancy.

Literature Review

Physical activity during and after pregnancy is essential for maternal health and postpartum recovery. However, women's engagement with exercise during these critical periods remains suboptimal globally, influenced by varying levels of knowledge, attitudes, and sociocultural contexts. The review of current literature identifies patterns, gaps, and determinants of exercise-related KAP among pregnant and postpartum women across diverse populations.

Knowledge of Exercise During and After Pregnancy

Research across multiple contexts reveals significant deficiencies in women's knowledge about exercise during and after pregnancy. Majeed et al. (2022) studied 120 postpartum women in Lahore, Pakistan, finding that while over half demonstrated good awareness of postpartum exercises, they remained largely unaware of the specific health benefits these exercises could provide (Majeed et al., 2022). This knowledge-benefit gap suggests that surface-level awareness does not necessarily translate into comprehensive understanding.

The situation appears more concerning in certain contexts. Janakiraman et al. (2021) reported critically low knowledge and engagement in prenatal exercise among 349 pregnant Ethiopian women, with outcomes significantly worse than those reported in comparable regional studies (Janakiraman et al., 2021). Similarly, Hasan et al. (2019) documented inadequate knowledge among Pakistani women regarding exercise during pregnancy, which directly contributed to negative attitudes and minimal participation (Hasan et al., 2019).

Specific types of exercises show particularly low awareness levels. A study found that among 110 Thai pregnant women, only approximately half were aware of pelvic floor muscle training, and very few actually practiced it despite its recognized benefits (Temtanakitpaisan et al., 2020). In a study conducted among Indian pregnant women demonstrated poor to moderate average understanding of exercise, and few exercisers met the recommended daily exercise duration, with walking being the most popular activity (Singh et al., 2025). This pattern suggests that knowledge deficits are most pronounced regarding specialized or targeted exercises rather than general physical activity.

The Role of Education in Shaping Knowledge and Attitudes

Educational attainment emerges as a critical determinant of exercise-related knowledge and behavior. Individuals with higher education levels consistently demonstrate better understanding and more positive attitudes toward exercise, which significantly influences their participation rates (Mbada et al., 2015). This relationship has been documented across multiple settings and populations. Mbada et al. (2015) examined 189 pregnant women and 179 nursing mothers in Nigeria, discovering high rates of exercise participation that increased notably with educational attainment. The study revealed that women with secondary or tertiary education were significantly more likely to engage in regular exercise during and after pregnancy compared to those with primary education or less. Similarly, a study conducted in Lusaka, Zambia, found that basic education substantially enhanced participants' awareness of physical activity benefits, with educated women more likely to engage in intentional exercise beyond routine domestic tasks and walking

(Balogun et al., 2025). These findings underscore a critical equity issue: women with lower educational backgrounds face compounded disadvantages, not only do they have less access to health information generally, but they also lack the knowledge necessary to make informed decisions about exercise during pregnancy and postpartum periods.

Attitudes Toward Exercise During and After Pregnancy

Attitudes toward exercise during and after pregnancy vary considerably across populations, though positive attitudes do not always correlate with actual practice. Alharbi (2019) found that Saudi Arabian women demonstrated both good knowledge and positive attitudes toward postpartum exercises, particularly pelvic floor exercises including Kegels, which translated into relatively high practice rates (Alharbi, 2019). This represents an optimal scenario where knowledge, attitudes, and practices align. However, this alignment is not universal. In a study conducted among Indian mothers observed that exhibited positive attitudes toward exercise during pregnancy despite having low overall awareness, suggesting that cultural or social norms may shape attitudes independently of knowledge (Sujindra et al., 2015). Conversely, Hasan et al. (2019) documented negative attitudes among Pakistani women that appeared directly linked to inadequate knowledge, resulting in minimal participation (Hasan et al., 2019). The relationship between knowledge and attitudes thus appears complex and context-dependent, influenced by cultural factors, social support systems, and access to accurate health information.

Practice and Engagement: The Knowledge-Practice Gap

A consistent and troubling pattern emerges across the literature: even when women possess adequate knowledge and positive attitudes, actual exercise participation remains disappointingly low. This knowledge-practice gap represents perhaps the most significant challenge in promoting maternal physical activity. A study conducted in Libya showed that while a majority of pregnant women were well-informed about the benefits and risks of exercise during pregnancy, fewer than half actually participated in regular exercise (Jahan & Anaiba, 2023). Despite positive attitudes and adequate knowledge, their exercise habits were constrained by practical barriers including time limitations, exhaustion, and concerns about fetal safety. Participants also identified poor time management and insufficient detailed knowledge about appropriate exercises as significant obstacles.

Similarly, Sundaramurthy et al. (2020) found that Indian postnatal women demonstrated adequate general knowledge but limited understanding of specific exercise benefits, with domestic responsibilities identified as the primary barrier to physical activity (Sundaramurthy et al., 2020). This suggests that even when women understand that exercise is beneficial, they may not fully grasp how or why specific exercises support postpartum recovery, limiting their motivation to prioritize physical activity amid competing demands. The types of exercises practiced also show interesting patterns. Mbada et al. (2015) found that among pregnant Nigerian women who did exercise, aerobic activities and stretching were most practiced, typically 2-1 times per week. However, pelvic floor exercises despite their specific benefits for pregnancy and postpartum recovery—showed notably lower participation rates across multiple studies (Alharbi, 2019; Temtanakitpaisan et al., 2020), suggesting that specialized exercises require more targeted education

and support.

Barriers to Exercise During and After Pregnancy

The literature identifies multiple categories of barriers that prevent women from translating knowledge and positive attitudes into consistent practice:

- Individual-level barriers include physical fatigue, lack of detailed knowledge about appropriate exercises, safety concerns regarding fetal wellbeing, and poor time management skills (Jahan & Anaiba, 2023).
- Social and cultural barriers encompass domestic responsibilities and childcare demands, which disproportionately affect women in contexts where household labor is not equally shared (Sundaramurthy et al., 2020). Cultural norms about appropriate behavior during pregnancy may also constrain physical activity in certain contexts.
- Structural barriers include limited access to exercise facilities, lack of professional guidance, absence of tailored exercise programs for pregnant and postpartum women, and insufficient integration of exercise counseling into routine prenatal and postnatal care.

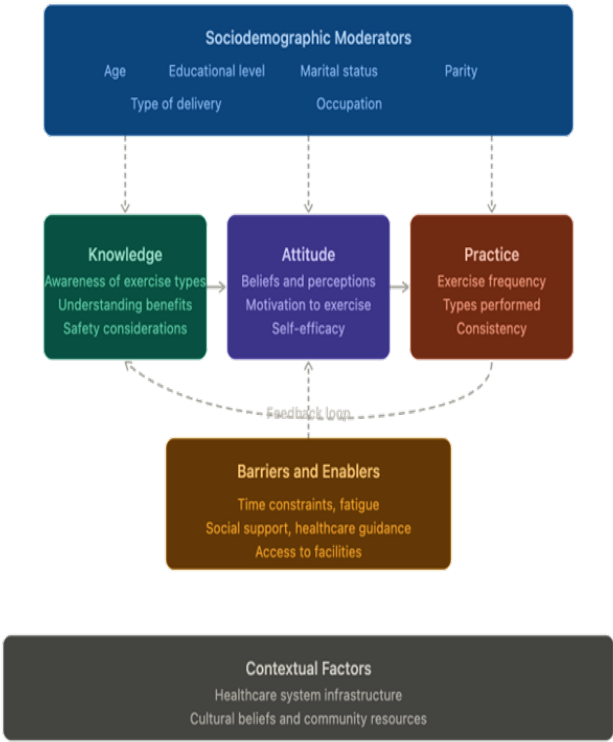
To synthesize the findings reviewed above, Appendix 1 presents a comprehensive overview of the major studies examining knowledge, attitudes, and practices regarding exercise during and after pregnancy across diverse geographic and cultural contexts. These studies underscore significant deficiencies in awareness, attitudes, and practices related to exercises during and after pregnancy across varying contexts. Enhancing education and support is crucial for encouraging physical activity during and after pregnancy, which is vital for the health and recovery of mothers.

Based on these studies, the proposed conceptual framework is highlighted in Figure 1. This conceptual framework illustrates KAP pathway for exercise during and after pregnancy, where knowledge influences attitudes, which in turn affects practice behaviours. Sociodemographic factors (age, education, marital status, parity, delivery type, and occupation) directly moderate all three components, while barriers and enablers (time constraints, social support, healthcare guidance, and facility access) mediate the attitude-practice relationship. A feedback loop shows how practice experiences can reinforce or modify knowledge and attitudes, with the entire framework operating within broader contextual factors including healthcare infrastructure and cultural beliefs.

The conceptual framework (Figure 1) was specifically designed to operationalize the study's research questions by mapping each question to distinct framework components. Research Question 1, which seeks to determine the level of knowledge regarding exercise during and after pregnancy, corresponds to the Knowledge component (encompassing awareness of exercise types, understanding of benefits, and safety considerations). Research Question 2, examining attitudes towards exercise, is represented by the Attitude component (including beliefs, perceptions, motivation, and self-efficacy). Research Question 3, investigating current practices, aligns with the Practice component (measuring exercise frequency, types performed, and barriers). Research Question 4, exploring socio-demographic associations, is addressed through the Sociodemographic Moderators positioned at the top of the

framework, with direct pathways showing how factors such as age, educational level, marital status, parity, type of delivery, and occupation influence all three KAP components. The framework further incorporates barriers and enablers that mediate the attitude-practice relationship, as well as contextual factors, providing a comprehensive theoretical structure that not only addresses each research question systematically but also illuminates the dynamic relationships among knowledge, attitudes, and practices within the study population.

Figure 1. Conceptual Framework



Methods

Study Design and Setting

A descriptive cross-sectional design was used for the study. The study is based in Kulhudhuffushi City, known as one of the largest islands in the Maldives, which covers an area of around 3.5 square kilometres and has a population of 10,857 individuals (Aboobakur & Samarakoon, 2019). Acting as the administrative centre for the Haa Dhaalu Atoll Division, this city is of considerable significance, both in terms of geography and administration within the nation. Data collection occurred from July 2025 ,24, to August 2025 ,5.

Participants

The sampling frame was derived from an updated household listing obtained from the Kulhudhuffushi City Council, reflecting the most recent available records at

the time of data collection, and was used for the random selection of households. The participants for the study were women of reproductive age residing in Kulhudhuffushi City. From the city's overall female population of 5,382, around 2,675 women were within the 18 to 49 years age bracket, according to the most recent figures from the Kulhudhuffushi City Council. This age range was selected because it signifies the time when women possess the biological capacity for conception. The lower age limit of 18 was selected as it is the legal age at which individuals in the Maldives can provide informed consent independently, without requiring parental or guardian approval. The participants were recruited into the study based on the following criteria:

Inclusion Criteria

- Participants will be selected if they are
- Females of reproductive age (49-18)
- Maldivian citizens currently residing in Kulhudhuffushi

Exclusion Criteria

- Females who are diagnosed with cognitive or neurological disorders
- Are unable to provide informed consent or comprehend the study information/questionnaire (due to language, sensory, or cognitive barriers).

Sampling

A simple random sampling method was employed to recruit participants for the current study. To avoid bias during data collection, samples were collected from different parts of the island each day for 2 weeks, ensuring all parts of the island were covered and everyone had the same probability of being chosen. To calculate the sample size, Slovin's formula was used $[n = N / (1 + Ne^2)]$, where n denotes the sample size, N is the population size, and e = margin of error (William, 2021). In this case, the population size, N , is 2675, which corresponds to women of reproductive age in Kulhudhuffushi City, while the estimated margin of error was set at 5% (0.05). By substituting these values, the estimated sample size was estimated to be 348.

Research Instrument

A questionnaire was adapted from previously published studies (Janakiraman et al., 2021; Mbada et al., 2015; Sundaramurthy et al., 2020; Temtanakitpaisan et al., 2020). The questionnaire consisted of four sections, each intended to evaluate different domains. Section A consisted of questions related to the demographic details. Section B consisted of questions assessing their knowledge (8 questions). Section C consisted of questions related to attitudes towards exercises during and after pregnancy (3 questions). Section D was focused on the practice of exercises during and after pregnancy, specifically targeting women who are currently pregnant or have been pregnant previously. This section consisted of 2 primary questions , along with sub-questions intended to identify the common types of exercises practiced during these stages. Practice-related questions were administered only to participants who were currently pregnant or had experienced pregnancy previously, whereas the remaining sections of the questionnaire were

completed by all eligible participants. To reduce errors and ensure precision, data collection was carried out through in-person interviews by visiting households from door to door. The sampling frame was derived from the updated household listing obtained from the Kulhudhuffushi City Council, and households were randomly selected to ensure equal probability of inclusion. Completion of the questionnaire took each respondent about 10 to 15 minutes. The questionnaire is available as a supplementary material (see appendix II)

Scoring of Knowledge and Attitude Items

The Knowledge score (K-score) was derived by assigning one point for each correct response and zero for each incorrect response. The scores from all knowledge items were summed to obtain a total score, with higher values indicating greater knowledge. The Attitude score (A-score) was also calculated similarly. The total attitude score was obtained by summing across all items, with higher scores representing more favourable attitudes toward exercise during and after pregnancy. The total Knowledge Score ranged from 0 to 37, while the total Attitude Score ranged from 0 to 14.

Validity of the Questionnaire

The reliability of the questionnaire was not formally assessed using statistical measures such as internal consistency or test-retest reliability. However, the instrument was developed based on existing literature and underwent content validation by an expert panel, with subsequent revisions made to improve clarity and relevance. A pilot assessment was conducted to ensure comprehensibility and feasibility among the target population. The questionnaire was validated using the Content Validity Index (CVI). A panel of nine healthcare professionals from the Maldives, specializing in women's health, evaluated the instrument. Each item was rated on a 4-point Likert scale (1 = not relevant, 2 = somewhat relevant, 3 = quite relevant, 4 = highly relevant). The Item-Level CVI (I-CVI) was computed for each question as the proportion of experts who rated the item as 3 or 4. The I-CVI values ranged from 0.78 to 1.00, demonstrating that most items were considered either quite relevant or highly relevant. Items scoring below the recommended cut-off of 0.78 were revised to improve clarity and alignment with study objectives. The Scale-Level CVI (S-CVI/Ave), calculated as the average of all I-CVI values across items, was 0.90, indicating excellent overall content validity of the questionnaire. Following the incorporation of the panel's feedback and necessary modifications, the finalized questionnaire was deemed valid and suitable for implementation in the study.

Ethical Consideration

All participants provided written informed consent after reviewing the study information sheet. They were informed of their right to withdraw from the study at any stage without consequence. This process ensured that participants clearly understood the study's objectives, purpose, and the way findings would be disseminated. Confidentiality was maintained by collecting only minimal personal information (age and gender), with all other identifying details excluded. Throughout the study, the researcher adhered strictly to the institutional ethical guidelines. This study received blanket ethical approval from the Maldives National University (MNU) Research Ethics Committee (Approval No. RE/2023/A-2). In

addition, a no-objection letter was obtained from the Kulhudhuffushi City Council, and approval was also granted by the National Health Research Council (NHRC) (Registration No. NHRC/2025/21).

Data Analysis

All data were analysed using JAMOV software. Descriptive statistics for both categorical and continuous data were utilized to summarize the results. Measures such as mean, mode, and standard deviation were performed to depict the central tendency and variability of continuous variables. For inferential analysis, the Kruskal-Wallis test was utilized to determine if there were statistically significant differences between the knowledge score and attitude score.

Results

Socio-demographic characteristics of the participants

A total of 353 participants with an average age of 32.7 ± 7.78 years participated in the study. Among the participants who were surveyed, 79.6% were married, 13.9% single, 6.2% divorced, and 0.3% widowed. Most of the participants reported having no children (30.3%), followed by those with two children (25.5%), three children (21.8%), one child (18.1%), and more than four children (4.2%). Furthermore, 4.2% of the total 353 participants were pregnant at the time the study was conducted. Table 1 highlights the detailed demographic characteristics of the participants.

Table 1. Demographic Characteristics of the Participants

Variables	Level	N (%)
Marital status	Married	281 (79.6)
	Single	49 (13.9)
	Divorced	22 (6.2)
	Widowed	1 (0.3)
No of kids	0	107 (30.3)
	2	90 (25.5)
	1	64 (18.1)
	3	77 (21.8)
	>4	15 (4.2)
Level of literacy	Bachelors	66 (18.7)
	Diploma	36 (10.2)
	Primary	33 (9.3)
	Masters	37 (10.5)
	Foundation	9 (2.5)

	Secondary	159 (45.0)
	Higher secondary	13 (3.7)
History of miscarriage	No	282 (79.9)
	Yes	71 (20.1)
	NA	107 (30.3)
Type of delivery	Normal delivery	106 (30)
	Cesarean	140 (39.7)
Currently pregnant	No	338 (95.8)
	Yes	15 (4.2)
Recent medical checkup	Not applicable	338 (95.8)
	Yes	15 (4.2)
Previous medical checkup	Not applicable	102 (28.9)
	Yes	250 (70.8)
	No	1 (0.3)

Knowledge and Attitude Scores among the study participants

A significant portion of women indicated that they took part in regular physical activity during and after pregnancy. Moreover, approximately one-third of the participants noted that they had never been provided with information about exercises by a healthcare professional suitable for their own pregnancy. Within the subset of women who received recommendations for antenatal exercise, walking was the most frequently suggested form of activity. Conversely, cycling and strength training were the least commonly recommended exercises.

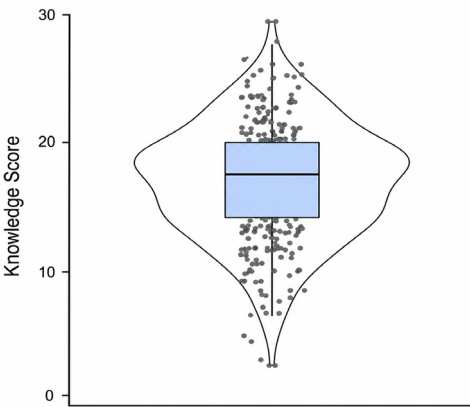
The average score for knowledge among the participants was 20.3 ± 5.43 , with scores varying from 4 to 35. Only 159 women, representing 45%, exhibited sufficient knowledge concerning exercises during and after pregnancy. A mere fraction of the participants exhibited a thorough understanding of the benefits linked to exercising during and after pregnancy (see Table 2).

The distribution of knowledge scores is illustrated in Figure 2. The violin plot, overlaid with a box plot, demonstrates both the spread and concentration of scores within the sample. The widest sections of the violin indicate that most participants scored between 18 and 25, with the median positioned around 20. The box plot highlights the interquartile range, while individual data points show the variability of responses and the presence of a few outliers at both lower and higher ends. Overall, the figure indicates that knowledge scores were symmetrically distributed, with most participants clustering around the central values.

Table 2. Descriptives of Knowledge scores

	Knowledge Score
Mean	20.3
95% CI mean lower bound	19.8
95% CI mean upper bound	20.9
Median	21
Standard Deviation	5.43

Figure 2. Distribution of knowledge scores



The average attitude score among pregnant women was 9.34 (see Table 3). A significant majority (75.1%) reported that their perception of exercise during and after pregnancy was influenced by the advice from healthcare providers. Moreover, 85% of the participants believed that regular exercise during antenatal could help with a normal delivery and that they believe regular exercise helps prepare their body for childbirth. However, almost half of the participants believed that exercise during pregnancy does not suit our culture, and pregnant women should not exercise without advice from a healthcare provider. However, majority of the participants thought that antenatal exercise could help in preventing complications related to pregnancy.

The distribution of attitude scores is presented in Figure 5 using a violin plot combined with a box plot. Most participants scored between 8 and 12, with the median close to 9. Individual data points show a clustering of responses within this range, though a few outliers are visible at both the lower and upper ends. Overall, the figure indicates that participants generally reported positive attitudes, with most scores concentrated in the higher range.

Table 3. Descriptives of Attitude score

	Attitude Score
Mean	9.34
95% CI mean lower bound	9.12
95% CI mean upper bound	9.56
Median	9
Standard deviation	2.09

Figure 3. Distribution of Attitude Scores

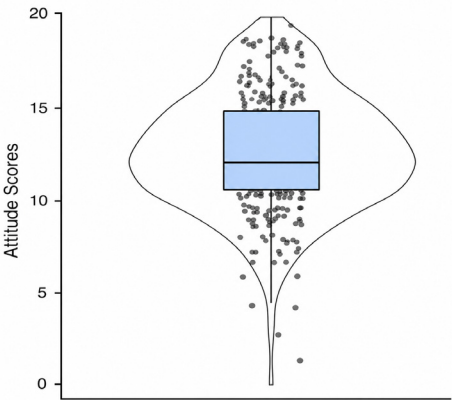
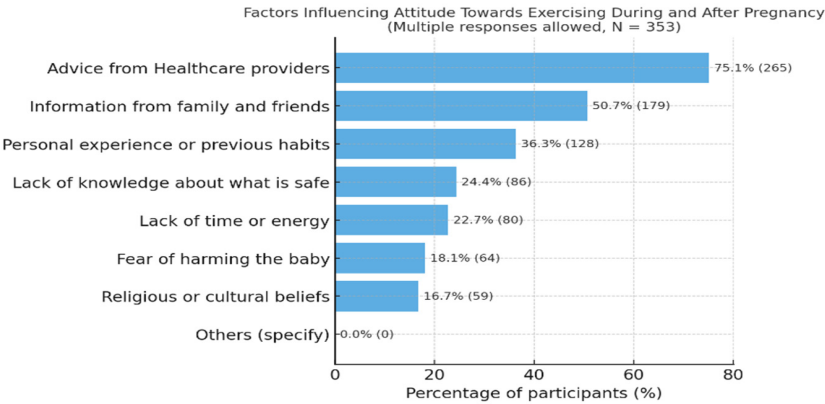


Figure 4 illustrates the factors influencing participants’ attitudes towards exercising during and after pregnancy. The most frequently cited factor was advice from healthcare providers (75.1%), followed by information from family and friends (50.7%) and personal experience or previous habits (36.3%). Other influences included lack of knowledge about what is safe (24.4%), lack of time or energy (22.7%), fear of harming the baby (18.1%), and religious or cultural beliefs (16.7%).

Figure 4. Factors influencing attitude among study participants

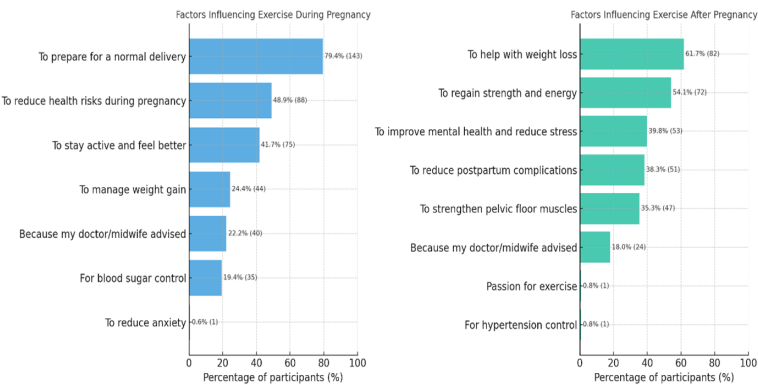


Exercise Patterns among the participants

A contrast was observed between women’s engagement in exercise during pregnancy and after childbirth. More than two-thirds of participants (68.2%) reported practicing some form of antenatal exercise, with walking or brisk walking being the most reported activity. In comparison, the proportion of women who continued exercising after pregnancy declined, with just under half (49%) reporting participation.

Factors that motivated women to exercise also differed between the antenatal and postnatal periods. During pregnancy, the strongest influence was the desire to prepare for a normal delivery, reported by nearly four out of five participants (79.4%). Other common motivators included reducing health risks (48.9%), staying active and feeling better (41.7%), managing weight gain (24.4%), and medical advice from a doctor or midwife (22.2%). A smaller proportion reported exercising for blood sugar control (19.4%) or anxiety reduction (see Figure 5). After pregnancy, motivations shifted towards recovery and regaining function. The leading reasons were weight loss (61.7%), regaining strength and energy (54.1%), improving mental health and reducing stress (39.8%), and lowering the risk of postpartum complications (38.3%). Advice from healthcare providers (18%) and strengthening pelvic floor muscles (35.3%) were also cited. Taken together, these findings indicate that while antenatal exercise was primarily motivated by delivery-related outcomes and health promotion, postnatal exercise was driven by recovery, physical restoration, and psychosocial well-being.

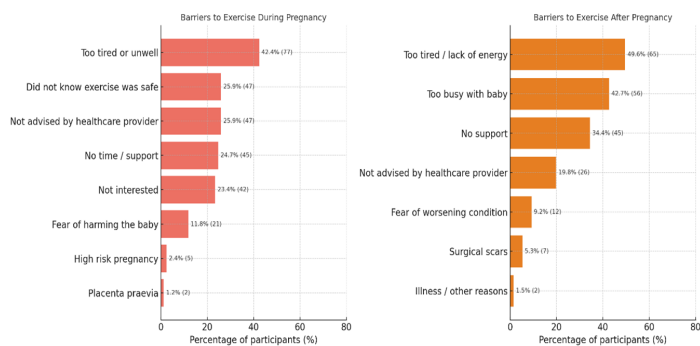
Figure 5. Perceived Benefits of exercise during and after pregnancy



Barriers to exercise varied between pregnancy and the postpartum period. During pregnancy, the most frequently cited reason for not exercising was feeling too tired or unwell (42.4%), followed by being unaware that exercise was safe (25.9%) or not receiving adequate advice from healthcare professionals (25.9%). Other barriers included lack of time or support (24.7%), lack of interest (23.4%), and fear of harming the baby (11.8%), with a small number of participants reporting high-risk conditions such as placenta previa (see Figure 6). After pregnancy (after giving birth), however, the barriers shifted in nature. The leading reasons included fatigue (49.6%) and being too busy caring for the baby (42.7%), along with lack of support (34.4%) and insufficient guidance from healthcare providers (19.8%).

A smaller proportion (9.2%) reported concerns that exercise might worsen their condition, while very few cited medical or situational reasons such as surgical scars or illness. Together, these findings suggest that while antenatal barriers were shaped largely by health concerns and limited awareness, postpartum barriers were more strongly influenced by the competing demands of childcare, fatigue, and lack of support systems.

Figure 6. Barriers to exercise during and after pregnancy



Inferential analysis of K-score and A-score

The Kruskal-Wallis test was employed to evaluate whether there are significant differences in scores among various sociodemographic groups. The test showed that knowledge scores did not differ significantly across marital status groups, $H(3) = 3.96$, $p = .266$, $\epsilon^2 = .011$. Similarly, there was no significant difference in attitude scores by marital status, $H(3) = 2.92$, $p = .404$, $\epsilon^2 = .008$. This finding suggests that marital status does not significantly influence these scores within the population studies (see Table 4).

Table 4. Difference in K-scores and A-scores between the marital statuses

	H	df	p	ϵ^2
Knowledge score	3.96	3	0.266	0.0112
Attitude score	2.92	3	0.404	0.00833

As shown in the table 5 the analysis indicated no statistically significant differences in knowledge scores across literacy levels, $H(6) = 4.18$, $p = .652$, $\epsilon^2 = .012$. Likewise, attitude scores did not significantly differ across literacy levels, $H(3) = 2.69$, $p = .847$, $\epsilon^2 = .008$ (see Table 5).

Table 5. Difference in K-scores and A-scores between the literacy levels

	H	df	p	ϵ^2
Knowledge score	4.18	6	0.652	0.0119
Attitude score	2.69	3	0.847	0.00766

The data revealed no statistically significant differences in knowledge scores across the number of children, $H(4) = 6.23$, $p = .182$, $\epsilon^2 = .018$. For attitude scores, the test approached significance but did not reach the conventional threshold, $H(4) = 8.58$, $p = .073$, $\epsilon^2 = .024$ (see Table 6).

Table 6. *K-scores and A-scores across the number of children*

	H	df	p	² ϵ
Knowledge score	6.23	4	0.182	0.0177
Attitude score	8.58	4	0.073	0.0244

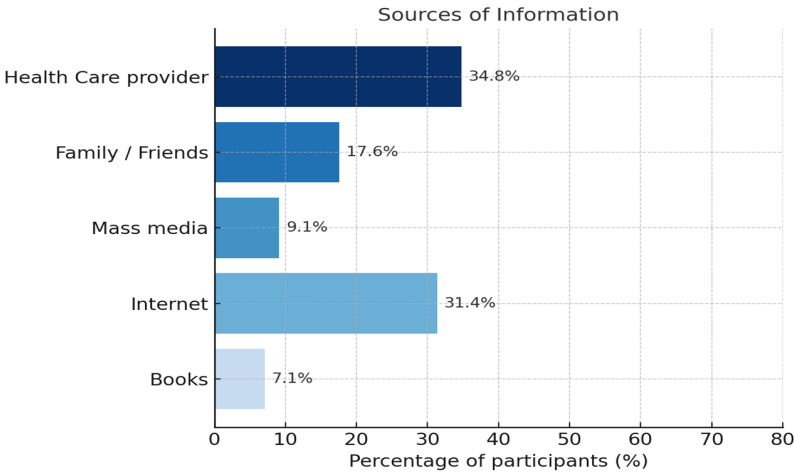
The test showed no statistically significant differences in knowledge scores across delivery types, $H(2) = 2.48$, $p = .290$, $\epsilon^2 = .007$. For attitude scores, the attitude score had a significant relationship with the type of delivery, $H(2) = 5.76$, $p = .056$, $\epsilon^2 = .016$ (see Table 7).

Table 7. *K-scores and A-scores across the types of delivery*

	H	df	p	² ϵ
Knowledge score	2.48	2	0.290	0.00703
Attitude score	5.76	2	0.056	0.0164

The sources of information regarding exercise during and after birth are presented in Figure 7. The most frequently cited source was health care providers (34.8%), followed closely by the internet (31.4%). Family and friends contributed as a source for 17.6% of participants, while mass media (9.1%) and books (7.1%) were less commonly reported. These findings highlight the dominant role of professional advice and online resources in shaping knowledge, with comparatively limited reliance on traditional media and printed materials.

Figure 7. *Source of Information about exercises among the study participants*



Discussion

Among participants, 69.7% were multigravida and 56.1% had undergone caesarean sections. This prevalence of caesarean deliveries aligns with findings from Sundaramurthy et al. (2020) but differs from the Nigerian population studied by Mbada et al. (2015), where vaginal births were more common. The high caesarean section rate in this population underscores an urgent need for enhanced awareness regarding postpartum exercise, as many women may avoid physical activity due to misconceptions and fears about potential harm to themselves or their babies.

Exercise after caesarean delivery requires careful consideration and appropriate guidance. Light activities such as walking and pelvic floor exercises can typically begin soon after delivery, depending on individual medical recommendations (ACOG, 2020). However, high-impact exercises and abdominal strengthening activities should be postponed for several weeks to allow adequate healing (ACOG, 2020). A gradual return to physical activity supports core and pelvic muscle strengthening, facilitates recovery, and minimizes complication risks. Therefore, enhancing awareness about safe postpartum exercise protocols, particularly following caesarean delivery, is essential for alleviating concerns and promoting healthier behaviors in this population (Singh et al., 2025).

Healthcare professionals emerged as the primary source of exercise information, followed by online resources and family or friends. This finding contrasts with studies such as Alharbi et al. (2019), which identified the internet and mass media as predominant information sources. Interview data revealed a new protocol at KRH whereby consultants and nursing staff systematically counsel all pregnant and postpartum women about the importance of exercise during their appointments. This direct professional engagement likely accounts for the shift in information sources and underscores the pivotal role healthcare providers play in enhancing exercise awareness among this population.

Approximately 55% of participants demonstrated insufficient knowledge regarding exercise during and after pregnancy, contrasting with findings by Sundaramurthy et al. (2020). Given the urban setting and the fact that over half of participants held undergraduate degrees, the relatively limited knowledge level may be associated with parity. Women with more children may have increased opportunities to receive guidance from healthcare professionals during multiple pregnancies. Regarding exercise types, aerobic exercises were most commonly recognized, followed by yoga, breathing techniques, and abdominal exercises. These findings align with research by Mbada et al. (2015) and Alharbi et al. (2019), where aerobic and stretching exercises similarly emerged as the most familiar and practiced forms of physical activity.

The majority of women exhibited supportive attitudes toward physical activity during and after pregnancy, consistent with findings from Sundaramurthy et al. (2020). These positive attitudes may be influenced by participants' interactions with healthcare providers and their experiences as multiparous women, who are more likely to recognize the benefits and importance of perinatal exercise. This suggests that direct professional guidance, combined with personal experience, significantly shapes the development of favorable attitudes toward exercise in this demographic.

A substantial proportion of women were engaged in exercise during pregnancy, primarily to promote safe delivery and maintain health. However, many others abstained, citing reasons including preoccupation with baby care, feeling unwell, or uncertainty about exercise safety during pregnancy. In the postpartum period, while some women continued exercising to regain strength and manage weight, nearly half discontinued physical activity. Common barriers included childcare responsibilities, lack of time or social support, and insufficient information about when it was safe to resume exercise.

These findings parallel those of Sundaramurthy et al. (2020), who similarly identified childcare duties, injury concerns, and inadequate information as prevalent obstacles to exercise during and after pregnancy. It is important to emphasize that physical activity during pregnancy is typically safe and carries minimal risk for most women when no medical contraindications exist (ACOG, 2020). Exercise provides numerous benefits, though routines may require modification to accommodate the anatomical and physiological changes of pregnancy and fetal needs (ACOG, 2020). In the absence of medical complications, pregnant women are encouraged to maintain or initiate safe exercise programs that enhance health outcomes for both mother and baby (ACOG, 2020).

Unlike studies by Alharbi (2019) and Mbada et al. (2015), which found positive associations between educational level and exercise knowledge, this study, consistent with Sundaramurthy et al. (2020), identified no significant relationship between sociodemographic factors and knowledge, attitudes, or practices related to perinatal exercise. This absence of correlation may reflect the specific study context and cultural environment. The high proportion of undergraduate participants and the systematic exercise counseling protocols at the tertiary healthcare facility may have created a more uniform level of exposure to exercise information, thereby diminishing the influence of traditional sociodemographic predictors.

This study provides a foundation for future research on exercise during and after pregnancy, particularly regarding knowledge, attitudes, and practices. Given the lack of significant associations between sociodemographic factors and KAP outcomes, future investigations could explore alternative factors influencing exercise comprehension and attitudes among both healthcare students and the broader community. Additionally, research examining the effectiveness of healthcare provider-led interventions in diverse settings would be valuable, as would longitudinal studies tracking how knowledge, attitudes, and practices evolve from pregnancy through the extended postpartum period. The positive attitudes documented in this study, coupled with the identified knowledge gaps and practical barriers, suggest that targeted educational interventions addressing specific concerns could significantly improve maternal exercise participation and health outcomes in this population.

Delimitations and Limitations

This study examined the knowledge, attitudes, and practices (KAP) regarding exercise during and after pregnancy among women of reproductive age in Kulhudhuffushi City, Haa Dhaalu Atoll. The study was intentionally delimited to this geographic region to ensure feasibility within available time and logistical resources, while allowing for focused exploration of maternal health behaviors

within a defined community context. The selection of this population enabled the identification of context-specific patterns related to demographic variables such as age, marital status, number of children, and education level, as well as commonly practiced forms of exercise and gaps in evidence-based awareness. However, this localized focus limits the generalizability of the findings to the broader Maldivian population, particularly given the diversity in healthcare access, cultural practices, and health literacy across different islands and atolls. Therefore, extrapolation of findings should be undertaken with caution.

Several methodological limitations must also be acknowledged. Firstly, the cross-sectional design captures data at a single point in time and does not allow for the assessment of temporal changes or causal relationships between variables. To partially address this limitation, the study incorporated a comprehensive set of variables to provide a broad snapshot of participants' knowledge, attitudes, and practices; however, longitudinal designs would be required in future research to understand changes over time and the impact of interventions.

Secondly, the study relied on a self-reported questionnaire, which is inherently subject to response biases, including recall bias and social desirability bias. Participants may have overreported positive health behaviours or attitudes toward exercise during and after pregnancy. To minimize this, anonymity and confidentiality were emphasized during data collection, and participants were informed that there were no right or wrong answers, encouraging more honest responses. Additionally, the questionnaire was designed using simple, clear language and underwent content validation by an expert panel to enhance clarity and reduce misinterpretation.

Another limitation relates to the use of subjective self-reported data, which may not always accurately reflect actual behaviours or practices. While this is a common limitation in KAP studies, efforts were made to ensure that questions were specific and contextually relevant to reduce ambiguity. Nevertheless, objective measures of physical activity, such as wearable activity tracking or observational methods, would strengthen future studies.

The questionnaire underwent content validation using the Content Validity Index (CVI), demonstrating excellent validity; however, formal reliability testing (e.g., internal consistency or test-retest reliability) was not conducted. Although pilot testing was undertaken to assess clarity and feasibility, the absence of statistical reliability assessment may affect the consistency and reproducibility of the findings. This is acknowledged as a methodological limitation and should be addressed in future research.

Furthermore, the absence of extensive prior research in the Maldivian context limited opportunities for comparison with local data and may have influenced the interpretation of findings. To mitigate this, the study drew upon international literature to contextualize results; however, differences in healthcare systems and sociocultural factors should be considered when interpreting these comparisons.

Despite these limitations, the study provides important baseline data on maternal exercise-related knowledge, attitudes, and practices within a previously under-researched population. The findings highlight critical gaps and barriers that can inform targeted educational interventions, clinical guidance, and public health strategies aimed at promoting safe and effective exercise practices during

and after pregnancy. Future research should consider larger, multi-center samples, longitudinal designs, incorporation of objective measures, and comprehensive psychometric evaluation of instruments to build upon the findings of this study.

Recommendations

Women without medical restrictions should engage in moderate-intensity physical activity for at least 150 minutes per week during pregnancy, which helps reduce the risk of complications such as pre-eclampsia, gestational diabetes, excessive weight gain, and the need for caesarean delivery. After childbirth, exercise programs should include pelvic floor muscle training as a core component, with careful attention to individual needs and appropriate modifications based on how the woman gave birth, her recovery progress, and any complications she experienced. These personalized exercise plans support physical recovery, restore strength in the core and pelvic floor muscles, prevent long-term problems like urinary incontinence and pelvic organ issues, and promote mental wellbeing during the postpartum period.

Healthcare providers must offer tailored, evidence-based exercise guidance that considers each woman's unique health situation, pregnancy history, current medical conditions, and stage of postpartum recovery. This individualized approach ensures both safety and effectiveness, allowing providers to maximize health benefits while minimizing potential risks. Our findings reveal significant knowledge gaps regarding safe exercise practices and a high rate of caesarean deliveries in Kulhudhuffushi City, highlighting the urgent need to systematically integrate exercise counseling into routine antenatal and postnatal care. Healthcare professionals require adequate training in perinatal exercise principles, contraindications, and culturally appropriate counseling methods to effectively support women throughout pregnancy and the postpartum period.

Beyond clinical practice, our findings have important implications for maternal health policy in the Maldives. The results demonstrate the need for national guidelines on exercise during and after pregnancy that reflect both international evidence and local cultural realities. Policymakers should prioritize initiatives that strengthen healthcare provider capacity through continuing education, develop community-based exercise programs accessible to women across different islands and atolls, and create supportive environments that help mothers stay physically active despite common barriers like childcare demands and time pressures. Incorporating structured exercise programs into existing maternal and child health services at health centers and regional hospitals throughout the Maldives could significantly improve maternal health outcomes across the population.

Conclusion

This study provides the first comprehensive assessment of knowledge, attitudes, and practices regarding exercise during and after pregnancy among women in Kulhudhuffushi City, Maldives, contributing valuable insights into maternal health behaviors in a small island developing state context. The findings reveal that more than half of the participants lacked adequate knowledge regarding perinatal exercise, with many unfamiliar with specific indications, contraindications, and safe exercise protocols appropriate for pregnancy and the postpartum period. This knowledge gap is particularly concerning given the high caesarean section rate

(56.1%) observed in this population, as women recovering from surgical delivery require specialized guidance on safe exercise resumption.

Encouragingly, healthcare providers emerged as the primary source of exercise information, reflecting the successful implementation of systematic counseling protocols at Kulhudhuffushi Regional Hospital. This finding highlights both an opportunity and a responsibility: healthcare professionals in the Maldives are uniquely positioned to influence maternal health behaviors and must be supported to deliver evidence-based exercise guidance tailored to the local context. The predominantly positive attitudes toward exercise observed among participants, coupled with substantial engagement in physical activity during pregnancy, demonstrate that women in Kulhudhuffushi City are receptive to exercise interventions when appropriately informed and supported.

However, the marked decline in exercise participation during the postpartum period driven by barriers including childcare responsibilities, time constraints, lack of social support, and uncertainty about safe exercise practices underscores a critical gap between attitudes and sustained behavior. This knowledge-practice gap suggests that information alone is insufficient; women require ongoing support, practical strategies for overcoming barriers, and culturally appropriate exercise programs that accommodate the realities of island life and traditional postpartum practices in Maldivian society.

The lack of sociodemographic variation may reflect the relatively uniform healthcare access and educational opportunities in Kulhudhuffushi City's urban setting, where systematic exposure to maternal health services at the tertiary care facility appears to have equalized exercise awareness across demographic groups. Additionally, shared cultural beliefs and practices surrounding pregnancy and childbirth in Maldivian society may contribute to this homogeneity.

These findings have important implications for maternal health programming in the Maldives and similar island nations. First, healthcare providers must prioritize comprehensive exercise education during antenatal and postnatal visits, with particular emphasis on safe practices following caesarean delivery: a pressing need given the high surgical birth rate. Second, interventions should extend beyond knowledge dissemination to address practical barriers, potentially incorporating community-based exercise groups, culturally adapted postpartum exercise programs, and family engagement strategies that align with Maldivian social structures. Third, given the pivotal role of healthcare providers as information sources, investment in training nurses, midwives, and physicians on evidence-based perinatal exercise guidelines is essential.

Future research should examine the effectiveness of targeted exercise interventions in the Maldivian context, explore cultural beliefs and traditional practices that may influence postpartum exercise behaviors, and investigate strategies for sustaining physical activity beyond the immediate postpartum period. Longitudinal studies tracking exercise patterns from pregnancy through extended postpartum recovery would provide valuable insights into critical points for intervention. Additionally, research comparing exercise behaviors across different islands and atolls could reveal whether findings from Kulhudhuffushi City are generalizable to more remote or rural Maldivian communities where healthcare

access and cultural contexts may differ.

In conclusion, while women in Kulhudhuffushi City demonstrate positive attitudes toward perinatal exercise and benefit from systematic healthcare provider engagement, significant knowledge gaps and practical barriers limit optimal exercise participation, particularly in the postpartum period. Addressing these challenges through enhanced provider training, culturally tailored interventions, and community support structures represents a crucial opportunity to improve maternal health outcomes in the Maldives and contribute to the growing evidence base for exercise promotion in small island developing states.

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