The Open Public Health Journal
DOI: 10.2174/0118749445342415240910050237, 2024, 17, e18749445342415
ISSN: 1874-9445

RESEARCH ARTICLE **OPEN ACCESS**

Investigating the Relationship between the General Health of Mothers and their Maternal Performance following Vaginal Childbirth

Niloufar Izaddoost[1], Sahar Parsaie[1], Masoumeh Choobdarnezhad[1], Sally Pezaro[2] and Leila Amiri-Farahani[3,*]

[1]*Department of Reproductive Health and Midwifery, School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran*
[2]*The Research Centre for Healthcare and Communities, Coventry University, Coventry, UK, The University of Notre Dame, Notre Dame, Australia*
[3]*Department of Reproductive Health and Midwifery, Nursing and Midwifery Care Research Center, School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran*

Abstract:

Background: Birthing parents need to use specialized skills as the first caregivers of the newborn. Several factors may affect maternal performance, the general health of the birthing parent (*e.g.*, mother) being one of them. Yet, there is a paucity of research in this area, particularly in Iran, and evidence remains inconsistent. Consequently, this study aimed to determine any correlations between maternal performance and the general health of mothers following vaginal childbirth in the context of Iran.

Methods: This cross-sectional study was conducted with people identifying as mothers (n = 450) who had given birth (< two months) and been referred for the vaccination of their newborn. The multi-stage sampling method was carried out from April 2022 to February 2023. Participants who met the inclusion criteria completed a demographic and obstetric information questionnaire, along with the Barkin maternal performance and general health questionnaire. To investigate the relationship between maternal performance and the general health of the mothers, an independent t-test analysis was conducted . The level of statistical significance was set at $p < 0.05$.

Results: The mean age of participants was 26.78, and the mean total score of maternal performance was 91.04 (0 - 120). The highest and lowest scores related to the 'maternal competence' and the 'maternal needs' domains, respectively. Overall, 76.89% of participants had a favorable general health condition (a score of less than 3.5 is considered favorable). There was no statistically significant difference identified in terms of maternal performance scores between those with a favorable and those with an unfavorable general health status.

Conclusion: Although the results of the present study did not show a significant relationship between the general health of mothers and maternal performance, this research builds on a growing body of evidence in the context of Iran. Despite recording high maternal performance scores in this sample, it will be important to enhance and maintain good mental health in all childbearing people, particularly following vaginal childbirth, as it is this which will enhance care and outcomes overall.

Keywords: General health, Maternal performance, Childbirth, Predictors, Postpartum, Pregnancy.

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*Address correspondence to this author at the Department of Reproductive Health and Midwifery, Nursing and Midwifery Care Research Center, School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran; Tel: +98.2143651139; Fax: +98.2143651800; Postal Code: 1996713883; E-mail: l.amirifarahani@gmail.com

Cite as: Izaddoost N, Parsaie S, Choobdarnezhad M, Pezaro S, Amiri-Farahani L. Investigating the Relationship between the General Health of Mothers and their Maternal Performance following Vaginal Childbirth. Open Public Health J, 2024; 17: e18749445342415. http://dx.doi.org/10.2174/0118749445342415240910050237

Received: July 22, 2024
Revised: August 10, 2024
Accepted: August 19, 2024
Published: September 19, 2024

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1. INTRODUCTION

The performance of the birthing person in the postpartum period is an important indicator of the successful transition in their role as a parent and predicts behavior, self-efficacy, and infant care behavior [1]. Childbirth itself is one of the most significant life events [2]. Yet the postpartum period can be particularly stressful, with sudden and severe changes in one's roles and responsibilities following childbirth [3]. Applying the specialized skills that birthing parents need to strengthen their role as the first caregiver of the baby, ensuring their health, and managing household affairs is often referred to as 'maternal performance' [4], though we recognize the need for future language to be gender inclusive [5]. Such performance is an important variable affecting infant care during the 12 months following birth and throughout parental life [6]. Postpartum maternal performance is a complex and multidimensional concept that includes self-care, care of the baby, infant feeding, family care, and social and occupational activities [7]. As this performance presents as stressful, there is a need to explore how the health of the birthing parent may correlate with performance in this context.

The performance of the birthing person (often a mother) is influenced by several factors [8]. In the postpartum period, influencing factors may include mode of birth [9], infant mood and night waking [10], social support [11], depression [12], and anxiety [13]. Considering that depression and anxiety are both factors affecting maternal performance in this context, we hypothesized that general health and/or mental health may also be an influencing factor.

According to the World Health Organization, health is defined as being not only the absence of disease or disability but also the optimal state of physical, mental, and social well-being, where mental health is the relative ability of a person to perform physical, mental and social roles [14]. General health is also one of the important indicators of personal and social health [15]. It has four subscales, including physical function, social function, anxiety, and depression [16]. People experience significant changes in their general health status during and after pregnancy and childbirth [15]. As such, studying general health in this context will be vital, particularly in the prevention of adverse outcomes associated with pregnancy and childbirth [16].

Previous studies have identified significant relationships between maternal performance following childbirth and mental health (*e.g.*, anxiety, depression, behavior control, and positive affect) [17-20]. Indeed, some child bearers with depression and clinical problems may experience lower performance [8] and functioning [7] when acting as primary carers for their newborn. Postpartum depression following childbirth can also have a negative effect on bonding with the infant at one- and four months post-childbirth [21]. Conversely, performance following childbirth can increase following a decrease in depression [22]. Yet, in one study, no significant relationship was found between postpartum depression symptoms and the quality of infant care [23]. Such inconsistencies require further examination in a variety of contexts, particularly in Iran, where limited studies exist and birthing people are reportedly less prepared for parenthood following childbirth [17, 24]. It is also not clear how general health (as opposed to mental health) may relate to maternal performance in this context. Considering the above, we aimed to determine the relationship between the general health of the birthing person (*e.g.*, mother) and maternal performance following vaginal childbirth in the context of Iran.

2. METHODS

2.1. Study Design and Setting

This cross-sectional study included participants attending health centers for their neonates to receive vaccinations two months following childbirth. Participants were recruited from health centers affiliated with the University of Medical Sciences in Tehran, Iran. Multi-stage sampling was used, and health centers affiliated with the university were first divided into two strata (west and northwest). Following the randomized selection of centers from each stratum, sampling occurred *via* the proportional allocation method. Continuous sampling was then used until the full sample size was reached among those who met the inclusion criteria. The share of each comprehensive health service center and the number of participants recruited to the study were determined by the total number of people who gave birth and were referred to the West and Northwest health centers overall. Information about the research and questionnaire was given to potential participants by one of the authors (M.CH.). Participants who gave their informed consent to participate were subsequently asked to complete the instruments in paper form. Sampling continued from April 2022 to February 2023.

2.2. Sample Size

Where the standard deviation of maternal performance was equal to 0.24, taking into account an accuracy of 0.03 and with a confidence limit of 95%, the sample size calculated for a similar study based on estimating averages has been equal to 246, rising to 450 after additionally taking into account the possibility of incomplete cases [25].

$$n = \frac{z^2_{1-\frac{\alpha}{2}} s^2}{d^2}$$

$n = [(1.96)^2 \times (0.24)^2] \div (0.03)^2 = 246$

2.3. Inclusion and Exclusion Criteria

All participants who met the inclusion criteria were Iranian and had experienced vaginal births resulting from either a low-risk or a high-risk (*e.g.*, due to either diabetes, anemia, hypothyroidism, blood pressure, preeclampsia, a body mass index above 29, age $\geq$ 35 or $\leq$

18, low birth weight and/or premature birth) singleton pregnancy. Those who had experienced stressful events such as the death of a loved one in the last three months, instrumental vaginal birth or babies born with abnormalities, cesarean section, a history of alcohol, smoking and/or drug use, known psychological conditions, or underlying physical conditions (*e.g.*, lupus, heart disease, and kidney disease) were excluded from participation, as these were considered to be factors which may influence performance independently.

2.4. Data Collection

Our data collection tool included a demographic and obstetric history questionnaire. Following this, the 12-item General Health questionnaire (GHQ) was administered. In this questionnaire, the following answers: "more than usual" and "in the normal range," were given a score of zero, whereas the answers; "worse than usual" and "much worse than usual" were assigned a score of one. Accordingly, the minimum score was considered to be zero, and the maximum score was considered to be 12. The best cut point for the 12-question general health questionnaire is 3.5 [26]. In this study, the Likert scoring method was used (1-1-0-0). The Persian version of this questionnaire was translated in Iran by Tagharrobi *et al*. (2012), who previously designed and implemented a study with the aim of investigating the reliability and validity of a 12-item general health questionnaire with C-GHQ scoring style in Iran. With this scoring method, which varies between 0 (favorable) and 12 (unfavorable), a higher score indicates a more negative response [27].

The third part of our data collection tool contained the Barkin Index of Maternal Functioning (BIMF) instrument [28], which included 20 items. Each item was scored on a 7-point Likert scale (strongly disagree = 0 to strongly agree = 6). The minimum score was zero, and the maximum score was 120. A higher score was associated with a higher level of performance. This tool had two domains: the domain related to 'maternal needs' included 7 items (2, 6, 7, 8, 9, 11, and 13), and the domain related to 'maternal competence' included 13 items (1, 3-5, 10, 12, 14-20). In order to complete the questionnaire, participants were asked to indicate their performance experience during the last two weeks. Items 16 and 18 required reverse scoring. The reliability of the original version of this instrument was confirmed with a Cronbach's alpha of 0.87 [28]. The validity of the Iranian version of the tool was confirmed *via* face and content validity, and its reliability was confirmed through Cronbach's alpha coefficient [29]. Participants in the present study were given the opportunity to complete the entire data collection tool containing all questionnaires and their items within 30 minutes in a completely calm environment without being hurried or disturbed in any way.

2.5. Ethical Approval

This study was approved by the Ethics Committee at Iran University of Medical Sciences, Tehran, Iran (Number: IR.IUMS.REC. 1400.1083). Informed written consent was obtained from participants (> 18 years old), who were fully informed of the purpose and procedures of the study. Participants were also assured of the confidentiality of information. All methods were carried out in accordance with our study protocol, along with relevant guidelines and regulations associated with Iran University of Medical Sciences and professional regulatory bodies such as the Nursing and Midwifery Council. This research was conducted on humans by the Helsinki Declaration of 1975, as revised in 2013 (http://ethics.iit.edu/ecodes/node/3931).

2.6. Analyses

The data were analyzed using SPSS V.24 (SPSS). Following the assessment of skewness and kurtosis, the quantitative data were considered to be normally distributed. Descriptive statistics, including frequencies and percentages, mean and SD, were used to understand demographic and other variables associated with obstetric history. To compare the constructs of maternal performance, scores were normalized to a maximum score of 100. To calculate each construct's normalized score, each score was subtracted from the minimum score related to that construct and then divided by the difference between the maximum and minimum score. The final result obtained was then multiplied by 100.

To investigate the relationship between maternal performance and general health, independent t-test analysis was conducted. The level of statistical significance was set at $p < 0.05$.

Table 1. Frequency distribution of participants' demographic characteristics.

Variable		No	Percent	Min	Max	Mean	SD
Age (Year)	25 ≥	200	44.44	16	43	26.78	5.318
	26-35	223	49.56				
	36 ≤	27	6.00				
Spouse's age (Year)	25 ≥	70	15.56	20	54	31.40	5.197
	26-35	281	62.44				
	36 ≤	99	22.00				
Level of education	Primary school	35	7.78	-	-	-	-
	Secondary School	60	13.33				
	Diploma	153	34.00				
	University education	202	44.89				

(Table 1) contd.....

Variable		No	Percent	Min	Max	Mean	SD
Occupation	Employed	103	22.89	-	-	-	-
	Housewife	347	77.11				
Spouse's level of education	Primary school	25	5.56	-	-	-	-
	Secondary School	56	12.44				
	Diploma	169	37.56				
	University education	200	44.44				
Spouse's occupation	Worker	82	18.22	-	-	-	-
	Employees	170	37.78				
	Self-employment	198	44.00				
Ethnicity	Turk	95	21.11	-	-	-	-
	Kurdish	41	9.11				
	Lur	68	15.11				
	Fars	132	29.33				
	Other	114	25.33				
Financial status	Undesirable	68	15.11	-	-	-	-
	Fairly favorable	243	54.00				
	Optimal	139	30.89				

3. RESULTS

The inclusion and exclusion criteria were examined in 765 potential participants. Many (n = 315) were subsequently excluded. Some because they were not Iranian (n = 85), some because they gave birth *via* cesarean section (n = 175), some because they declined to participate (n = 40), and others because they had known psychological conditions or underlying physical conditions (*e.g.*, lupus, heart disease, kidney disease) (n = 15) (Response rate = 59%). Of all eligible participants included in this study (n = 450), most participants were aged between 26 and 35 years, with a frequency of 223 (49.6%). The highest level of education of participants (n=202) was university level (44.9 percent), and the majority (n=347) were unemployed (77.1%). Most (n=273) gave birth in a public hospital (60.7%), and the majority (n=258) had experienced one previous pregnancy (57.3%). Many (n=299) had a previous history of vaginal childbirth (66.4%), and even more (n=363) reported no history of abortion (80.7%). The average gestational age of participants at the time of vaginal childbirth was 38.75 weeks. The demographic characteristics and obstetric history of the participants are presented in Tables **1** and **2**.

Table **3** below presents results highlighting an average general health status of 1.86±2.306 for participants based on scores from 0 to 100. In reference to the variable related to maternal performance, competence had the highest average score.

Table **4** presents our finding that performance had no significant relationship with either the favorable or unfavorable general health status of participants (P=0.486).

Table 2. Frequency distribution of participants' fertility information.

Variable		No	Percent	Min	Max	Mean	SD
Place of birth	Governmental hospital	273	60.67	-	-	-	-
	Private of hospital	177	39.33				
Number of previous births	1	309	68.67	-	-	-	-
	2	122	27.11				
	3 ≤	19	4.22				
Number of abortions	0	363	80.67	-	-	-	-
	1	77	17.11				
	2 ≤	10	2.22				
Gestational age at the time of birth (weeks)	< 37	41	9.11	31	41	38.75	1.255
	37- 39	297	66.00				
	40 – 41	112	24.89				
Wanted pregnancy	Yes	394	87.56	-	-	-	-
	No	56	12.44				
Pregnancy status	Low risk	329	73.11	-	-	-	-
	High risk	121	26.89				

(Table 2) contd.....

Variable		No	Percent	Min	Max	Mean	SD
Reason for pregnancy being high risk	Diabetes	16	3.56	-	-	-	-
	Anemia	5	1.11				
	Hypothyroidism	23	5.11				
	Preeclampsia	5	1.11				
	BMI > 29	8	1.78				
	Participant's age > 35	12	2.67				
	Participant's age < 18	6	1.33				
	Low birth weight	5	1.11				
	Preterm birth	41	9.11				
Frequency of receiving antenatal care	< 4	60	13.33	1	20	7.03	2.640
	5 – 10	352	78.22				
	11 ≤	38	8.44				
Place of antenatal care	Hospital clinic	268	59.56	-	-	-	-
	Midwife's office	58	12.89				
	Health center	124	27.56				
Provider of antenatal care	Midwife	182	40.44	-	-	-	-
	General physician	11	2.44				
	Obstetrician	257	57.11				
Participation in childbirth preparation classes	Yes	190	42.22	-	-	-	-
	No	260	57.78				
Epidural or spinal anesthesia separate	Yes	148	32.89	-	-	-	-
	No	302	67.11				
Use of analgesics	Yes	177	39.33	-	-	-	-
	No	273	60.67				
Birth suite	Single Occupancy	256	56.89	-	-	-	-
	Multiple Occupancy	194	43.11				
Episiotomy	Yes	343	76.22	-	-	-	-
	No	107	23.78				
Lead professional during birth	Obstetrician	129	28.67	-	-	-	-
	Midwife	108	24.00				
	Both	213	47.33				
Length of hospitalization in the birth suite	≤ 4	122	27.11	2	12	5.92	1.755
	5 - 8	314	69.78				
	≥ 9	14	3.11				
Accompanying presence in the birth suite	Yes	141	31.33	-	-	-	-
	No	309	68.67				
Length of hospitalization (Day)	1	372	82.67	-	-	-	-
	2	66	14.67				
	3	12	2.67				
Hospitalization of the neonate after birth in the intensive care unit	Yes	33	7.33	-	-	-	-
	No	417	92.67				
Duration of hospitalization of the neonate in the intensive care unit	0	417	92.67	-	-	-	-
	1	13	2.89				
	2	9	2.00				
	3 ≤	11	2.44				

Table 3. Mean and standard deviation of performance and general health in participants.

Total Scores and Domains	Max.	Min.	Mean	SD	Scores based on the 1-100			
					Max.	Min.	Mean	SD
General health (0-12)	11	0	1.86	2.306	92	0	15.50	19.219
Maternal performance (0-120)	118	51	91.04	12.418	98	43	75.87	10.348
Domain 1: maternal needs (0-42)	42	9	30.58	6.272	100	21	72.81	14.933
Domain 2: Maternal competence (0-78)	78	39	60.46	7.383	100	50	77.51	9.465

Table 4. Statistical indicators of participant performance according to general health status.

Variable	Group	NO (%)	Performance		Results
			Mean	SD	
General health status*	Favorable (< 3.5)	346 (76.89)	91.27	11.814	t= 697 df= 448 P= 0.486
	Unfavorable (> 3.5)	104 (23.11)	90.30	14.281	

Note: *Analysis with independent t-test.

4. DISCUSSION

This study has determined no relationship between general health and maternal performance in those referring to comprehensive health centers affiliated with the University of Medical Sciences in Tehran, Iran. The mean and standard deviation of general health scores were 1.86 and 2.306, respectively. Considering that the general health score varies between 0 (favorable) and 12 (unfavorable), our results demonstrate that many participants have favorable general health overall. In a previous study, the average rating scores of participants at 34 and 36 weeks of pregnancy and 6 weeks after vaginal childbirth were reported as 3.36 (SD = 2.69), 3.11 (SD = 2.58), and 3.12 (SD = 2.89), respectively [30]. Yet in Molly *et al*.'s (2013) study, the average score of the general health of those with children who had hearing impairments was 29.82 compared to those who did not (20.24). These averages indicate that the general health of those with children who had hearing impairments is somewhat favorable, and the general health of those who did not is favorable [31]. Considering these results are inconsistent with those presented in the present study, large meta-analyses may be indicated in the future.

The average general health score identified in a previous study conducted by Omidi *et al*. (2019) was 33.81 ± 16.27. The highest percentage of those studied (40%) had mild health disorders, and only a small percentage (3.7%) had severe health disorders [32]. Based on results reported by Mohajeri *et al*. (2015), the mean general health of participants in physical functioning areas (65.81 ± 24.12), social performance (61.62± 27.01), pain (62.12±27.01), mental Health (61.94 ± 20.14) was higher than other areas, and the lowest general health average was related to the impact of the role affected by emotional problems (44.38 ± 44.49). However, 23.2% in this area had a maximum general health score, and 32.1% had the lowest general health score. General health in those birthing with special educational needs was reported at a low level [33]. Moreover, birthing parents of children with disabilities also reportedly had low health levels [34]. Considering these inconsistencies with the results of the present study, it may be useful to take an intersectional approach in the future to account for how the characteristics of different birthing people intersect in this context.

5. MATERNAL PERFORMANCE

The mean and standard deviation of scores relating to maternal performance, maternal needs, and maternal competence were 91.04 ± 12.418, 30.58 ± 6.272, and 60.46 ± 7.383, respectively. A separate study conducted in Tabriz, Iran, reported an average maternal performance score of 97.4 [17]. Elsewhere, performance scores have been reported at 93.3 [35], 97.4 [36]. All the above studies used the same questionnaire, and the results aligned with those presented here. As such, this research contributes to a growing body of evidence in this regard. This is particularly interesting given that performance has been reported with an average score of 80 (range: 0-120) elsewhere, where participants screened positive for depression and other mental ill health conditions [37]. As in the present study, the highest scores related to competence have also been reported elsewhere more recently [38]. This further suggests that the field must now act on the growing body of evidence in this regard. Nevertheless, future studies may more usefully draw from alternate data collection tools such as the IFSAC tool [25, 39, 40] in order to make meta-analyses more feasible.

6. GENERAL HEALTH AND MATERNAL PERFORMANCE

We have identified no statistically significant difference in performance scores for those with favorable and unfavorable general health status following childbirth. This is somewhat surprising given that there is often a significant relationship reported between performance following childbirth alongside mental health and all its subscales (anxiety, depression, behavior control, and positive affect) [4, 17, 37, 38]. Yet our study excluded participants who did not self-report good mental health, and performance is known to increase in the absence of poor mental health [4, 6, 7, 8, 22]. Yet, considering the importance of family and the role of birthing parents in Iranian culture, some may attempt to maintain their role, strengthen family relationships, and maintain their performance despite ill health. Future studies could usefully explore these phenomena by employing more qualitative methodologies.

The implications of the findings presented suggest that those childbearing with poor general health may be overcompensating in caring for their newborns early on. The consequences of this may unfold later in parenthood, when maternal performance can no longer be sustained in the face of ill health. As such, it will be important that parental support continues to sustain childhood development in the long term, particularly as parental burnout may have detrimental consequences to both childhood development and parental well-being in the long term.

7. STRENGTHS, LIMITATIONS, AND SUGGESTIONS FOR FUTURE RESEARCH

The current study was rigorously conducted, and multi-stage sampling was used to reduce sampling errors and enhance representation. Nevertheless, a clear limitation is that only participants from the west and northwest regions of Tehran were included. Moreover, due to the design of this study, those who experienced birth *via* cesarean section were also excluded. Considering that not all participants with a high-risk pregnancy and/or birth were able to participate, results cannot be generalized to all high-risk pregnancies and births. Future research is required in other geographical areas of Tehran, examining maternal performance in those who have given birth *via* cesarean section and those who experience high-risk pregnancy and childbirth. It will also be important to compare scores with participants in other parts of the world and conduct more qualitative research to understand how people adapt to parenthood following childbirth in a variety of cultures and contexts.

CONCLUSION

No statistically significant difference in maternal performance score was identified for those with favorable and unfavorable general health status following vaginal childbirth. This builds upon a growing body of evidence in the context of Iran. Despite this sample having high performance scores, it will be important to enhance and maintain good mental health in all childbearing people, particularly following childbirth, as this will enhance care and outcomes overall.

AUTHORS' CONTRIBUTION

The authors confirm their contribution to the paper as follows: M.CH. and L.A.F. designed the study. M.CH., S.PA. and L.A.F. analyzed and interpreted the data. N.I., S.P., and L.A.F. interpreted the findings and wrote and revised the paper. All authors reviewed the results and approved the final version of the manuscript.

LIST OF ABBREVIATIONS

GHQ = General Health questionnaire

BIMF = Barkin Index of Maternal Functioning

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the Ethics Committee at Iran University of Medical Sciences, Tehran, Iran (Number: IR.IUMS.REC. 1400.1083).

HUMAN AND ANIMAL RIGHTS

All methods were carried out in accordance with our study protocol, along with relevant guidelines and regulations associated with Iran University of Medical Sciences and professional regulatory bodies such as the Nursing and Midwifery Council. This research was conducted on humans by the Helsinki Declaration of 1975, as revised in 2013 (http://ethics.iit.edu/ecodes/node/3931).

CONSENT FOR PUBLICATION

Informed written consent was obtained from participants (> 18 years old), who were fully informed of the purpose and procedures of the study.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The data and supportive information are available within the article.

FUNDING

The current study was funded and supported by Iran University of Medical Sciences.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

ACKNOWLEDGEMENTS

The authors would like to thank all who participated in this study.

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