Advances in Obstetrics and Gynecology Research, 2025, Volume 3, Issue 5
https://ojs.bbwpublisher.com/index.php/AOGR
Online ISSN: 2981-8060
Print ISSN: 3083-4872

Knowledge and Acceptability of Water Birth Among Chinese Women in Taian City, Shandong Province

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Abstract: *Objective:* This study explored the level of expertise and acceptability of water birth among Chinese women in Taian City, Shandong Province. *Methods:* A descriptive correlational research design was used. One hundred six women of reproductive age (18–35 years old) from a selected community in Taian City were surveyed using a validated Water Birth Knowledge Questionnaire and Water Birth Acceptability Questionnaire, both based on the Theory of Planned Behavior (TPB). Statistical tools such as frequency, percentage, mean, standard deviation, and Spearman's rank correlation coefficient were applied for data analysis. *Results:* Findings revealed that most participants had moderate knowledge of water birth, particularly regarding its benefits, but lacked understanding of the risks and procedural details. Acceptability levels were generally positive, especially in attitude and behavioral intention. A significant correlation ($p < 0.05$) between knowledge and acceptability was found. Educational level and monthly income were significantly associated with higher learning and greater acceptability of water birth. *Conclusion*: Increased knowledge of water birth does not necessarily lead to greater acceptance; it may instead foster more cautious decision-making.

Keywords: Water birth; Knowledge; Acceptability; Theory of Planned Behavior; Maternal health

Online publication: November 11, 2025

1. Introduction

Labor or delivery, a natural and complex process, is a physical and mental test for every woman in labor. Intense and persistent labor pains, which often last for hours or even a dozen hours [1], overwhelm many women in labor. Although pharmacological analgesia is an effective means, its possible side effects, such as affecting contractions, prolonging labor, and even the need to switch to a cesarean section [2], have also caused many women to be apprehensive.

Against this background, water birth has emerged as an innovative delivery method and is gradually gaining popularity worldwide. Especially in developed countries, such as the United Kingdom, the United States, and Australia, water birth has been proven effective in reducing pain, shortening the labor process, and promoting emotional bonding between mother and baby [3]. These countries have established a complete system of water

birth services and actively promoted related research to validate further its safety and effectiveness [4]. Meanwhile, developing countries actively explore and practice this delivery method.

In China, water birth is also becoming popular, especially in developed cities, and has become an ideal choice for many women [5]. However, the prevalence in less developed cities remains low due to resource and technological constraints [6]. Nonetheless, it has been shown that water birth can significantly reduce maternal tension and pain, shorten the duration of labor, and reduce the risk of birth canal tears and postpartum hemorrhage [7].

Despite the many advantages of water birth, there are some controversies, such as perineal injuries and neonatal health issues [8]. Nevertheless, meta-analyses have shown that water deliveries reduce total duration, protect perineal integrity, improve quality of delivery and maternal satisfaction, and do not increase neonatal infections compared with conventional deliveries [9]. However, there is still limited research on water delivery, especially the relative scarcity of high-quality clinical trial data, which limits a comprehensive assessment of its risks and benefits [10].

Given the growing interest in water birth in China, research on women's awareness and acceptance of it is fundamental. However, current research focuses on specific populations, and research on the general female population in China remains relatively scarce [11]. Therefore, this study aimed to fill this research gap by including a diverse sample and obtaining more comprehensive and representative data. The researcher also called for more randomized controlled trials and long-term follow-up studies to further validate the safety and efficacy of water delivery.

The researcher has developed a strong interest in water birth because of the witness to the pain and difficulty during labor and delivery. This study aimed to scientifically validate the effectiveness of water birth and provide women with a more humanized and comfortable birthing option, thus promoting the continuous development of medical practice.

2. Materials and methods

2.1. Methods

A descriptive correlational research design was used. One hundred six women of reproductive age (18–35 years old) from a selected community in Taian City were surveyed using a validated Water Birth Knowledge Questionnaire and Water Birth Acceptability Questionnaire, both based on the Theory of Planned Behavior (TPB). Statistical tools such as frequency, percentage, mean, standard deviation, and Spearman's rank correlation coefficient were applied for data analysis.

2.2. Population and sampling

This study was conducted in a representative community-based maternal and child health hospital in Tai'an City, Shandong Province, which has 145 women of childbearing age, and 106 of them were selected as a sample after scientific calculations by Raosoft software to ensure a 5% error, 95% confidence level, and a 5% predicted response rate. This community has a concentration of women of childbearing age and a full range of medical service facilities, providing a rich resource for the study. Subject recruitment followed strict inclusion and exclusion criteria to enhance intrinsic validity. The use of purposive sampling, while improving the efficiency of data collection, requires attention to potential biases such as subjectivity, limited coverage, and non-randomization, which need to be carefully assessed, and measures were taken to ensure the scientific validity and reliability of the study.

In this study, the researcher recruited the participants based on set inclusion criteria:

(1) Age range: Study participants must be between 18 and 35, which covers most women of childbearing

age. According to data from the National Bureau of Statistics of China in 2024, the average age of first childbearing for women in China is 26.3 years old, with 26–35 years old being the peak age for childbearing. This range covers the group of women who are more willing to give birth and are more concerned about the mode of delivery, which aligns with the characteristics of the study's target population. According to the Chinese Obstetrics and Gynecology Nursing textbook, the 18–25 years-old group is mainly in the childbirth preparation period, while the 26–35 years-old group is more likely to face childbirth mode choices [12]. Therefore, by analyzing age subgroups, this study may reveal differences in women's perceptions of water birth at different life stages and provide a basis for targeted interventions.

(2) Women of childbearing age: All women of childbearing age can be included in the study.

(3) Consciousness and full capacity: the participant must be conscious and able to express opinions and make choices on their own.

Exclusion criteria: (1) Presence of psychological disorders or illnesses; (2) Presence of serious physical illness; (3) Undergoing or planning to undergo a cesarean section; (4) Suffering from blood-borne transmitted diseases and (5) Serious complications of pregnancy.

2.3. Research instrument

(1) Demographic characteristics

(2) The knowledge questionnaire used in this study was adapted from the questionnaire developed by Bashaikh and improved according to Chinese clinical practice guidelines and expert consensus. The questionnaire contained 24 binary-choice questions systematically.

(3) Acceptance Questionnaire Design: Theoretical basis and scale structure.

2.4. Data analysis

The researcher uses SPSS data analysis methods learned in relevant courses or training. First, descriptive statistics were calculated to summarize participants' demographic characteristics, such as frequencies and percentages for categorical variables (education level, income range) and means and standard deviations for continuous variables (knowledge scores). Inferential statistics, such as correlation and regression analyses, were then used to explore relationships between variables, such as the relationship between demographic characteristics and knowledge of water birth, and between knowledge of water birth and acceptability. Throughout the analysis process, the researcher followed strict statistical guidelines to ensure the validity and reliability of the results.

3. Results

3.1. Knowledge on water birth

Table 1. Relationship between the participants' demographic profile and their knowledge on water birth

Characteristic	*R*-value	*P*-value	Decision
Age	0.02	0.87	Failed to Reject H0
Educational Level	0.05	0.59	Failed to Reject H0
Monthly Income	-0.05	0.58	Failed to Reject H0

3.1.1 Age

Spearman's correlation showed almost no association between age and knowledge about water birth (r = 0.02, p = 0.87). This suggests that age did not significantly influence women's knowledge levels. The lack of variability in the age range (majority between 26–35 years old) may explain the nonsignificant result. However, prior research indicates that older women may have deeper childbirth knowledge due to life experience [13].

3.1.2. Education level

The analysis revealed no significant correlation between education level and knowledge of water birth (r = 0.05, p = 0.59). Although education is generally considered a predictor of health knowledge, this study suggests that knowledge about water birth may not be systematically transmitted through formal education channels, but instead via media and healthcare providers. Previous studies found that more educated women typically acquire and evaluate childbirth information more effectively [13]. The nonsignificant result here may be due to the sample's high concentration of university-educated participants (69.81%), limiting variability.

3.1.3. Monthly income

Monthly income showed a weak, nonsignificant negative correlation with knowledge (r = -0.05, p = 0.58). This indicates that income was not a determinant of women's knowledge about water birth. Information dissemination may be relatively egalitarian, supported by widespread access to the Internet and community outreach. However, a study found a positive relationship between income and childbirth knowledge, as higher-income women often access better medical resources and educational programs [14]. In this study, the concentration of participants in low-to-middle income groups may have contributed to the nonsignificant result.

3.2. Acceptance on water birth

Table 2. Relationship between the participants' demographic profile and their acceptance on water birth

Characteristic	R value	*P* value	Decision
Age	0.07	0.49	Failed to Reject H0
Educational level	-0.22	0.02*	Reject H0
Monthly income	0.09	0.34	Failed to Reject H0

Note: p-value ≤ 0.05 – significant, p-value > 0.05 – not significant

3.2.1. Age

(1) Findings: The correlation between age and the acceptability of water birth was not significant (r = 0.07, p = 0.49). Acceptance was relatively balanced across age groups, even though most participants were between 26–35 years old. The limited age span (18–35 years) may have weakened age as a differentiating factor.

(2) Supporting literature: A study found that older women (including those above 35) were slightly more accepting, possibly due to greater experience and proactive comfort-seeking choices [15]. However, another study reported that age was not a main factor; instead, education and healthcare provider advice played a more important role [16].

(3) Summary: Age was not a significant factor influencing acceptance of water birth in this study, likely due

to the narrow age range of participants, although other research suggests older women may show greater acceptance [2,15].

3.2.2. Educational level

(1) Findings: There was a significant negative correlation between education level and acceptance of water birth (r = -0.22, p = 0.02). Higher-educated women were slightly less accepting, possibly due to concerns about safety, access to conflicting medical information, and cultural or provider influences.

(2) Supporting literature: Zhong et al. (2023) and Sharifipour et al. (2022) reported similar findings, noting that highly educated women tended to question clinical safety and preferred conventional methods [5,17]. In contrast, Bashaikh et al. (2022) and Li et al. (2023) found that highly educated women in some regions had more knowledge and willingness to accept water birth, especially in areas with abundant medical resources [9,15].

(3) Summary: Education showed a significant negative relationship with acceptance, suggesting that higher education may increase caution. However, findings in the literature remain mixed, with some studies showing skepticism while others highlight greater willingness among highly educated women [5,15,17].

3.2.3. Monthly income

(1) Findings: Monthly income showed no significant correlation with acceptance (r = 0.09, p = 0.34). Income did not appear to influence attitudes, likely because water birth is not yet a mainstream choice, the sample had a concentrated income distribution, and psychosocial factors were more influential.

(2) Supporting literature: Zhong et al. (2021) and Cha et al. (2019) reported similar findings, noting that income was not a major factor in areas where water birth is not widely available [10,18]. However, Li et al. (2023) found that higher-income groups in first-tier cities were more likely to choose personalized birth methods, while Carlsson et al. (2020) reported that high-income women in Sweden were more inclined toward natural, autonomous births [9,19].

(3) Summary: Income was not a significant predictor of acceptance in this study, consistent with findings in northern China, though evidence from other regions suggests that higher income may promote acceptance where resources and options are more available [9,10,18,19].

3.3. Knowledge and acceptance of water birth

Table 3. Relationship between the participants' knowledge and acceptance on water birth

R-value	*P*-value	Decision
-0.14	0.012*	Reject H_0

Note: p-value ≤ 0.05 – significant, p-value > 0.05 – not significant

The study found a weak but significant negative correlation between knowledge and acceptance of water birth (r = -0.14, p = 0.012). This suggests that higher knowledge levels were associated with lower acceptance, likely because women focused more on risks than benefits, consistent with the Cognitive Threat Effect [10]. According to the Theory of Planned Behavior, knowledge alone does not enhance willingness if women perceive low control due to inadequate facilities or resources [20,21]. Similar findings in China and Brazil showed that increased

awareness often heightened concerns about risks in unsupportive healthcare environments [10,21].

In contrast, studies in contexts with strong healthcare systems and structured education (e.g., Saudi Arabia and Iran) reported positive correlations, where knowledge significantly increased acceptance [15,17]. These differences suggest that the impact of knowledge depends on the source, quality, and delivery of information, as well as the availability of institutional and medical support. Effective promotion of water birth should therefore combine accurate education, professional guidance, and systemic safety mechanisms to establish a positive "knowledge–trust–behavior" cycle.

4. Discussion

Their socio-demographic factors influence Chinese women's knowledge and acceptability of water birth. Enhancing public education and targeted health interventions could increase awareness and encourage informed decision-making. These findings highlight the need for integrated water birth services and policy support to provide women with safe and personalized childbirth options.

5. Conclusion

(1) Regarding research question 1 (demographic characteristics): Women aged 26–35 accounted for 66.04% of the sample, those with university education accounted for 69.81%, and those in the middle- and low-income groups ($5,000–$10,000) accounted for 49.06%, which showed a concentration of people in the late childbearing age group, with higher education, and in the middle- and low-income groups. Evidence shows no significant association between age, education level, income, and knowledge of water delivery ($p > 0.05$), suggesting that knowledge popularization should cover the whole population.

(2) Regarding research question 2 (knowledge level): Participants' overall knowledge score was 63.21% (moderate cognition), and only the question "Water delivery is suitable for all pregnancies" showed low cognition (45.28% correct). Among the dimensions, risk perception (58.49%) was relatively weak, reflecting inadequate knowledge of key information such as contraindications.

(3) Regarding research question 3 (acceptability): The overall mean acceptability score of 2.79 (acceptable) was higher for behavioral intention (2.83) than for perceived behavioral control (2.75), indicating that pregnant women had the intention to try the service but had concerns about service accessibility and barriers to practice, despite their willingness to do so. The subjective normative score of 2.78 suggests that there is still room for improvement in supporting significant others, such as family members and doctors.

(4) Regarding research question 4 (variable association): Age, education, and income were not significantly associated with knowledge level ($p > 0.05$), validating the equalization of knowledge acquisition.

(5) Regarding research question 5 (variable association): Education level is weakly negatively associated with acceptance ($r = -0.22$, $p = 0.02$), and higher-educated women have lower acceptance due to more sensitive risk perception.

(6) Regarding research question 6 (variable association): Knowledge was weakly and negatively associated with acceptance ($r = -0.14$, $p = 0.012$), reflecting that knowledge accumulation may reinforce cautionary attitudes rather than directly promote choice.

Evidence would show that age, education, and income failed to predict women's knowledge of water birth significantly. After learning more, highly educated women may be less accepting due to increased risk awareness.

Ultimately, the more knowledge women have about water birth, the more prudent or conservative they may be, and not necessarily more inclined to choose water birth.

Disclosure statement

The authors declare no conflict of interest.

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