Factors Related to Maternal Knowledge about Colostrum at "M" Clinic in Pandeglang, Banten, November-December 2024

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Abstract. Deficits in maternal awareness of colostrum feeding methods are a substantial contributor to the illness and death of neonates that may have been prevented.An investigation of the parameters that are connected with maternal awareness regarding colostrum was the purpose of this research.The research was conducted using a quantitative cross-sectional design, with total population sample being used to include all 35 women who gave birth throughout the course of the study. Descriptive statistics and chi-square tests were also used. According to the findings, 57.1% of the participants exhibited a lack of information of colostrum, whereas 42.9% held a substantial amount of knowledge.Using bivariate analysis, it was determined that there were statistically significant associations between colostrum knowledge and all of the demographic variables that were examined. The most significant association was found to be between educational level (OR=36.000, p<0.001), followed by information source (OR=12.000, p=0.001), employment status (OR=11.333, p=0.002), and maternal age (OR=6.000, p=0.014).Implementing thorough risk stratification procedures is something that healthcare facilities should do in order to identify moms who have many disadvantaged traits for the purpose of targeted educational interventions. Additionally, these institutions should produce materials that are culturally acceptable and literacy-adapted in order to successfully address knowledge discrepancies.

Keywords: Colostrum, Education, Healthcare, Knowledge, Maternal

1 Introduction

Neonatal mortality remains a critical global health challenge, with approximately 2.3 million newborns dying in their first month of life in 2023, representing nearly half of all under-five child deaths worldwide [1]. Among the evidence-based interventions that can significantly reduce infant mortality, early initiation of breastfeeding and colostrum provision stands as one of the most cost-effective strategies. Colostrum, the first immunologically rich breast milk produced during the initial 72 hours postpartum, contains essential antibodies, immunoglobulins, and bioactive compounds that provide crucial protection against neonatal infections and establish optimal immune function [2]. The World Health Organization

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emphasizes that timely colostrum administration can prevent up to 22% of neonatal deaths through enhanced immunity development and infection prevention, potentially saving approximately 170 million child lives globally if universally implement Despite the well-documented benefits of colostrum, significant disparities exist in colostrum feeding practices across different regions. Global data indicates substantial variations in colostrum provision rates, with European countries achieving 68% coverage while Asian nations lag at 52%. Indonesia presents a particularly concerning scenario, where the 2017 Demographic and Health Survey revealed that only 28.9% of newborns received colostrum, falling considerably short of the national target of 34.5% [3]. Recent studies from various developing countries demonstrate similar challenges, with research in Ethiopia showing that 64% of mothers provided colostrum to their neonates, while studies in Bangladesh identified a 54% gap in colostrum feeding practices within the first three days of life [4], [5].The primary barriers to optimal colostrum provision stem from deeply rooted misconceptions and inadequate maternal knowledge. Cultural beliefs often perpetuate harmful practices, with many mothers perceiving colostrum as "dirty," "stale," or unsuitable for newborns due to its yellowish appearance and thick consistency. A study conducted in Indonesia revealed that over 90% of mothers discard colostrum primarily due to insufficient information and cultural misconceptions [6]. Similar findings in other developing countries indicate that mothers with limited knowledge about breastfeeding were significantly less likely to provide colostrum, with educational interventions showing promising results in improving feeding practices [7] Maternal education and knowledge acquisition represent critical determinants in successful colostrum provision. Research consistently demonstrates that higher educational levels facilitate better information processing and knowledge retention, subsequently influencing positive attitudes toward evidence-based infant feeding practices. Conversely, inadequate knowledge creates substantial barriers to adopting recommended feeding behaviors, perpetuating harmful traditional practices that compromise neonatal health outcomes. Health education interventions targeting pregnant and lactating mothers have shown significant effectiveness in improving colostrum feeding rates and reducing harmful misconceptions about early breastfeeding practices.

The urgency of addressing this knowledge gap becomes particularly evident when considering the preventable nature of colostrum-related neonatal morbidity and mortality. Infants who do not receive colostrum face substantially higher risks of developing serious conditions including gastroenteritis, respiratory infections, sepsis, and other life-threatening complications that could be prevented through early immunological protection. The economic burden associated with treating these preventable conditions, combined with the long-term health consequences, underscores the critical importance of improving maternal knowledge and colostrum feeding practices. While previous research has documented global and national trends in colostrum provision, limited studies have specifically examined the knowledge-related factors influencing colostrum feeding decisions at the primary healthcare level in Indonesia. The gap in understanding local-specific barriers and knowledge deficits presents a significant challenge for developing targeted interventions. Moreover, recent changes in healthcare policies and increased awareness campaigns may have influenced maternal knowledge and practices since the 2017 national survey, necessitating updated assessments of current knowledge levels and associated factors. Therefore, this study aims to investigate the factors associated with maternal knowledge about colostrum at M Clinic in Pandeglang, Banten, during November-December 2024. By identifying specific knowledge deficits and their contributing factors within this healthcare setting, this research will provide essential insights for developing targeted educational interventions and improving colostrum feeding practices in the local context, ultimately contributing to reduced neonatal mortality and improved infant health outcomes.

2 Methods

2.1 Study Design and Setting

This study employed a quantitative research approach using a cross-sectional design, which allows for the simultaneous measurement and observation of dependent and independent variables at a single point in time to examine associations between maternal knowledge and related factors [8]. The research was conducted at M Clinic, located on Jl. AMD Lintas Timur Cikole, Sukaratu, Majasari District, Pandeglang Regency, Banten Province, Indonesia. The study period spanned from November to December 2024, with proposal preparation beginning in November 2024 and data collection conducted during November-December 2024.

2.2 Population and Sampling

The study population consisted of all mothers who gave birth at M Clinic during the November-December 2024 period. Using a total population sampling technique, all 35 mothers who delivered during this timeframe were included as participants, eliminating sampling bias and ensuring comprehensive data collection from the entire accessible population. The inclusion criteria encompassed mothers who delivered at M Clinic during the specified period, were willing to participate voluntarily, and provided informed consent. Exclusion criteria included mothers with severe medical complications that prevented participation and those who declined to participate after being informed about the study.

2.3 Data Collection Instruments and Variables

Data collection was performed using a structured questionnaire consisting of two main components: demographic characteristics and maternal knowledge assessment about colostrum. The demographic section captured variables including maternal age, education level, parity, occupation, and previous breastfeeding experience. The knowledge assessment instrument comprised 20 multiple-choice questions covering colostrum definition, benefits, composition, timing of administration, and storage practices, with each correct answer scored as 1 point (total possible score: 20 points). Knowledge levels were categorized as good (>75% or >15 points), moderate (56-75% or 11-15 points), and poor (<56% or <11 points). The questionnaire was validated through expert review and pilot testing to ensure content validity and reliability [9].

2.4 Data Analysis and Ethical Considerations

Data analysis was conducted using SPSS version 26.0 software, employing both descriptive and analytical statistical methods. Descriptive analysis included frequency distribution, percentages, mean, and standard deviation to characterize participant demographics and knowledge levels. Analytical analysis utilized chi-square tests to examine associations between independent variables (demographic factors) and the dependent variable (maternal knowledge about colostrum), with statistical significance set at $p<0.05$. Prior to data collection, ethical approval was obtained from the institutional review board, and informed consent was secured from all participants after explaining the study objectives, procedures, voluntary participation, confidentiality measures, and their right to withdraw at any time without consequences [9]. Data confidentiality and anonymity were maintained throughout the study process, with participant identities coded numerically and stored securely.

3 Results

3.1 Participant Characteristics

This cross-sectional study included 35 mothers who delivered at M Clinic in Pandeglang, Banten, during November-December 2024. The following sections present comprehensive descriptive and analytical findings regarding maternal knowledge of colostrum and associated demographic factors.

3.2 Maternal Knowledge of Colostrum

Table 1. Distribution of Colostrum Knowledge Among Mothers at M Clinic, Pandeglang, Banten, November-December 2024 (N=35)

Knowledge Level	Frequency (n)	Percentage (%)
Poor	20	57.1
Good	15	42.9
Total	35	100.0

Table 1 shows, the assessment of maternal knowledge regarding colostrum revealed that the majority of participants (20 mothers, 57.1%) demonstrated poor knowledge, while 15 mothers (42.9%) possessed good knowledge. This finding indicates significant knowledge deficits within the study population, highlighting the urgent need for targeted educational interventions to improve understanding of colostrum benefits and feeding practices.

3.3 Age Distribution

Table 2. Age Distribution of Mothers at M Clinic, Pandeglang, Banten, November-December 2024 (N=35)

Age Category	Frequency (n)	Percentage (%)
At-risk (≤20 or ≥35 years)	20	57.1
Not at-risk (21-34 years)	15	42.9
Total	35	100.0

Table 2 shows, the age distribution analysis revealed that 20 participants (57.1%) belonged to the at-risk age category, defined as mothers aged ≤20 years or ≥35 years, while 15 participants (42.9%) were classified as not at-risk (21-34 years). This age categorization follows established obstetric risk stratification, where maternal ages below 21 and above 34 years are associated with increased perinatal risks and potential complications that may affect breastfeeding initiation and knowledge acquisition.

3.4 Educational Level

Table 3. Educational Level Distribution Among Mothers at M Clinic, Pandeglang, Banten, November-December 2024 (N=35)

Educational Level	Frequency (n)	Percentage (%)
Low education (≤9 years)	21	60.0

High education (>9 years)	14	40.0
Total	35	100.0

Table 3 shows educational attainment analysis demonstrated that 21 participants (60.0%) had completed low education, defined as ≤9 years of formal schooling corresponding to primary or junior secondary education completion. In contrast, 14 participants (40.0%) achieved higher education, indicating completion of senior secondary or tertiary education (>9 years). This educational distribution reflects the broader socioeconomic context of the rural study area and provides crucial insight into potential barriers to health knowledge acquisition and retention.

3.5 Employment Status

Table 4. Employment Status Distribution Among Mothers at M Clinic, Pandeglang, Banten, November-December 2024 (N=35)

Employment Status	Frequency (n)	Percentage (%)
Unemployed	22	62.9
Employed	13	37.1
Total	35	100.0

Table 4 shows employment status analysis revealed that 22 participants (62.9%) were unemployed, primarily engaged in household responsibilities and domestic activities, while 13 participants (37.1%) maintained formal employment outside the home. This employment pattern is consistent with traditional family structures prevalent in rural Indonesian communities and may significantly influence access to health information, healthcare services, and economic resources that facilitate knowledge acquisition.

3.6 Information Sources

Table 5. Information Source Distribution Among Mothers at M Clinic, Pandeglang, Banten, November-December 2024 (N=35)

Information Source	Frequency (n)	Percentage (%)
Non-healthcare professionals	18	51.4
Healthcare professionals	17	48.6
Total	35	100.0

Table 5 shows information source analysis revealed a near-equal distribution, with 18 participants (51.4%) obtaining colostrum-related information from non-healthcare professionals, including family members, friends, traditional birth attendants, and community members. Meanwhile, 17 participants (48.6%) received information from qualified healthcare professionals such as midwives, nurses, physicians, and other certified medical personnel. This distribution indicates significant reliance on informal information networks, which may contribute to knowledge deficits and misconceptions about colostrum feeding practices.

3.7 Association Between Age and Colostrum Knowledge

The analytical examination of relationships between demographic characteristics and maternal knowledge of colostrum revealed several statistically significant associations that provide important insights into factors influencing knowledge acquisition and retention within this healthcare setting.

Table 6. Association Between Maternal Age and Colostrum Knowledge at M Clinic, Pandeglang, Banten, November-December 2024 (N=35)

Age Category	Poor Knowledge	Good Knowledge	Total	P-value	OR (95% CI)
	n (%)	n (%)	n (%)		
At-risk (≤20 or ≥35 years)	15 (75.0)	5 (25.0)	20 (57.1)	14	6.000 (1.372-26.237)
Not at-risk (21-34 years)	5 (33.3)	10 (66.7)	15 (42.9)		
Total	20 (57.1)	15 (42.9)	35 (100.0)		

Table 6 shows the chi-square analysis revealed a statistically significant association between maternal age and colostrum knowledge ($p = 0.014$). Among the 20 participants in the at-risk age group, 15 (75.0%) demonstrated poor colostrum knowledge, while only 5 (25.0%) possessed good knowledge. Conversely, among the 15 participants in the not at-risk age group, 5 (33.3%) had poor knowledge while 10 (66.7%) demonstrated good knowledge. The odds ratio of 6.000 (95% CI: 1.372-26.237) indicates that mothers in the not at-risk age group have six times higher odds of possessing good colostrum knowledge compared to those in the at-risk age category. This finding suggests that maternal age within the optimal reproductive range (21-34 years) is significantly associated with better knowledge acquisition and retention regarding colostrum benefits and feeding practices.

3.8 Association Between Educational Level and Colostrum Knowledge

Table 7. Association Between Educational Level and Colostrum Knowledge at M Clinic, Pandeglang, Banten, November-December 2024 (N=35)

Educational Level	Poor Knowledge	Good Knowledge	Total	P-value	OR (95% CI)
	n (%)	n (%)	n (%)		
Low education (≤9 years)	18 (85.7)	3 (14.3)	21 (60.0)	<0.001	36.000 (5.212-248.656)
High education (>9 years)	2 (14.3)	12 (85.7)	14 (40.0)		
Total	20 (57.1)	15 (42.9)	35 (100.0)		

The relationship between educational level and colostrum knowledge demonstrated the strongest statistical significance among all examined variables ($p < 0.001$). Among the 21 participants with low education, 18 (85.7%) exhibited poor colostrum knowledge, while only 3 (14.3%) possessed good knowledge. In stark contrast, among the 14 participants with high education, only 2 (14.3%) had poor knowledge while 12 (85.7%) demonstrated good knowledge. The substantial odds ratio of 36.000 (95% CI: 5.212-248.656) indicates that mothers with higher education have thirty-six times greater odds of possessing good colostrum

knowledge compared to those with lower educational attainment. This finding emphasizes the critical role of formal education in facilitating health information processing, comprehension, and application in evidence-based maternal health practices.

3.9 Association Between Employment Status and Colostrum Knowledge

Table 8. Association Between Employment Status and Colostrum Knowledge at M Clinic, Pandeglang, Banten, November-December 2024 (N=35)

Employment Status	Poor Knowledge	Good Knowledge	Total	P-value	OR (95% CI)
	n (%)	n (%)	n (%)		
Unemployed	17 (77.3)	5 (22.7)	22 (62.9)	0.002	11.333 (2.219-57.879)
Employed	3 (23.1)	10 (76.9)	13 (37.1)		
Total	20 (57.1)	15 (42.9)	35 (100.0)		

Table 8 shows employment status showed a statistically significant association with colostrum knowledge (p = 0.002). Among the 22 unemployed participants, 17 (77.3%) had poor colostrum knowledge while only 5 (22.7%) possessed good knowledge. Among the 13 employed participants, 3 (23.1%) had poor knowledge while 10 (76.9%) demonstrated good knowledge. The odds ratio of 11.333 (95% CI: 2.219-57.879) indicates that employed mothers have approximately eleven times higher odds of possessing good colostrum knowledge compared to unemployed mothers. This association likely reflects broader socioeconomic advantages among employed mothers, including enhanced access to health information, healthcare services, social networks, and economic resources that facilitate knowledge acquisition and retention.

3.10 Association Between Information Source and Colostrum Knowledge

Table 9. Association Between Information Source and Colostrum Knowledge at M Clinic, Pandeglang, Banten, November-December 2024 (N=35)

Information Source	Poor Knowledge	Good Knowledge	Total	P-value	OR (95% CI)
	n (%)	n (%)	n (%)		
Non-healthcare professionals	15 (83.3)	3 (16.7)	18 (51.4)	0.001	12.000 (2.374-60.648)
Healthcare professionals	5 (29.4)	12 (70.6)	17 (48.6)		
Total	20 (57.1)	15 (42.9)	35 (100.0)		

Table 9 shows the source of information regarding colostrum demonstrated a highly significant association with maternal knowledge (p = 0.001). Among the 18 participants who received information from non-healthcare professionals, including family members, friends, and traditional birth attendants, 15 (83.3%) had poor colostrum knowledge while only 3 (16.7%) possessed good knowledge. Conversely, among the 17 participants who obtained information from qualified healthcare professionals such as midwives, nurses, and physicians, 5 (29.4%) had poor knowledge while 12 (70.6%) demonstrated good knowledge. The odds ratio of 12.000

(95% CI: 2.374-60.648) indicates that mothers receiving information from healthcare professionals have twelve times higher odds of possessing good colostrum knowledge compared to those obtaining information from non-professional sources.

3.11 Comprehensive Analysis and Integration of Findings

The comprehensive analysis of maternal knowledge regarding colostrum at M Clinic reveals multiple interconnected factors that significantly influence knowledge acquisition and retention within this healthcare setting. The predominance of poor knowledge (57.1%) among study participants highlights the urgent need for targeted educational interventions to address knowledge deficits that may compromise optimal colostrum feeding practices and subsequently affect neonatal health outcomes. The significant associations identified across all examined demographic variables demonstrate the complex, multifactorial nature of health knowledge acquisition in this population. The strongest association observed between educational level and colostrum knowledge (OR = 36.000, $p < 0.001$) underscores the fundamental role of formal education in facilitating health literacy and evidence-based practice adoption. This finding is particularly concerning given that 60% of participants had low educational attainment, suggesting that knowledge deficits may be deeply rooted in broader educational disadvantages within the community.

The substantial influence of information sources (OR = 12.000, $p = 0.001$) emphasizes the critical importance of healthcare professional engagement in maternal education. The near-equal distribution between professional and non-professional information sources (48.6% vs. 51.4%), combined with the dramatic knowledge differences between these groups, indicates significant opportunities for improving healthcare provider communication strategies and education delivery systems. The relationship between employment status and colostrum knowledge (OR = 11.333, $p = 0.002$) likely reflects broader socioeconomic determinants of health, including differential access to resources, social networks, healthcare services, and information channels. Employed mothers may benefit from expanded social networks, increased health insurance coverage, and greater economic resources that facilitate access to quality healthcare information and services.

The age-related association (OR = 6.000, $p = 0.014$) suggests that mothers within the optimal reproductive age range (21-34 years) demonstrate superior knowledge acquisition capabilities. This finding may reflect both physiological and psychosocial factors, with mothers in this age group potentially having greater receptivity to health information, better cognitive processing capabilities, and increased motivation for evidence-based parenting practices. These findings collectively demonstrate that maternal knowledge of colostrum is significantly influenced by demographic, educational, occupational, and healthcare access factors. The identification of these statistically significant associations provides essential evidence for developing targeted, multi-component interventions that address the diverse barriers to knowledge acquisition within this population. The results emphasize the critical need for healthcare system improvements that ensure equitable access to accurate, professional health information while simultaneously addressing underlying educational and socioeconomic determinants that influence maternal health knowledge and practices in rural Indonesian communities.

4 Discussions

4.1 Maternal Knowledge of Colostrum: A Critical Analysis

The current study's finding that 57.1% of mothers demonstrated poor knowledge of colostrum at M Clinic represents a significant public health concern that aligns with the broader pattern observed in developing nations. This knowledge deficit is particularly alarming when contextualized within the framework of early childhood nutrition and immune system development. The theoretical foundation for understanding colostrum knowledge lies in health behavior models, which suggest that knowledge serves as a prerequisite for appropriate health behaviors. However, knowledge alone is insufficient without consideration of the complex interplay of demographic, socioeconomic, and healthcare access factors that influence maternal health literacy. The implications of inadequate colostrum knowledge extend beyond individual maternal-infant dyads to encompass broader public health outcomes. Colostrum, often referred to as "liquid gold" in pediatric nutrition literature, contains concentrated immunoglobulins, antimicrobial factors, and essential nutrients that provide passive immunity to newborns during their most vulnerable period. The World Health Organization emphasizes that colostrum feeding within the first hour of life is crucial for establishing successful breastfeeding patterns and reducing neonatal morbidity and mortality. Therefore, the knowledge deficits identified in this study population represent a critical gap in maternal health education that requires immediate attention and targeted intervention strategies.

4.2 Age-Related Knowledge Patterns: Reproductive Maturity and Information Processing

The significant association between maternal age and colostrum knowledge (OR = 6.000, $p = 0.014$) reveals that mothers in the not-at-risk age group (21-34 years) demonstrated superior knowledge acquisition compared to their younger and older counterparts. This finding corroborates the research conducted by Mose et al. [10], who identified age-related variations in colostrum knowledge among Ethiopian mothers, demonstrating that optimal reproductive age was associated with better health knowledge outcomes. Similarly, Gemeda et al. found that mothers aged 25-40 years had significantly higher odds of implementing appropriate breastfeeding practices, including colostrum administration [11]. The theoretical explanation for this age-knowledge relationship can be understood through developmental and cognitive psychology frameworks. Mothers within the 21-34 age range typically possess optimal cognitive processing capabilities, enhanced information-seeking behaviors, and greater receptivity to health education interventions. Jawaid et al. support this finding by demonstrating that higher maternal age was associated with better knowledge about colostrum benefits in Pakistani populations [12]. The younger maternal age group (≤20 years) may experience cognitive and emotional challenges related to the transition to motherhood, which can impede effective information processing and retention. Furthermore, the older maternal age group (≥35 years) may face competing health priorities and concerns that divert attention from colostrum-specific education. Segura-Pérez et al. identified that advanced maternal age was associated with increased risk factors for breastfeeding difficulties, which may indirectly affect knowledge acquisition and application [13]. The optimal age group's superior performance can also be attributed to their active engagement with digital health resources, social media platforms, and peer networks that facilitate knowledge sharing and health information dissemination.

4.3Educational Attainment: The Knowledge Multiplier Effect

The relationship between educational level and colostrum knowledge yielded the strongest statistical association in this study (OR = 36.000, $p < 0.001$), with mothers possessing higher

education demonstrating markedly superior knowledge outcomes. This finding resonates strongly with the research conducted by Hasan et al. in Bangladesh, who identified that literate mothers had significantly higher odds of implementing appropriate breastfeeding practices [14]. The educational gradient in health knowledge has been extensively documented across diverse cultural contexts, as demonstrated by Sabo et al. in Nigeria, where tertiary education was associated with ten-fold higher odds of exclusive breastfeeding practices [15]. The theoretical foundation for this educational-knowledge relationship lies in health literacy theory, which posits that formal education enhances individuals' capacity to access, understand, evaluate, and apply health information effectively. Higher educational attainment provides mothers with sophisticated analytical skills, critical thinking capabilities, and scientific reasoning abilities that facilitate the processing of complex health information. Karcz et al. demonstrated that educational level was the primary determinant of accurate knowledge regarding maternal nutrition during lactation among Polish mothers, supporting the universality of this association across different healthcare systems [16].

Educational attainment also influences information-seeking behaviors and source evaluation capabilities. Mothers with higher education are more likely to consult evidence-based resources, engage with healthcare professionals meaningfully, and critically evaluate health information quality. Huang et al. found that mothers with master's degrees or above had nearly six-fold higher odds of possessing good knowledge about neonatal health issues, including feeding practices [17]. This educational advantage extends beyond knowledge acquisition to encompass knowledge application and behavior modification, creating a multiplier effect that enhances overall maternal health outcomes. The dramatic difference in knowledge outcomes between educational groups in the current study highlights the critical importance of addressing educational disparities in maternal health programming. The finding that 85.7% of mothers with higher education possessed good colostrum knowledge compared to only 14.3% of those with lower education underscores the urgent need for educational interventions that account for varying literacy levels and learning capabilities within the target population.

4.4 Employment Status: Socioeconomic Advantage and Information Access

The significant association between employment status and colostrum knowledge (OR = 11.333, $p = 0.002$) demonstrates that employed mothers possessed substantially better knowledge outcomes, with 76.9% of employed mothers demonstrating good knowledge compared to 22.7% of unemployed mothers. This finding aligns with research conducted by Tu et al. in China, who identified employment as a significant predictor of willingness to engage with human milk banking services, suggesting that employment status influences broader maternal health engagement patterns [18]. The employment-knowledge relationship can be understood through multiple theoretical frameworks, including social capital theory and resource mobilization theory. Employed mothers typically have access to broader social networks, enhanced economic resources, and increased exposure to diverse information sources through workplace interactions. Ramachandran et al. demonstrated that employment status influenced knowledge acquisition regarding infant feeding practices among Malaysian mothers, supporting the cross-cultural validity of this association [19].

Employment also provides mothers with enhanced self-efficacy and confidence in information-seeking behaviors. The regular engagement with professional environments, problem-solving activities, and collaborative relationships inherent in employment settings may enhance cognitive flexibility and information processing capabilities. Ali et al. found that employed mothers demonstrated superior attitudes and knowledge regarding breastfeeding practices in Iraqi populations, suggesting that occupational engagement contributes to maternal

health literacy development [20]. Furthermore, employed mothers often have access to employer-sponsored healthcare benefits, educational resources, and professional development opportunities that indirectly enhance their health knowledge base. The economic stability associated with employment may also reduce stress and anxiety levels that could otherwise impede effective learning and information retention. Mary et al. identified that socioeconomic factors, including employment status, significantly influenced breastfeeding knowledge and practices among Indian mothers, supporting the importance of addressing economic determinants in maternal health interventions [21].

4.5 Information Sources: Professional Credibility and Knowledge Quality

The association between information sources and colostrum knowledge (OR = 12.000, p = 0.001) reveals that mothers receiving information from healthcare professionals demonstrated markedly superior knowledge outcomes, with 70.6% possessing good knowledge compared to 16.7% of those relying on non-healthcare sources. This finding strongly supports the research conducted by Asaro et al., who identified that maternal knowledge regarding colostrum was significantly influenced by the quality and credibility of information sources available to mothers [22]. The theoretical foundation for this relationship lies in information processing theory and source credibility frameworks. Healthcare professionals possess specialized training, evidence-based knowledge, and clinical experience that enable them to provide accurate, comprehensive, and contextually relevant health information. G/slassie et al. demonstrated that mothers who received counseling from healthcare professionals had significantly reduced odds of colostrum avoidance practices, supporting the critical importance of professional information sources in maternal health education [23].

Non-healthcare information sources, while well-intentioned, may lack the scientific foundation and clinical expertise necessary to provide accurate health information. Traditional beliefs, cultural misconceptions, and anecdotal experiences often form the basis of non-professional health advice, which may contradict evidence-based recommendations. Demmelmair & Koletzko emphasized that detailed, scientifically grounded information about human milk composition and benefits requires professional expertise to communicate effectively to mothers [24]. The quality differential between professional and non-professional information sources extends beyond factual accuracy to encompass communication effectiveness and individualized guidance. Healthcare professionals can tailor information to specific maternal and infant circumstances, address individual concerns and misconceptions, and provide ongoing support throughout the breastfeeding journey. Anggraeni et al. demonstrated that professional guidance regarding infant feeding practices significantly influenced maternal knowledge and subsequent health outcomes, supporting the importance of healthcare provider engagement in maternal education [25].

4.6 Integrative Analysis: Multifactorial Knowledge Determinants

The convergence of age, education, employment, and information source factors in determining colostrum knowledge reflects the complex, multifactorial nature of health literacy development. These factors do not operate in isolation but rather interact synergistically to create knowledge acquisition environments that either facilitate or impede maternal learning. The theoretical framework of social determinants of health provides a comprehensive lens through which to understand these interconnected relationships. Mothers who possess multiple advantageous characteristics (optimal age, higher education, employment, and professional information access) experience cumulative benefits that substantially enhance their knowledge outcomes. Conversely, mothers facing multiple disadvantages encounter compounding barriers

that severely limit their knowledge acquisition capabilities. This multiplicative effect has profound implications for maternal health intervention design and implementation strategies. The findings also highlight the importance of addressing structural inequalities that contribute to knowledge disparities. Educational disadvantages, unemployment, and limited healthcare access represent systemic barriers that individual-level interventions alone cannot adequately address. Comprehensive maternal health programming must incorporate policy-level changes, community-based interventions, and healthcare system improvements to create environments that support equitable knowledge acquisition across diverse populations.

4.7 Clinical and Public Health Implications

The identified knowledge determinants have significant implications for clinical practice and public health policy development. Healthcare providers must recognize that maternal knowledge deficits are not simply individual failures but rather reflect broader systemic challenges that require comprehensive intervention strategies. The development of culturally appropriate, educationally tailored, and linguistically accessible educational materials becomes essential for reaching diverse maternal populations effectively. The substantial odds ratios identified across all demographic variables indicate that targeted interventions addressing specific risk factors could yield dramatic improvements in maternal knowledge outcomes. The findings also underscore the importance of implementing universal screening and assessment procedures to identify mothers at risk for knowledge deficits. Mothers who are young, have limited education, are unemployed, or rely on non-professional information sources require intensive educational interventions and ongoing support to achieve optimal colostrum knowledge and feeding practices. The multiplicative nature of these risk factors suggests that mothers experiencing multiple disadvantages may require particularly intensive and sustained intervention approaches to achieve meaningful knowledge improvements. Healthcare system improvements must focus on enhancing provider communication skills, developing standardized educational protocols, and creating supportive environments that facilitate maternal learning and behavior change. The integration of technology-based educational resources, peer support networks, and community-based interventions can complement clinical services to create comprehensive knowledge support systems for mothers across diverse socioeconomic circumstances. These improvements should specifically address the communication gaps between healthcare providers and vulnerable populations, ensuring that critical information about colostrum benefits reaches all mothers regardless of their demographic characteristics.

The clinical implications extend to antenatal care programming, where early identification of knowledge risk factors can facilitate proactive educational interventions. Healthcare facilities should develop risk stratification protocols that identify mothers requiring additional educational support based on age, educational attainment, employment status, and information source preferences. This approach enables targeted resource allocation and personalized educational strategies that maximize intervention effectiveness while optimizing healthcare resource utilization. Furthermore, the findings highlight the critical importance of workforce development initiatives that enhance healthcare providers' capacity to deliver effective maternal health education. Training programs should emphasize cultural competency, health literacy principles, and evidence-based communication strategies that enable providers to effectively reach diverse maternal populations. The integration of behavioral change theories and motivational interviewing techniques into provider training can enhance the effectiveness of educational interventions and improve maternal engagement with health information.

4.8 Limitations and Future Directions

While this study provides valuable insights into colostrum knowledge determinants, several limitations must be acknowledged. The cross-sectional design limits causal inference capabilities, and the single-site sampling may restrict generalizability to broader populations. Future research should employ longitudinal designs to examine knowledge development trajectories and intervention effectiveness over time. Additionally, qualitative research approaches could provide deeper insights into the mechanisms through which demographic factors influence knowledge acquisition and retention processes. The findings establish a foundation for developing evidence-based interventions that address the multifactorial nature of maternal health knowledge. Future studies should examine the effectiveness of targeted educational interventions designed to address specific risk factors identified in this research, ultimately contributing to improved maternal and infant health outcomes through enhanced colostrum knowledge and feeding practices. The development and validation of culturally appropriate knowledge assessment instruments represent another critical area for future investigation, ensuring that maternal health research can accurately capture knowledge variations across diverse populations.

Longitudinal research designs should particularly focus on examining the temporal relationships between demographic factors and knowledge acquisition processes. Understanding how maternal knowledge evolves throughout the pregnancy and postpartum periods can inform optimal timing for educational interventions and identify critical windows for knowledge enhancement. Such research should also investigate the sustainability of knowledge gains over time and identify factors that contribute to knowledge retention versus knowledge decay. The role of technology and digital health interventions in addressing knowledge disparities represents another promising area for future research. Given the increasing prevalence of smartphone usage and internet access, even in rural communities, mobile health applications and web-based educational platforms may offer scalable solutions for reaching diverse maternal populations. However, research must carefully examine digital divide issues and ensure that technology-based interventions do not exacerbate existing health inequities.

Community-based participatory research approaches could provide valuable insights into the cultural and social factors that influence colostrum knowledge within specific populations. Such research methodologies enable communities to participate actively in identifying barriers to knowledge acquisition and developing culturally appropriate solutions. The integration of traditional knowledge systems with evidence-based medical information represents a particularly important area for investigation, ensuring that maternal health interventions respect cultural values while promoting optimal health outcomes. Furthermore, economic evaluation studies examining the cost-effectiveness of different educational intervention strategies are essential for informing policy decisions and resource allocation. Understanding the economic implications of knowledge enhancement interventions can support the development of sustainable, scalable programs that address maternal health knowledge deficits across diverse healthcare settings and resource environments.

5 Conclusion

This study revealed a substantial knowledge deficit regarding colostrum among mothers attending M Clinic, Pandeglang, with more than half of the participants (57.1%) demonstrating poor understanding of its benefits and practice. Bivariate analysis indicated that all examined

demographic variables were significantly associated with colostrum knowledge. Mothers who were highly educated, aged between 21 and 34 years, employed, and who obtained information from professional healthcare providers demonstrated significantly higher knowledge levels compared to their counterparts. These findings underscore the multifactorial nature of maternal health knowledge acquisition and highlight the influence of structural determinants such as education, socioeconomic status, and access to professional information sources on maternal health literacy.

The observed knowledge gap should not be interpreted solely as an individual failure but rather as a reflection of broader systemic disparities. Educational inequities, restricted access to accurate health information, and socioeconomic constraints collectively contribute to limited maternal awareness and understanding of essential newborn care practices such as colostrum feeding. The synergistic interaction among these determinants creates a cumulative effect that significantly shapes maternal knowledge outcomes. Identification of these risk factors provides an important evidence base for developing targeted, equity-oriented interventions that address the multidimensional barriers affecting maternal knowledge acquisition—particularly among vulnerable subgroups experiencing multiple disadvantages.

In light of these findings, the development and implementation of comprehensive, targeted health education programs are urgently required to address the identified knowledge deficits. Health facilities should adopt risk-screening protocols to identify mothers with multiple risk factors—such as low educational attainment, unemployment, reliance on non-professional information sources, and age-related vulnerabilities—so that they can receive intensive and sustained educational support. The creation of culturally tailored, linguistically accessible, and literacy-sensitive educational materials is also essential to ensure effective communication across diverse maternal populations. Furthermore, training programs for healthcare professionals should prioritize improving communication competence, cultural sensitivity, and the use of evidence-based communication strategies to enhance engagement with diverse communities.

At the policy level, interventions should focus on improving access to education, expanding economic opportunities for women, and strengthening health system capacity to deliver equitable and high-quality health information. Integration of digital health technologies, peer-support networks, and community-based educational initiatives may further complement clinical services and foster a comprehensive maternal knowledge support system. Finally, longitudinal research is recommended to evaluate the effectiveness of these targeted interventions and to elucidate the temporal mechanisms underlying maternal knowledge acquisition. Such efforts will ultimately contribute to improving maternal and neonatal health outcomes through enhanced awareness, positive attitudes, and optimal colostrum feeding practices.

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