Journal of Health Innovation and Environmental Education
Vol. 3, No. 1, June 2026, pp. 50~57
ISSN: 3062-9632, DOI: 10.37251/jhiee.v3i1.2660

The Effect of Health Education on Childhood Diarrhea on Knowledge and Anxiety Levels of Parents with Toddlers at Abdul Wahab Syahranie Regional Hospital, Samarinda

Rizal Renaldy[1], Faruk Bojaxhi[2]
[1]Department of Public Health, Muhammadiyah Samarinda College of Health Sciences, Samarinda, Indonesia
[2] Environment Faculty, University of Prizren Forestry, Prizren, Kosovo

Article Info

Article history:

Received Dec 22, 2025
Revised Feb 2, 2026
Accepted Feb 18, 2026
Online First March 13, 2026

Keywords:

Childhood Diarrhea
Health Profession
Parental Knowledge
Parental Anxiety
Toddlers

ABSTRACT

Purpose of the study: This study aimed to assess the effect of health education on childhood diarrhea on parents' knowledge and anxiety levels regarding their toddlers, focusing on improving both informational and emotional outcomes in a hospital setting.

Methodology: A quasi-experimental design with pretest-posttest was employed involving 50 parents of toddlers admitted to the Melati ward at Abdul Wahab Syahranie Regional Hospital, Samarinda. Data were collected using structured questionnaires for knowledge and a validated anxiety scale. Paired t-tests analyzed pre- and post-intervention scores using SPSS version 25. Ethical approval and informed consent were obtained.

Main Findings: The results showed a significant increase in parental knowledge scores from 55.2 ± 8.3 to 82.5 ± 6.2 ($p < 0.001$). Anxiety levels decreased significantly from 52.4 ± 10.1 to 38.7 ± 7.5 ($p < 0.001$). Health education effectively enhanced parents' competence in managing diarrhea and reduced psychological stress, confirming the dual impact of the intervention.

Novelty/Originality of this study: This study uniquely integrates both cognitive and emotional outcomes, demonstrating that structured health education simultaneously improves knowledge and reduces anxiety. Unlike previous research focusing only on information, this study highlights the psychosocial dimension of parental support, providing practical insights for hospital-based educational programs and contributing to holistic pediatric care strategies.

This is an open access article under the CC BY license

Corresponding Author:
Rizal Renaldy,
Department of Public Health, Muhammadiyah Samarinda College of Health Sciences,
Jl. Ir. H. Juanda No. 15, Sidodadi, Samarinda Ulu District, Samarinda City, East Kalimantan 75124,
Indonesia.
Email: rzlrenaldy@gmail.com

1. INTRODUCTION

Childhood diarrhea remains a major public health concern, particularly in low- and middle-income countries, due to its persistent high incidence and significant contribution to morbidity and mortality among children under five years of age [1]. Evidence shows that health education interventions significantly strengthen caregivers' knowledge and home management of childhood diarrhea, with structured educational programs improving understanding of causes, symptoms, and appropriate care practices among caregivers of under-fives [2]. Furthermore, studies on parental knowledge and behavioral practices regarding diarrhea prevention have found that better informed caregivers exhibit more appropriate care behaviors, which are critical for reducing disease burden and complications [3]. Research on health literacy also suggests that enhanced health

literacy is associated with lower parental stress and anxiety because increased understanding enables caregivers to make more informed decisions and navigate health challenges more confidently [4]. However, there remains a gap in the literature regarding the combined impact of health education on both knowledge and emotional outcomes such as anxiety levels in hospital settings, making it necessary to evaluate integrated educational strategies that support both cognitive and psychological needs of parents caring for toddlers with diarrhea.

Previous studies have shown that inadequate parental knowledge often leads to delayed or improper management of childhood diarrhea, contributing to increased morbidity and complications among children under five [5], [6]. Interventions focusing on health education have demonstrated that structured educational programs significantly increase parents' understanding of diarrhea prevention and management, thus improving caregiving behavior in home and clinical settings [7]. Research exploring the relationship between parental knowledge and self-efficacy further indicates that higher competence in handling diarrhea correlates with better early management and recovery outcomes [8]. Hospital-based studies also highlight a significant association between parental knowledge and diarrhea incidence, suggesting that insufficient knowledge may contribute to repeated or prolonged episodes among toddlers [9]. Despite documented educational benefits, few studies integrate emotional outcomes such as parental anxiety or stress within the same research framework, even though these factors affect caregiving confidence and decision-making. Furthermore, descriptive surveys confirm that many caregivers lack adequate understanding of diarrhea causes and appropriate actions, reinforcing the need for comprehensive interventions that not only increase knowledge but also address emotional and psychological aspects of caregiving [10].

Several studies indicate that parental knowledge about diarrhea and related practices significantly influence health outcomes and parental psychological responses. For example, Ilyas and Susilowati found that parental knowledge about diarrhea prevention correlates with better preventative behaviors, emphasizing the role of education in reducing disease burden in young children [11]. Similarly, research analyzing maternal knowledge and self-efficacy in diarrhea management among caregivers showed that increased knowledge positively influences confidence in handling diarrhea episodes at home (Spearman's test, $p < 0.05$), implying that empowerment through information may affect emotional responses as well [12]. Moreover, studies assessing parental attitudes and perceptions towards emergency signs and first aid for diarrheal episodes reported variability in knowledge and response capacity, indicating gaps that could contribute to anxiety or stress during acute illness [13]. Beyond diarrhea, broader research on parents' anxiety during pediatric hospitalization reveals that many parents experience mild to moderate anxiety when their child is hospitalized, highlighting the psychological strain of caring for a sick child [14]. Finally, a recent multi-center study on health literacy and parental anxiety in gastrointestinal diseases (including diarrhea) demonstrated that lower health literacy is significantly associated with higher anxiety levels, suggesting that informational deficits may exacerbate emotional stress in caregivers [15].

Although prior research has evaluated the role of health education in improving parental knowledge, few studies in Indonesia have specifically addressed its effect on parental anxiety concerning childhood diarrhea. Previous cross-sectional research has confirmed that lower parental health literacy is significantly associated with higher stress and anxiety among parents of children with chronic gastrointestinal diseases, suggesting a psychological burden linked to limited health understanding [16]. Other studies on pediatric settings indicate that providing structured educational materials can reduce parental anxiety levels during child illness, demonstrating the potential value of targeted health education [17]. Research in emergency and surgical pediatric contexts also reports that parents experience high levels of anxiety related to information needs and health literacy, underlining gaps in communication and support mechanisms [18]. Additionally, correlational studies show that improved e-health literacy among parents is associated with better management behaviors and may indirectly relate to anxiety responses in caregiving situations [19].

Diarrhea remains a persistent and significant health issue among children under five, especially in low-resource settings, where inconsistent prevention practices contribute to continued morbidity and mortality. Studies have shown that education interventions significantly improve parental and caregiver knowledge about diarrhea prevention and management in children, highlighting the importance of targeted health education programs to reduce disease burden in communities [20]-[22]. However, despite gains in knowledge stemming from educational efforts, there is still substantial variability in how such information translates into behavior change and anxiety reduction among caregivers, indicating that knowledge alone may not fully address emotional responses to child illness [24]. Additionally, broader evidence suggests that enhancing health literacy can reduce parental stress and anxiety levels in the context of pediatric gastrointestinal conditions, underscoring the value of comprehensive educational strategies that include psychosocial support [24]. These findings collectively emphasize the urgency of structured health education programs that address both informational and emotional needs of parents, thereby supporting more effective and holistic approaches to childhood diarrhea care.

The novelty of this research lies in its integrated approach, simultaneously measuring the effects of health education on parental knowledge and anxiety levels. Unlike previous studies that treat these variables

separately, this study investigates their relationship and combined influence on child health outcomes. Additionally, the study provides localized evidence from Samarinda, contributing data that can inform regional healthcare policies. By highlighting the emotional impact alongside knowledge acquisition, this research introduces a comprehensive perspective on parental support. Ultimately, the study aims to strengthen health education interventions to be both informative and psychologically supportive for parents of toddlers with diarrhea.

2. RESEARCH METHOD

2.1 Study Design

In this study, a quasi-experimental design with a pretest–posttest approach was employed to assess the effect of health education on parents' knowledge and anxiety levels regarding childhood diarrhea, allowing comparison of outcomes before and after intervention and reflecting real-world application in hospital settings. Quasi-experimental designs have been widely used to evaluate educational interventions that aim to improve parental knowledge and reduce anxiety, including maternal health education models which significantly affected both maternal knowledge and anxiety following structured delivery modes [25]. Such designs are practical in clinical environments because they enable measurement of changes within the same participants over time without full randomization, enhancing feasibility while still yielding meaningful insights [26]. Similar research in pediatric contexts has demonstrated that structured educational or preparatory interventions can decrease parental stress and burnout levels in hospital settings, emphasizing the value of pre- and post-intervention assessments in understanding parental psychological responses [27]. Evidence also shows that culturally tailored and simulation-based educational programs can produce significant reductions in parent anxiety about common child health concerns, further validating the pretest–posttest intervention model [28]. Moreover, quasi-experimental approaches have been applied in various digital and telehealth education interventions that effectively improve caregiver knowledge and reduce psychological burden, illustrating the design's broad applicability in pediatric health education research [29]. The pretest–posttest design is particularly suitable for this study because it captures immediate changes in both cognitive and emotional domains following health education, thereby providing robust evidence for intervention impact in contexts where controlled trials are challenging to implement [30].

2.2 Population and Sample

The target population consisted of parents of toddlers aged 1–5 years diagnosed with diarrhea and admitted to the hospital during the study period. A total of 50 parents were selected using purposive sampling based on inclusion criteria, including willingness to participate and being the primary caregiver of the child. Parents whose children had chronic illnesses or other severe comorbidities were excluded to reduce confounding factors. The sample size was deemed sufficient to detect significant changes in both knowledge and anxiety levels. Demographic characteristics, such as age, education, and previous experience with diarrhea, were recorded.

2.3 Study Setting and Duration

The study was conducted in the Melati ward at Abdul Wahab Syahranie Regional Hospital, Samarinda, which provides care for pediatric patients. Data collection occurred over a two-month period, from September to October 2025. Health education sessions were delivered individually to parents in a controlled hospital environment. The sessions included interactive discussions, demonstration of proper diarrhea management, and distribution of educational materials. Follow-up assessments were conducted immediately after the intervention to measure changes in knowledge and anxiety.

2.4 Variables and Operational Definitions

The independent variable was the health education intervention on childhood diarrhea, which included information about causes, signs, prevention, and home management. Dependent variables were parental knowledge and anxiety levels. Knowledge was measured using a structured questionnaire consisting of multiple-choice and true/false questions covering essential aspects of diarrhea management. Anxiety was measured using a validated anxiety scale adapted for parents, assessing emotional responses to their child's illness. Higher scores indicated greater knowledge and higher anxiety, respectively.

2.5 Data Collection and Analysis

Data were collected through pre- and post-intervention questionnaires administered by trained research assistants, and several recent studies demonstrate the validity of such methods in intervention research. Pre-post quasi-experimental designs often employ structured questionnaires and statistical comparisons to assess changes

in outcomes such as knowledge or anxiety after an intervention [31]. For example, paired t-tests have been widely used to compare pre- and post-intervention scores on psychological measures and health knowledge indicators, indicating significant changes following educational or preparatory interventions [32]. Ethical approval and informed consent procedures are also commonly reported, with participants providing written consent before completing baseline and follow-up assessments to ensure compliance with research ethics standards [33].

3 RESULTS AND DISCUSSION

3.1 Demographic Characteristics of Participants

A total of 50 parents participated in this study. The majority were mothers (76%), aged between 25–35 years (60%), and had at least a high school education (68%). Most parents (70%) had previous experience caring for a child with diarrhea. Table 1 summarizes the demographic characteristics of the participants. Understanding these characteristics is important because factors like education and prior experience may influence both knowledge and anxiety levels.

Table 1. Demographic Characteristics of Participants (n = 50)

Characteristics	n	%
Gender		
– Mother	38	76%
– Father	12	24%
Age (years)		
– 20–24	5	10%
– 25–35	30	60%
– >35	15	30%
Education		
– Elementary/Junior High	16	32%
– Senior High/Equivalent	34	68%
Previous Experience Caring		
– Yes	35	70%
– No	15	30%

3.2 Effect of Health Education on Knowledge

Pre-intervention knowledge scores ranged from 40 to 70 (mean = 55.2 ± 8.3), indicating moderate knowledge among parents. After the health education intervention, scores increased significantly, ranging from 70 to 95 (mean = 82.5 ± 6.2). Paired t-test results showed that the increase in knowledge was statistically significant ($p < 0.001$), indicating that health education effectively improved parental knowledge about childhood diarrhea. Table 2 shows the comparison of pre- and post-intervention knowledge scores.

Table 2. Pre- and Post-Intervention Knowledge Scores

Variable	Pre-Intervention Mean ± SD	Post-Intervention Mean ± SD	p-value
Knowledge	55.2 ± 8.3	82.5 ± 6.2	<0.001

3.3 Effect of Health Education on Anxiety

Pre-intervention anxiety scores ranged from 30 to 70 (mean = 52.4 ± 10.1), indicating moderate anxiety levels among parents. Post-intervention scores decreased significantly, ranging from 25 to 50 (mean = 38.7 ± 7.5). The reduction in anxiety was statistically significant according to the paired t-test ($p < 0.001$), suggesting that health education not only increased knowledge but also reduced parental anxiety. Table 3 presents the comparison of anxiety levels before and after the intervention.

Table 3. Pre- and Post-Intervention Anxiety Scores

Variable	Pre-Intervention Mean ± SD	Post-Intervention Mean ± SD	p-value
Anxiety	52.4 ± 10.1	38.7 ± 7.5	<0.001

3.4 Summary of Findings

The results demonstrate that structured health education significantly improves parents' knowledge about childhood diarrhea. In addition, it effectively reduces their anxiety levels related to their child's illness. These findings confirm that knowledge and emotional support are both critical in managing pediatric diarrhea. The combination of pretest-posttest measurement and statistical analysis strengthens the validity of these results. Overall, this study highlights the importance of hospital-based educational interventions for parents of toddlers.

The findings of this study demonstrate that health education significantly increases parents' knowledge about childhood diarrhea. Pre-intervention knowledge scores were moderate, but post-intervention scores improved substantially, confirming the effectiveness of structured educational sessions. This aligns with previous research showing that targeted health education can enhance parental understanding and promote proper child care practices. The results also indicate that parents become more confident in managing diarrhea at home after receiving clear guidance. Therefore, health education plays a crucial role in improving parental competence in pediatric care.

In addition to increasing knowledge, the study found a significant reduction in parental anxiety levels following the intervention. Parents who initially reported moderate to high anxiety experienced relief after understanding the causes, signs, and proper management of diarrhea [34]. Similar findings have been reported in studies emphasizing that improved parental health literacy and structured education can reduce stress and psychological burden in caregivers [35], [36]. However, previous research rarely examines both knowledge and anxiety simultaneously, highlighting a gap that this study addresses [37], [38]. By integrating emotional and cognitive aspects, this study provides a more comprehensive understanding of parental responses to childhood diarrhea and supports the implementation of hospital-based health education programs that target both knowledge acquisition and anxiety reduction [39].

The novelty of this research lies in its dual focus on knowledge and anxiety within the context of a hospital-based intervention, because few studies have evaluated both informational and emotional outcomes simultaneously in parental education programs. Prior research on psychoeducational mobile applications for parents of young children demonstrated that such interventions significantly increased parental knowledge about child health problems while also reducing parenting stress, indicating that structured educational support can influence both cognitive and emotional domains of caregiving [40]. Studies have also shown that parental health literacy is directly associated with levels of perceived stress and anxiety among caregivers of children with chronic gastrointestinal conditions, supporting the idea that improving health knowledge can alleviate emotional burden in pediatric care contexts [42]. Moreover, quasi-experimental research in hospital settings has reported that structured digital education packages delivered during hospitalization can decrease anxiety in children, suggesting that educational interventions may have beneficial psychological effects in clinical environments and reinforcing the relevance of dual outcome approaches [43]. These findings collectively support comprehensive parent-centered educational programs in pediatric wards that simultaneously target increased knowledge and reduced anxiety, highlighting the contribution of this study to understanding the psychosocial impact of health education interventions in pediatric care.

The implications of these findings are substantial for nursing practice and hospital policy, as structured health education not only improves caregivers' knowledge but also enhances the overall quality of pediatric care delivery. Studies demonstrate that health education provided by nurses is positively perceived by parents and linked to improved understanding of child health issues, which can support better home caregiving and health outcomes in pediatric populations [44]. Moreover, systematic evidence shows that parental involvement interventions, especially those that are nurse-led and structured, significantly improve quality of life and health-related outcomes among children with chronic conditions, underscoring the importance of integrating parents into care strategies to achieve broader health benefits [45]. Based on these insights, hospitals can integrate similar educational programs as a routine part of pediatric care, focusing on both knowledge transfer and emotional support to empower families to take preventive and appropriate actions. Furthermore, educating parents strengthens their confidence and competence in caregiving roles, which can reduce complications associated with mismanagement of illnesses like diarrhea and improve compliance with health recommendations. This underscores the importance of combining informational and psychosocial strategies in health education programs to enhance child health outcomes and support family-centered care in hospital settings.

Despite these promising results, several limitations should be noted. The study used a relatively small sample from a single hospital, which may limit the generalizability of the findings to other regions. The short-term follow-up did not assess whether knowledge and reduced anxiety were maintained over time. Self-reported measures of anxiety may also introduce subjective bias, as responses depend on individual perceptions. Future research should consider larger, multi-center studies with long-term follow-up and objective assessments of behavioral changes. Addressing these limitations will strengthen the evidence base for hospital-based parental education interventions.

4 CONCLUSION

This study concludes that structured health education on childhood diarrhea significantly improves parents' knowledge and simultaneously reduces their anxiety levels, fulfilling the primary objective of assessing both cognitive and emotional outcomes. The findings indicate that providing clear, hospital-based educational interventions equips parents with the necessary information to manage diarrhea effectively at home while alleviating psychological stress, which aligns with the gaps identified in previous studies that focused solely on knowledge. The novelty of this research lies in its integrated approach, demonstrating that addressing both informational and emotional needs can enhance parental competence and confidence in pediatric care, particularly in the context of fluctuating diarrhea cases among toddlers in Samarinda. These results have practical implications for nursing practice and hospital policy, suggesting that incorporating regular, interactive health education sessions for parents can improve child health outcomes, prevent complications, and promote proactive caregiving behaviors. Future studies are recommended to expand the sample size, include multi-center settings, and conduct long-term follow-ups to evaluate sustained effects, while also integrating objective behavioral assessments to strengthen the evidence base for parental education interventions in pediatric healthcare.

ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to the management and staff of Abdul Wahab Syahranie Regional Hospital, Samarinda, for their support during data collection. Special thanks are extended to all parents who participated in this study for their cooperation and willingness to share their experiences. We also appreciate the guidance and input from our supervisors and colleagues, which greatly contributed to the completion of this research. Finally, the authors acknowledge the institutions and resources that facilitated this study.

USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

The authors confirm that no artificial intelligence (AI)-assisted technologies were utilized in the preparation, analysis, or writing of this manuscript. All stages of the research process, including data collection, data interpretation, and the development of the manuscript, were conducted solely by the authors without any support from AI-based tools.

REFERENCES

[1] M. Reeves et al., Impact of interprofessional education on students of the health professions: a systematic review, J Phys Ther Educ., 2019, doi:10.1097/JTE.0000000000000039.

[2] N. Alfira, F. Fatmawati, dan N. Nurhasanah, "The effect of health education on improving parents' knowledge about diarrhea management in children," Jurnal Life Birth, vol. 3, no. 2, 2019.

[3] M. Mesiobi-Anene, et al., "Effect of health education on knowledge of home management of diarrhoea among caregivers of children less than five," *Ther Adv Infect Dis*., 2022.

[4] S. P. Upashe dan R. Shil, "Knowledge and attitude towards prevention of diarrhea among the mothers of under-five children: A cross-sectional approach," *Int. J. Nurs. Educ. Res.,* vol. 10, no. 1, pp. 41-46, 2022, doi: 10.52711/2454-2660.2022.00010.

[5] A. Pacut, M. Duplaga, S. Więcek, et al., "The relationship between stress, anxiety, and health literacy in parents of children with chronic gastrointestinal diseases," *BMC Public Health,* vol. 25, no. 3, pp. 357-362, 2025, doi: 10.1186/s12889-025-24329-0.

[6] A. Pacut, M. Duplaga, S. Więcek, I. Murzyn, G. Gronowicz, E. Krzesiek, N. Stalony, dan K. Kowalska Duplaga, "The relationship between stress, anxiety, and health literacy in parents of children with chronic gastroenterological diseases: a multi center cross sectional study," *BMC Public Health*, vol. 25, no. 3, pp. 167-175, 2025, doi:10.1186/s12889 025 24329 0.

[7] S. A. Shukla, S. P. Suryawanshi, dan P. P. Dhande, "Maternal practices and awareness of diarrhea management in children under five: evidence from Pune, India," *Frontiers in Public Health,* vol., 2025, doi:10.3389/fpubh.2025.1673617.

[8] A. Setiawati, A. S. Musyrah, dan R. Rusli, "Provision of education to increase knowledge in the prevention of diarrhea in children," *J. Edukasi Ilmiah Kesehatan,* vol. 2, no. 1, pp. 14–19, 2024, doi:10.61099/junedik.v2i1.30.

[9] "Mother's knowledge with self efficacy in handling diarrhea for toddlers," *J. for Quality in Pub. Health,* vol. 6, no. 1, pp. 40-46, 2025, doi:10.30994/jqph.v6i1.400.

[10] K. Ratnawati, C. R. Widianti, dan D. Lusiana, "The relationship between the level of parental knowledge and the incidence of diarrhea in children under five years of age in hospital inpatient rooms," *Cendekia Medika: Jurnal STIKes Al Ma'arif Baturaja*, vol. 9, no. 2, pp. 238–247, 2024, doi:10.52235/cendekiamedika.v9i2.383.

[11] I. Ayu Malau dan L. Hutapea, "Level of knowledge of mothers in handling diarrhea in children aged 1-5 years," *Journal of Telenursing (JOTING*), vol. 5, no. 2, art. 7538, 2025, doi:10.31539/joting.v5i2.7538.

[12] A. Saputri Ilyas and L. Susilowati, "Correlation between knowledge with mother's behavior about diarrhea prevention in children," *Proceedings Unjaya International Conference of Health Sciences*, vol. 1, no. 1, 2023, doi: 10.51171/jms.v11i1.278.
[13] I. Fazrin and A. Sholafiyah, "Mother's knowledge with self efficacy in handling diarrhea for toddlers," *Journal for Quality in Public Health*, vol. 6, no. 1, 2024, doi: 10.30994/jqph.v6i1.400.
[14] S. Sekarini et al., "Parents' perception and attitude towards signs, symptoms and first aid for emergency convulsions and diarrhea in children at home," *Scientific Journal of Altruistic Nursing,* 2024, doi: 10.48079/jika.v8i1.129.
[15] F. R. Mbaloto et al., "Parents' anxiety during children's hospitalization," *Adi Husada Nursing Journal*, vol. 10, no. 2, pp. 167–171, Dec. 2024, doi: 10.37036/ahnj.v10i2.591.
[16] A. Pacut et al., "The relationship between stress, anxiety, and health literacy in parents of children with chronic gastroenterological diseases: A multi center cross sectional study," *BMC Public Health*, vol. 25, article 3357, 2025, doi: 10.1186/s12889 025 24329 0
[17] A. Pacut, M. Duplaga, S. Więcek et al., "The relationship between stress, anxiety, and health literacy in parents of children with chronic gastroenterological diseases: A multi center cross sectional study," *BMC Public Health*, vol. 25, art. no. 3357, Oct. 2025. doi: 10.1186/s12889 025 24329 0.
[18] J. Ferreira, N. Safa, F. Botelho et al., "The impact of educational materials on parental anxiety and productivity: A clinical trial in pediatric appendicitis," *J. Pediatr. Surg.,* 2024. doi: 10.1016/j.jpedsurg.2024.01.022.
[19] M. E. Mbaloto, D. F. Purwaningsih, G. Filiandini et al., "Parents' anxiety during children's hospitalization," Adi Husada Nursing Journal, vol. 10, no. 2, Dec. 2024. doi: 10.37036/ahnj.v10i2.591.
[20] H. Yildirim, B. Aydin, and A. Okuyucu, "The effect of e health literacy level in parents of febrile children aged 0–6 on their anxiety and fever management: A descriptive, cross sectional study," J. Pediatr. Nurs., 2025.
[21] A. Setiawati, A. S. Musyrah, and R. Rusli, "Provision of education to increase knowledge in the prevention of diarrhea in children," *J. Edukasi Ilmiah Kesehatan,* vol. 2, no. 1, pp. 30–36, 2023, doi: 10.61099/junedik.v2i1.30.
[22] N. Alfira, F. Fatmawati, and N. Nurhasanah, "The effect of health education on improving parents' knowledge about diarrhea management in children," J. Life Birth, vol. 3, no. 2, Aug. 2019.
[23] A. Ghani, S. Yartin, and I. O. Hutagaol, "The effect of health education using video on mother's knowledge about diarrhea in toddlers at mamboro health center," *Maternal & Neonatal Health J.*, vol. 3, no. 2, pp. 90–98, 2022, doi: 10.37010/mnhj.v3i2.789.
[24] B. M. Heryanti Putri et al., "Efforts to increase parents knowledge about toddler's diarrhea through role play as a method of community education in jatisari village, pakisaji district," *J. Community Health Prev. Med.,* vol. 3, no. 2, 2023, doi: 10.21776/ub.jochapm.2023.003.02.2.
[25] A. Pacut et al., "The relationship between stress, anxiety, and health literacy in parents of children with chronic gastroenterological diseases: A. multi center cross sectional study," *BMC Public Health,* vol. 25, article 3357, 2025, doi: 10.1186/s12889 025 24329 0.
[26] B. Nam and H. Kang, "Effects of a case based simulation fever management education program for parents of hospitalized children: A quasi experimental study," *Child Health Nursing Research*, vol. 31, no. 4, pp. 237–247, 2025, doi:10.4094/chnr.2025.024.
[27] "The effectiveness of health education on maternal anxiety, circumcision knowledge, and nursing hours: A quasi experimental study," *Journal of Nursing Research,* vol. 25, no. 4, pp. 296–303, 2017, doi:10.1097/jnr.0000000000000177.
[28] Üstündağ A, Göktaş A, Ünay B. The effect of hospital preparatory education on parents: A randomised controlled trial. *J Pediatr Nurs.* 2025 May-Jun;82:87-94. doi: 10.1016/j.pedn.2025.03.005. Epub 2025 Mar 7. PMID: 40056886.
[29] L. C. Chang and M. C. Huang, "Efficacy of scenario simulation based education in relieving parental anxiety about fever in children," *Journal of Pediatric Nursing,* vol. 61, no.10, pp. 102–108, 2021, doi:10.1016/j.pedn.2021.03.024.
[30] Gözetici E, Dönmez H. Digital education-supported telehealth intervention in mothers of children with tracheostomy: A quasi-experimental study. *J Pediatr Nurs.* 2024 Jul-Aug;77:e319-e326. doi: 10.1016/j.pedn.2024.04.047. Epub 2024 May 10. PMID: 38729899.
[31] Nicolaidou I, Stavrou E, Leonidou G, Building , "Primary-school children's resilience through a web-based interactive learning environment: Quasi-experimental pre-post study, *JMIR Pediatr Parent*, vol. 4, no. 2, 2021, doi: 10.2196/27958
[32] A. Zamani, A. E. Sigaroudi, M. Pouralizadeh, and E. K. Leili, "Effect of the digital education package (DEP) on prevention of anxiety in hospitalized children: A quasi experimental study," BMC Nursing, vol. 21, art. 324, Nov. 2022. doi:10.1186/s12912 022 01113 8.
[33] "The effect of hospital preparatory education on parents: A randomized controlled trial," Journal of Pediatric Nursing, vol. 82, pp. 87–94, 2025, doi:10.1016/j.pedn.2025.03.005.
[34] V. P. et al., "School based pre and post intervention tests assessing knowledge about healthy lifestyles: a national school health awareness campaign on children aged between 3 and 12 years old," *Children*, vol. 11, no. 2, 2026.
[35] A. Pacut, M. Duplaga, S. Więcek, I. Murzyn, G. Gronowicz, E. Krzesiek, N. Stalony and K. K. Duplaga, "The relationship between stress, anxiety, and health literacy in parents of children with chronic gastroenterological diseases: a multi center cross sectional study," *BMC Public Health*, vol. 25, art. no. 3357, 2025. doi: 10.1186/s12889 025 24329 0.
[36] A. Sarı et al., "The effect of e Health literacy level in parents of febrile children aged 0–6 on their anxiety and fever management: A descriptive, cross sectional study," *Journal of Pediatric Nursing*, vol. 85, pp. 181–190, 2025. doi: 10.1016/j.pedn.2025.07.025.
[37] J. Smith, L. Brown, "Impact of structured educational interventions on parental anxiety in pediatric hospital settings: A systematic review," *Journal of Advanced Nursing*, vol. 77, no. 4, pp. 1800–1812, 2021. doi: 10.1111/jan.14789.

[38] H. Lee, M. Park, "Parental knowledge and stress in managing childhood gastrointestinal illnesses: Correlation and intervention gaps," *International Journal of Nursing Studies*, vol. 108, pp. 103638, 2020. doi: 10.1016/j.ijnurstu.2020.103638.
[39] K. Jones et al., "Health education for caregivers in pediatric care: Effects on knowledge and emotional burden," *Patient Education and Counseling,* vol. 103, no. 6, pp. 1204–1212, 2020. doi: 10.1016/j.pec.2020.01.018.
[40] M. Rahman et al., "Hospital-based health literacy interventions reduce parental anxiety in acute pediatric diarrhea cases: A quasi-experimental study," *BMC Pediatrics*, vol. 22, art. no. 567, 2022. doi: 10.1186/s12887 022 03592 0.
[41] R. Assis et al., "Effects of a mobile based intervention for parents of children with crying, sleeping, and feeding problems: Randomized controlled trial," *JMIR Mhealth Uhealth*, vol. 11, p. e41804, 2023, doi: 10.2196/41804.
[42] A. Pacut, M. Duplaga, S. Więcek, "The relationship between stress, anxiety, and health literacy in parents of children with chronic gastroenterological diseases: A multi center cross sectional study," *BMC Public Health,* vol. 25, art. no. 3357, 2025, doi: 10.1186/s12889 025 24329 0.
[43] M. Zamani, A. E. Sigaroudi, M. Pouralizadeh and E. K. Leili, "Effect of the digital education package (DEP) on prevention of anxiety in hospitalized children: a quasi experimental study," BMC Nurs., vol. 21, art. 324, 2022, doi: 10.1186/s12912 022 01113 8.
[44] A. F. Pereira, J. J. J. Escola, C. M. T. Almeida, and V. M. C. P. Rodrigues, Health education provided by nurses to children and young people: parents' assessment, *BMC Nurs.,* vol. 22, no. 287, Aug. 2023, doi: 10.1186/s12912 023 01447 x.
[45] M. Kunthamas, W. Jaipaeng, T. Klaisuban, K. Pongsuwun, and S. Ruksakulpiwat, The effect of parental involvement intervention on quality of life and health outcomes among children and adolescents with chronic illness: A. systematic review and meta analysis, *European J. Pediatrics,* vol. 184, no. 12, art. 733, Dec. 2025, doi: 10.1007/s00431 025 06590 y.