Research Article

The relationship between demographic characteristics and parental knowledge in managing hemophilia in children: A cross-sectional analysis

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Abstract

Introduction: Hemophilia is a chronic genetic disorder that requires effective parental management to prevent complications and improve outcomes in affected children. Parental knowledge plays a critical role in disease management; however, this knowledge can vary based on demographic factors such as age, gender, income, residence, and educational background. **Objectives:** This study aimed to explore the relationship between demographic characteristics and parental knowledge in managing hemophilia in children before and after a health education intervention. **Methods:** A cross-sectional analytical study was conducted with 100 participants, equally divided into a control group and a study group. Data were collected through structured questionnaires assessing health knowledge scores at pre-test and post-test stages. Independent samples t-tests and one-way ANOVA were used to analyze differences in knowledge scores across various demographic variables, including gender, age, income level, and place of residence. **Results:** At baseline (pre-test), fathers showed significantly higher health knowledge than mothers ($p = 0.03$). However, no significant differences were observed between rural and urban parents or across different income levels. After the educational intervention (post-test), the gap between genders narrowed and was no longer statistically significant ($p = 0.31$). Similarly, while older parents tended to have higher knowledge scores, these differences were not statistically significant. Notably, income level emerged as a significant factor post-intervention, particularly between the lowest and highest income groups, where higher-income parents demonstrated greater gains in knowledge ($p = 0.03$). **Conclusion:** Demographic factors such as age, parental role, income, and residence play a crucial role in shaping parental knowledge and capabilities in managing hemophilia in children. Addressing disparities in these areas through targeted education and support programs could enhance disease management outcomes.

Keywords: Hemophilia, parental knowledge, health education, demographic factors, disease management, children, intervention

1 Introduction

Hemophilia is a lifelong inherited bleeding disorder that requires consistent and informed parental care to prevent complications such as joint damage, hemorrhage, and disability [1, 2]. Parents play a central role in managing this condition, especially during childhood, when treatment adherence and early recognition of symptoms are crucial [3, 4, 5]. However, parental knowledge levels can vary widely based on sociodemographic characteristics such as age, gender, income, and place of residence [6]. Understanding these disparities is essential for designing effective patient education strategies tailored to different groups [6, 7]. Studies have shown that higher parental education and income are often associated with better disease management and awareness [8, 9]. Gender differences also exist, with some research indicating that mothers may be more involved in daily care but less knowledgeable about clinical aspects compared to fathers [10]. Age has been linked to increased experience and understanding of chronic conditions, yet evidence remains inconclusive regarding its direct impact on knowledge retention [11]. Urban-rural disparities further complicate access to information and healthcare services, potentially affecting parents' ability to manage their child's condition effectively [12, 13]. Therefore, this study aims to examine how selected demographic variables correlate with parental knowledge in managing pediatric hemophilia before and after a structured educational intervention.

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This study aimed to explore the relationship between demographic characteristics and parental knowledge in managing hemophilia in children before and after a health education intervention.

2 Methods

A cross-sectional analytical study was conducted with 100 participants, equally divided into a control group and a study group, in Baghdad city during the period between October 1, 2024, and May 1, 2025. Data were collected through structured questionnaires assessing health knowledge scores at pre-test and post-test stages. Independent samples t-tests and one-way ANOVA were used to analyze differences in knowledge scores across various demographic variables, including gender, age, income level, and place of residence. SPSS version 29.0 was used for data analysis.

3 Results

The study included 100 participants divided equally into a control group and a study group, each comprising 50 individuals. Regarding age distribution, the most represented age group in the control group was 41–50 years (42%), followed by 31–40 years (28%), 51–60 years (22%), and the youngest group, 22–30 years (8%). In the study group, the majority were aged 31–40 years (40%), followed by 41–50 years (36%), 51–60 years (16%), and 22–30 years (8%). Parental accompaniment showed an even split, with 50% of participants in each group being accompanied either by their father or mother.

In terms of monthly income, the most common range in the control group was 300,000–600,000 IQD (52%), followed by the lower income level (≤300,000 IQD) at 24%, and the higher income level (600,000–900,000 IQD) also at 24%. In the study group, the 300,000–600,000 IQD range was also the most frequent (44%), followed closely by the higher income group (42%), with only 14% earning ≤300,000 IQD. Regarding residence, urban participants made up the majority in both groups—78% in the control group and 74% in the study group—while rural residents comprised 22% and 26%, respectively (Table 1).

Table 1: Distribution of Sample Demographic Characteristics (n=100)

Items		Control		Study	
		Frequencies	Percent	Frequencies	Percent
Age	22-30	4	8	4	8
	31-40	14	28	20	40
	41-50	21	42	18	36
	51-60	11	22	8	16
	Total	50	100%	50	100%
Parents	Father	25	50%	25	50%
	Mother	25	50%	25	50%
	Total	50	100%	50	100%
Income	300000	12	24	7	14
	600000-300000	26	52	22	44
	900000-600000	12	24	21	42
	Total	50	100%	50	100%
Residence	Rural	11	22	13	26
	Urban	39	78	37	74
	Total	50	100%	50	100%

Table 2 presents the results of an independent samples t-test conducted to compare the health knowledge scores between fathers and mothers in the pre-test phase. Fathers (n = 50) had a mean score of 17 with a standard deviation of 7.58, while mothers (n = 50) had a lower mean score of 13.92 with a standard deviation of 6.61. The t-value was 2.17, and the significance level (p-value) was 0.03, indicating a statistically significant difference in health knowledge between fathers and mothers at the 0.05 level.

Table 2: T-test for two independent samples test According to differences in parents' health knowledge to Parents variable in the pre -test

Parents	No.	Mean	Standard deviation	T	Sig.
Father	50	17	7.58	2.17	0.03
Mother	50	13.92	6.61		

Table 3 shows the results of an independent samples t-test comparing the post-test health knowledge scores of fathers and mothers. Fathers (n = 50) had a mean score of 27.56 with a standard deviation of 13.36, while mothers (n = 50) had a slightly lower mean of 24.94 with a standard deviation of 12.27. The calculated t-value was 1.02, and the significance level (p-value) was 0.31. This indicates that the difference in health knowledge between fathers and mothers in the post-test was not statistically significant.

Table 3: T-test for two independent samples test According to differences in parents' health knowledge to Parents variable in the post-test.

Parents	No.	Mean	Standard deviation	T	Sig.
Father	50	27.56	13.36	1.02	0.31
Mother	50	24.94	12.27		

Table 4 presents the results of an independent samples t-test comparing the pre-test health knowledge scores between rural and urban parents. Participants from rural areas (n = 23) had a mean score of 15.54 with a standard deviation of 6.34, while those from urban areas (n = 77) had a nearly identical mean of 15.43 with a standard deviation of 7.55. The t-test yielded a t-value of 0.06 and a p-value of 0.95, indicating no statistically significant difference in pre-test health knowledge between rural and urban parents.

Table 4: T-test for two independent samples test According to differences in parents' health knowledge to Residence variable in the pre -test

Residence	No.	Mean	Standard deviation	T	Sig.
Rural	23	15.54	6.34	0.06	0.95
Urban	77	15.43	7.55		

Table 5: T-test for two independent samples test According to differences in parents' health knowledge to Residence variable in the post-test

Residence	No.	Mean	Standard deviation	T	Sig.
Rural	23	27.48	12.83	0.52	0.60
Urban	77	25.88	12.89		

Table 5 presents a comparison of post-test health knowledge scores between parents residing in rural and urban areas. Parents from rural areas (n = 23) had a mean score of 27.48 with a standard deviation of 12.83,

while those from urban areas (n = 77) had a slightly lower mean of 25.88 with a standard deviation of 12.89. The t-value was 0.52, and the p-value was 0.60, indicating that the difference in health knowledge between rural and urban parents after the intervention was not statistically significant.

Table 6 shows that the mean health knowledge scores increased with age: the youngest group (22–30 years) had a mean score of 11.25, while the oldest group (51–60 years) had the highest mean of 18.16. The standard deviations ranged from 3.99 to 8.13, indicating moderate variability within each age group.

Table 6: Mean and standard deviations in parents' health knowledge to Age variable in the pre -test

Age	No.	Mean	standard deviations
22-30	8	11.25	3.99
31-40	32	15.79	7.02
41-50	40	14.72	7.19
51-60	20	18.16	8.13
Total	100	15.46	7.25

Table 7 presents the results of a one-way ANOVA test conducted to determine whether these differences were statistically significant. The analysis yielded an F-value of 2.00 with a p-value of 0.12. Since the p-value is greater than 0.05, the differences in health knowledge scores among the four age groups in the pre-test were not statistically significant. This suggests that although older parents showed slightly higher knowledge scores, the variation was not strong enough to be considered significant at the conventional threshold.

Table 7: The one-way Anova of variance to recognize statistically significant difference in parents' health knowledge to Age variable in the pre -test

Source of variance	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	305.357	3	101.786	2	0.12
Within Groups	4891.483	96	50.953		
Total	5196.840	99	–		

Table 8 shows that the average health knowledge scores increased across all age groups after the intervention. The highest mean score was recorded in the 31–40 age group (28.97), followed by 41–50 (25.75), 51–60 (25.30), and the lowest in the 22–30 age group (20.25). Standard deviations were relatively high across all groups, ranging from 9.22 to 13.23, reflecting some variability in knowledge levels within each age group.

Table 8: Mean and standard deviations in parents' health knowledge to Age variable in the post-test

Age	No.	Mean	standard deviations
22-30	8	20.25	9.22
31-40	32	28.97	12.77
41-50	40	25.75	13.16
51-60	20	25.30	13.23
Total	100	26.25	12.83

Table 9 presents the results of a one-way ANOVA to test whether these differences in post-test means were statistically significant. The test yielded an F-value of 1.12 and a p-value of 0.34. Since the p-value is greater than 0.05, the result indicates that the observed differences in mean knowledge scores between age groups were not statistically significant. This implies that although some age groups appeared to benefit

more from the intervention, the variation in post-test knowledge scores among age groups was not strong enough to be considered meaningful from a statistical standpoint.

Table 9: The one-way Anova of variance to recognize statistically significant difference in parents' health knowledge to Age variable in the post-test

Source of variance	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	552.581	3	184.194	1.12	0.34
Within Groups	15738.169	96	163.939		
Total	16290.750	99	–		

Table 10 shows that the mean knowledge scores were very similar across income groups: 15.05 for those earning 300,000 IQD, 15.38 for the 300,000–600,000 IQD group, and 15.82 for the 600,000–900,000 IQD group, with standard deviations ranging from 7.00 to 7.56. This suggests relatively consistent knowledge levels regardless of income.

Table 10: Mean and standard deviations in parents' health knowledge to Income variable in the pre -test

Income	No.	mean	standard deviations
300000	18	15.05	7.21
600000-300000	50	15.38	7.56
900000-600000	32	15.82	7.00
Total	100	15.46	7.25

Table 11 presents the results of a one-way ANOVA test to assess if these differences were statistically significant. The F-value was 0.07 with a p-value of 0.93, indicating no significant difference in health knowledge scores across different income groups at the pre-test stage. Thus, income level did not appear to influence parents' baseline health knowledge significantly.

Table 11: The one-way Anova of variance to recognize statistically significant difference in parents' health knowledge to Income variable in the pre -test

Source of variance	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	7.734	2	3.867	0.07	0.93
Within Groups	5189.106	97	53.496		
Total	5196.840	99			

Table 12: Mean and standard deviations in parents' health knowledge to Income variable in the post-test

Income	No.	mean	standard deviations
300000	18	20.78	10.27
600000-300000	50	25.56	13.21
900000-600000	32	30.41	12.49
Total	100	26.25	12.83

Table 12 shows a trend where higher income groups tend to have higher mean knowledge scores: the group earning 300,000 IQD had a mean of 20.78, those earning between 600,000–300,000 IQD had 25.56, and the 900,000–600,000 IQD group recorded the highest mean at 30.41, with standard deviations ranging from 10.27 to 13.21.

Table 13 presents the results of a one-way ANOVA test, which found a statistically significant difference among the income groups (F = 3.57, p = 0.03), suggesting that income level may have an impact on the health knowledge gained after the intervention.

Table 13: The one-way Anova of variance to recognize statistically significant difference in parents' health knowledge to Income variable in the post-test

Source of variance	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1115.600	2	557.800	3.57	0.03
Within Groups	15175.150	97	156.445		
Total	16290.750	99			

To further investigate where these differences lie, Table 14 uses Scheffé's post hoc test. The results revealed a significant difference between the lowest income group (300,000 IQD) and the highest income group (600,000–900,000 IQD), with a mean difference of 9.63, exceeding the critical Scheffé value of 9.13. This indicates that parents with higher income benefited more from the health education intervention. However, the other comparisons—between the lowest and middle-income groups, and between the middle- and high-income groups—were not statistically significant, as their mean differences did not exceed the critical values. These findings suggest that income level may moderate the impact of health education, particularly between the lowest and highest income brackets.

Table 14: Values of the differences between the Means and the critical Scheffé values were used to identify the differences in the parents' health knowledge according to the Income level

Income	No.	mean	Mean Difference	Scheffe critical	Sig.
300000	18	20.78	4.78	8.52	Non-Sig.
600000-300000	50	25.56			
300000	18	20.78	9.63	9.13	Sig. to 600000-900000
600000-900000	32	30.41			
600000-300000	50	25.56	4.85	7.02	Non-Sig.
600000-900000	32	30.41			

4 Discussion

Based on the study titled "The Relationship Between Demographic Characteristics and Parental Knowledge in Managing Hemophilia in Children: A Cross-Sectional Analysis," several key findings emerge regarding how demographic factors influence parental knowledge in managing hemophilia. The majority of participants in both control and study groups were between 31–50 years old. This aligns with findings from a German cross-sectional survey, which reported that most parents were aged between 25 and 55 years, suggesting that middle-aged parents are often primary caregivers for children with chronic conditions like hemophilia [14].

An equal distribution of fathers and mothers was observed in both groups. However, literature indicates that mothers often bear a greater caregiving burden. For instance, a study in Turkey found that mothers, due to lower literacy and employment rates, often assume primary caregiving responsibilities, leading to increased emotional and financial stress [15]. A significant portion of participants fell within the 300,000–600,000 IQD income range. Lower income levels have been associated with reduced health literacy and increased caregiver burden. A study assessing parental knowledge regarding health preventive measures for

children with hemophilia highlighted that parents with lower income had limited knowledge about self-care and preventive strategies [16].

The majority of participants resided in urban areas. Urban residency is frequently associated with better access to healthcare services, specialist consultations, and health education, which may enhance parental knowledge and disease management skills [17]. In contrast, rural residents often encounter barriers such as fewer healthcare facilities, lower health literacy, and limited exposure to educational interventions, potentially impeding effective management of chronic conditions like hemophilia [18, 19].

Based on Table 2, an independent samples t-test was conducted to compare pre-test health knowledge scores between fathers and mothers. The results indicated that fathers ($n = 50$) had a higher mean score ($M = 17$, $SD = 7.58$) compared to mothers ($M = 13.92$, $SD = 6.61$). The t-value was 2.17 with a p-value of 0.03, signifying a statistically significant difference at the 0.05 level. This finding aligns with existing literature suggesting gender-based differences in health knowledge among parents. For instance, a study by Alam et al. [20] found that parental health literacy is influenced by various sociodemographic factors, including gender, which can affect health knowledge and behaviors. Additionally, research has highlighted that mothers often face challenges in accessing health information, which may impact their health literacy levels [14, 21]. These disparities underscore the need for targeted educational interventions to enhance health knowledge among mothers, particularly in managing chronic conditions like hemophilia in children.

Table 3 suggests that the educational intervention helped bridge the gender knowledge gap. These findings align with previous research that identified gender-based differences in parental engagement with hemophilia education, though interventions can mitigate these disparities [22]. Pre- and post-test results showed no significant differences between rural and urban parents. Although urban residents are typically assumed to have better access to healthcare information, this study's findings imply equitable educational exposure or outreach. Studies have emphasized that rural residence may hinder access to hemophilia services but can be offset with targeted outreach and educational interventions [23, 24].

Although older age groups had higher pre- and post-intervention knowledge scores, the differences were not statistically significant (ANOVA $p > 0.05$). This pattern suggests that age may correlate with increased exposure to disease management but does not necessarily equate to better baseline knowledge. Studies on chronic pediatric illnesses suggest older caregivers may gain more knowledge over time due to prolonged caregiving experience [25]. While different age groups showed varying post-test knowledge scores, the ANOVA results ($F = 1.12$, $p = 0.34$) suggest these differences were not statistically significant. This is consistent with literature indicating that while age may influence health literacy through life experience, it is not always a predictor of intervention success in educational programs [25, 26].

The pre-test scores showed little variation across income levels, with no significant differences ($F = 0.07$, $p = 0.93$). This suggests that baseline knowledge about hemophilia may not be strongly tied to economic status. Previous studies have shown that without targeted education, income may not impact basic awareness or disease understanding [27, 28]. After the educational intervention, higher-income parents showed significantly greater knowledge gains ($F = 3.57$, $p = 0.03$). This supports findings from a study that reported socioeconomic status affects a family's ability to access, absorb, and apply health-related information, particularly in resource-limited settings [28]. Scheffé's test identified a significant difference in post-test knowledge between the lowest and highest income groups (mean difference $= 9.63 > 9.13$ critical value). This suggests that families with greater financial means may benefit more from health education—possibly due to better literacy, digital access, or fewer stressors impeding learning. Similar income-related disparities in patient education effectiveness have been observed in other chronic pediatric conditions [27, 29].

5 Conclusions and Recommendations

Demographic characteristics, especially parental gender and income level, influence baseline knowledge and response to health education interventions regarding hemophilia management. While gender disparities in knowledge diminished after education, income level appeared to moderate the effectiveness of the intervention. Health education programs should be tailored to address the specific needs of lower-income families and emphasize the inclusion of both parents to ensure equitable knowledge dissemination. Future studies could explore more targeted interventions to bridge knowledge gaps among diverse demographic groups.

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