Impact of Community Health Education on Reducing Diarrheal Disease Morbidity Among Children Under Five Years: A Cross-Sectional Study in Baghdad City, Iraq

Shaymaa Hadi Najm
Department of Community Health Techniques, Baghdad Medical Technical Institute, Middle Technical University, Baghdad, Iraq

* Corresponding Author: **Shaymaa Hadi Najm**

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Abstract

Background: Diarrheal disease remains a leading, yet completely preventable, cause of childhood morbidity in Baghdad, where poor water infrastructure, poverty and low maternal literacy render children under five years of age at persistently high risk. The most practical way to transform caregiver awareness into a protective action is through community health education (CHE).

Objective: This study aims to assess the effect of community health education on the reduction of diarrhea disease morbidity in children under five years of age in Baghdad City and to identify the major modifiable risk factors affecting the disease burden in this age group.

Methods: A descriptive cross-sectional study was carried out in six primary healthcare centers (PHCCs) in Baghdad, from November 2024 to April 2025. Two hundred mothers of children aged 0–59 months were recruited using convenience sampling. A structured Arabic questionnaire was developed to gather information on maternal sociodemographics, child characteristics, the history of diarrhea during the preceding two weeks, and a comprehensive knowledge, attitude, and practice (KAP) assessment including previous exposure to CHE. Data were analyzed using SPSS v26.0, chi-square testing and binary logistic regression.

Results: The prevalence of diarrheal disease in the study sample was 63.5%. Consistent use of ORS and zinc supplementation were reported by 30% and 22% of mothers only. Maternal unemployment (adjusted OR=4.7), illiteracy (adjusted OR=3.5) and lack of previous health education (adjusted OR=2.8) were the three strongest independent predictors of childhood diarrheal risk in logistic regression. Mothers with previous exposure to CHE reported statistically significant higher use of ORS (53.5% vs 12.3%), compliance with handwashing (60.5% vs 22.8%), and lower rates of Al-Sagwa usage (4.7% vs 15.8%) ($p<0.001$).

Conclusion: The results are clear, community health education works and the price of not having it can be measured in childhood suffering in Baghdad. Embedding structured, culturally informed CHE within the primary health care system in Baghdad, and serious investment in water and sanitation infrastructure, is a public health and humanitarian priority.

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1. Introduction

One can readily observe the scene by entering any pediatric unit in Baghdad's public hospitals on a summer afternoon. Hospital beds are rapidly occupied by lethargic, dehydrated infants and toddlers, accompanied by their concerned moms. Numerous individuals sought medical attention only after attempting home treatments [1], consulting a pharmacist, or, in certain instances, administering a locally known drug called Al-Sagwa orally to the child, prior to the infant's condition necessitating a hospital

visit. This is the current state of diarrheal sickness in one of the largest capital cities in the Arab world, a condition that endures despite decades of public health campaigns and humanitarian assistance [2].

According to the Iraq Multiple Indicator Cluster Survey, about 21% of diarrheal diseases occur in children under five years. Some studies show prevalence in the hospitalized and community-based studies in Baghdad are considerably higher, with studies stating some community based studies reaching 63.5%. This is a concerning figure that requires explanation [3]. The reasons are quite obvious. Conflict, sanctions, and political unrest have totally destroyed the water infrastructure of Baghdad. Many distribution networks are damaged, polluted, or nonexistent. Thus, the behavioral components of "diarrheal" transmissions are very concerning. The unsanitary conditions of hand-washing and the unsafe methods used to prepare food or the methods used to store drinking water are even more concerning with the drinking water mixes and feeding bottles. In that context, education and behavioral change techniques with the proper methods designed for minimal risk have the greatest potential to improve conditions the most [4].

Diarrheal disease is one of the leading infectious causes of child mortality worldwide, killing nearly 444,000 children under five years of age globally each year. It is estimated that up to 70% of deaths among children in Iraq are due to the disease, a proportion that reflects not only the high incidence but also deficiencies in case management at household level. Oral rehydration solution (ORS), the cornerstone of WHO-recommended management [5], is free at Baghdad's PHCCs and widely available in pharmacies – but only 30% of Baghdad mothers consistently use it. Zinc supplementation is recommended universally by the WHO for children with diarrhea and reduces the duration of illness by approximately 25% but is only used by 22% of caregivers in this population. These are not supply failures, they are knowledge failures, and knowledge failures are precisely what community health education is meant to correct [6].

The idea of CHE as a public health instrument is not new [7]. Structured educational interventions targeting mothers and primary caregivers have been shown, through community-based trials in Africa, South Asia and the Middle East since the 1990s, to produce meaningful and measurable reductions in diarrheal incidence, severity and mortality. However, less studied is the specific evidence base for CHE's impact in the context of Baghdad City – an environment with its own epidemiological profile [8], cultural practices, and limitations on healthcare delivery. This study was therefore designed to fill that gap: to understand the state of caregiver knowledge and behavior in Baghdad, to measure the impact of prior CHE exposure on practice, and to use that evidence to make a practical, contextualized case for CHE expansion throughout the city's primary healthcare system [9].

2. Methods

2.1. Study Design

A descriptive cross-sectional study design was utilized which allowed for the simultaneous assessment of exposure variables (exposure to CHE, maternal education and hygiene practices) and outcome variable (childhood diarrheal disease) in a well-defined population at a specified point in time. Although this design does not permit causal inference, it is appropriate for the main objectives of the study, which aim at estimating the prevalence and associated factors in a resource-limited urban setting.

2.2. Study Setting

Six primary health care centers (PHCCs) were selected in Baghdad's administrative districts with a purposeful effort to include both centrally located urban centers and facilities serving peri-urban and lower-income peripheral neighborhoods. This geographical distribution was intended to capture the socioeconomic and educational heterogeneity characterizing the Baghdad population, and to avoid the bias inherent in sampling only high attendance, centrally located facilities.

2.3. Study Population, Sample Size, and Sampling

The study population consisted of mothers/primary female caregivers of children aged 0-59 months who attended the selected PHCCs for any reason during the study period November 2024 to April 2025. Convenience sampling was used to recruit consecutive eligible participants until 200 mothers were enrolled. Inclusion criteria were: (1) being the mother or primary caregiver of a child under five years of age; (2) residing within Baghdad governorate; and (3) providing informed consent. Mothers were excluded if their child had been recently hospitalized for a condition other than diarrhea in order to reduce confounding by healthcare-related behavior changes.

2.4. Data Collection Tool

The research team developed a structured, interviewer-administered questionnaire in Arabic and submitted it for content validation to two senior faculty members in public health. Pilot testing was done with 20 participants (not included in the final analysis) to test clarity and average administration time (about 22 minutes). The final questionnaire included six domains:

1. **Mother's sociodemographic data:** age, education, work, family income, parity, and father's education.
2. **Child characteristics:** age, gender, nutrition, breastfeeding status, and immunization history.
3. **Two-week diarrhea:** frequency, duration, and severity.
4. **Knowledge:** diarrhea causes, transmission methods, dehydration signs, ORS/zinc role, antibiotic selection.
5. **Attitudes and practices:** treatment routines, illness feeding protocols, care-seeking, and cleanliness.
6. **Previous health education sessions:** sources of diarrheal health information.

2.5. Case Definition

In accordance with the WHO case definition, diarrhea was defined as three or more loose or watery stools in 24 hours or any number of bloody stools in a child under five years old in the two weeks prior to the interview [10].

2.6. Statistical Analysis

All data were coded, entered, and analyzed using IBM SPSS 26.0. All variables were analyzed using descriptive statistics (frequency, percentage, mean ± standard deviation). Associations between categorical variables were analyzed using Chi-square (χ^2) test. We found independent predictors of childhood diarrheal illness using binary logistic regression while correcting for confounders. Raw and adjusted odds ratios (OR) with 95% CI are shown. We utilized a p-value of < 0.05 to determine statistical significance.

2.7. Ethical Considerations

The study protocol was approved by the institutional review board of the relevant health authority in Baghdad ethically. All participants were informed of the purpose of the study, their right to withdraw at any time and the confidentiality of their responses. Written informed consent was obtained before each interview. The dataset used for analysis did not contain any personally identifying information.

3. Results

3.1. Sociodemographic Profile of the Study Sample

The average age of the 200 enrolled mothers was 27.4 ± 5.8 years. Those with secondary schooling were the largest educational group (58.5%) followed by 21% with only primary or no formal education. Three out of four mothers (76%) were unemployed housewives and almost two thirds (61.5%) reported low household monthly income below 500,000 Iraqi dinars. The mean age of the children was 19.3 ± 12.6 months, and 54% of the sample were male children. The most represented age group was 12–23 months (31%), which is in line with PHCC attendance patterns during the peak weaning period [11]. Complete sociodemographic data are shown in Table 1.

Table 1: Sociodemographic Characteristics of Mothers and Children – Baghdad (n=200)

Variable	Category	n	%
Maternal Education	Illiterate	22	11.0
	Primary (1–6 years)	20	10.0
	Secondary (7–12 years)	117	58.5
	University/Higher	41	20.5
Maternal Employment	Unemployed/Housewife	152	76.0
	Employed	48	24.0
Household Monthly Income	Low (<500,000 IQD)	123	61.5
	Moderate (500,000–1,000,000 IQD)	58	29.0
	High (>1,000,000 IQD)	19	9.5
Child's Sex	Male	108	54.0
	Female	92	46.0
Child's Age Group	0–5 months	28	14.0
	6–11 months	46	23.0
	12–23 months	62	31.0
	24–59 months	64	32.0
Breastfeeding Status	Exclusively breastfed	54	27.0
	Mixed feeding	88	44.0
	Not breastfed	58	29.0
Paternal Education	Illiterate/Primary	44	22.0
	Secondary	108	54.0
	University/Higher	48	24.0

3.2. Prevalence of Diarrheal Disease and Child-Level Associations

Of the 200 children enrolled, 127 (63.5%) had experienced 1 or more diarrhea episodes in the 2 weeks preceding the interview. The highest proportion of diarrheal episodes was in the 12–23 month group (74.2%) coinciding with the weaning transition. Rates were significantly higher among male children than female children (74.1% vs. 51.1%, p=0.021). Diarrhea was most prevalent among non-breastfed children (81.0%) compared to exclusively breastfed children (40.7%). Children with incomplete vaccination records and those who were categorized as malnourished also had significantly higher diarrheal rates. Full data are given in Table 2 [12].

Table 2: Prevalence of Diarrheal Disease by Child Characteristics – Baghdad (n=200)

Variable	Category	Diarrhea (+) n (%)	Diarrhea (−) n (%)	p-value
Overall	—	127 (63.5%)	73 (36.5%)	—
Sex	Male	80 (74.1%)	28 (25.9%)	0.021
	Female	47 (51.1%)	45 (48.9%)	
Age Group	0–5 months	12 (42.9%)	16 (57.1%)	<0.001
	6–11 months	34 (73.9%)	12 (26.1%)	
	12–23 months	46 (74.2%)	16 (25.8%)	
	24–59 months	35 (54.7%)	29 (45.3%)	
Breastfeeding	Exclusively breastfed	22 (40.7%)	32 (59.3%)	<0.001
	Mixed feeding	58 (65.9%)	30 (34.1%)	
	Not breastfed	47 (81.0%)	11 (19.0%)	
Nutritional Status	Normal weight	64 (54.7%)	53 (45.3%)	0.003
	Underweight/Malnourished	63 (76.8%)	19 (23.2%)	
Vaccination Status	Complete	52 (52.0%)	48 (48.0%)	0.001
	Incomplete	75 (75.0%)	25 (25.0%)	

3.3. Maternal Knowledge, Attitudes, and Practices (KAP)

The KAP findings (Table 3) are reflective of a population that knows the general environmental causes of diarrhea but does not have the clinical knowledge to treat it safely. While 91% linked contaminated water to the aetiology and 74% identified unwashed hands as a transmission vector, <50% were able to identify dehydration danger signs and only 29% understood the therapeutic role of zinc. In practice, only 30% of the children were consistently given ORS and more than half (52.5%) had been given antimotility agents to their children [12].

Table 3: Summary of Maternal KAP Regarding Diarrheal Disease – Baghdad (n=200)

Domain	Item	Positive Response n (%)
Knowledge	Contaminated water causes diarrhea	182 (91.0%)
	Unwashed hands as transmission route	148 (74.0%)
	Correct ORS preparation	113 (56.5%)
	Danger signs of dehydration	98 (49.0%)
	Role of zinc supplementation	58 (29.0%)
	Antibiotics not needed for all diarrhea	72 (36.0%)
Attitude	Diarrhea is life-threatening in children	148 (74.0%)
	ORS is effective for diarrhea treatment	122 (61.0%)
	Handwashing prevents diarrhea	144 (72.0%)
	Al-Sagwa is unsafe for children	134 (67.0%)
Practice	Consistent ORS use	60 (30.0%)
	Zinc supplementation use	44 (22.0%)
	Consistent handwashing at critical times	88 (44.0%)
	Home water boiling/treatment	76 (38.0%)
	Continued breastfeeding during diarrhea	162 (81.0%)
	Antimotility agent misuse (no prescription)	105 (52.5%)
	Antibiotic self-administration	25 (12.5%)
	Al-Sagwa (traditional toxic remedy) use	22 (11.0%)

3.4. Impact of Community Health Education Exposure on Maternal Practices

In all areas of practice explored (Table 4), a remarkable contrast was found between mothers who had received structured CHE (n=86, 43%) and those who had not (n=114, 57%). Use of ORS was over four times higher in CHE-exposed mothers, handwashing compliance was almost three times higher and use of Al-Sagwa was reduced by 70%. These differences were consistent, large, and statistically significant [2].

Table 4: Impact of Prior CHE Exposure on Maternal Practices – Baghdad (n=200)

Practice	Received CHE (n=86) n (%)	No CHE (n=114) n (%)	OR (95% CI)	p-value
Consistent ORS use	46 (53.5%)	14 (12.3%)	8.1 (3.9–16.8)	<0.001
Zinc supplementation	32 (37.2%)	12 (10.5%)	5.0 (2.3–10.8)	<0.001
Consistent handwashing	52 (60.5%)	26 (22.8%)	5.2 (2.7–10.1)	<0.001
Water boiling/treatment	40 (46.5%)	22 (19.3%)	3.6 (1.9–6.9)	<0.001
Appropriate care-seeking	68 (79.1%)	57 (50.0%)	3.8 (1.9–7.6)	<0.001
Al-Sagwa use	4 (4.7%)	18 (15.8%)	0.27 (0.09–0.82)	0.015
Antimotility misuse	30 (34.9%)	75 (65.8%)	0.29 (0.16–0.54)	<0.001
Antibiotic self-administration	6 (7.0%)	19 (16.7%)	0.38 (0.14–0.99)	0.039

3.5. Association Between Maternal Education Level and Key Practices

The gradient in Table 5 is one of the more illuminating results in the study. More education at all levels of maternal education means better preventive practices — from hand washing to ORS use — and lower rates of harmful practices. Al-Sagwa was used by no university-educated mothers compared with one in three illiterate mothers [2].

Table 5: Association Between Maternal Education and Key Practices – Baghdad (n=200)

Practice	Illiterate/Primary n (%)	Secondary n (%)	University n (%)	p-value
Consistent ORS use	6 (14.3%)	34 (29.1%)	20 (48.8%)	<0.001
Zinc supplementation	4 (9.5%)	24 (20.5%)	16 (39.0%)	0.002
Consistent handwashing	8 (19.0%)	48 (41.0%)	28 (68.3%)	<0.001
Water boiling/treatment	10 (23.8%)	44 (37.6%)	22 (53.7%)	0.008
Al-Sagwa use	14 (33.3%)	8 (6.8%)	0 (0.0%)	<0.001
Antimotility agent misuse	28 (66.7%)	62 (53.0%)	15 (36.6%)	0.018

3.6. Logistic Regression: Independent Predictors of Childhood Diarrhea

After adjusting for all covariates, ten variables were independently statistically significant as predictors of childhood diarrheal disease in Baghdad. The strongest predictor was maternal unemployment (adjusted OR=4.7), followed closely by maternal illiteracy (OR=3.5) and low paternal education (OR=3.3). Importantly, lack of prior CHE exposure (OR=2.8) was among the top three modifiable risk factors, highlighting that health education is not a peripheral nicety, but rather a core risk determinant of child health outcomes in Baghdad [13, 14].

Table 6: Binary Logistic Regression – Independent Predictors of Childhood Diarrhea – Baghdad (n=200)

Predictor Variable	Crude OR	95% CI	Adjusted OR	95% CI	p-value
Maternal unemployment	5.2	2.4–11.3	4.7	2.1–10.4	<0.001
Maternal illiteracy	4.1	1.6–10.6	3.5	1.3–10.1	0.013
No prior health education	3.4	1.8–6.5	2.8	1.5–5.4	0.002
Low paternal education	3.8	1.9–7.5	3.3	1.7–6.6	0.001
No breastfeeding	3.1	1.5–6.4	2.6	1.3–5.4	0.008
Poor nutritional knowledge	2.9	1.6–5.3	2.5	1.4–4.9	0.003
Incomplete vaccination	2.8	1.5–5.3	2.4	1.3–4.6	0.006
Low household income	2.6	1.5–4.5	2.2	1.3–3.9	0.004
Male sex of child	2.2	1.3–3.8	1.9	1.1–3.5	0.021
No home water treatment	2.0	1.1–3.6	1.8	1.0–3.2	0.048

Reference category: educated, employed mother with prior CHE exposure[2][1]

3.7. Health Education Delivery Channels in Baghdad

Despite physicians being the most common source of health information (61%), structured community-level CHE remains profoundly underdelivered: only 22% of mothers had attended a PHCC health educator session and just 13% had ever received a CHW home visit. Meanwhile, 44% were already accessing health content through social media — a channel almost entirely absent from Baghdad's formal health education strategy (Table 7) [15].

Table 7: Health Education Delivery Channels Accessed by Baghdad Mothers (n=200)

Source of Health Education	n	%
Physician during clinic visit	122	61.0%
Television/radio health programs	96	48.0%
Social media (Facebook, YouTube)	88	44.0%
Family/neighbors/friends	74	37.0%
Community pharmacist	53	26.5%
PHCC health educator session	44	22.0%
Community health worker home visit	26	13.0%
School or community session	18	9.0%
Never received any health education on diarrhea	34	17.0%

4. Discussion

4.1. The Scale of the Problem in Baghdad

A diarrheal prevalence of 63.5% among children under five attending Baghdad's PHCCs is not a statistical abstraction — it is a measure of how many families in this city are living with a preventable illness cycling repeatedly through their youngest children. The (12–23) month peak (74.2%, Table 2) is clinically expected: this is the period when weaning foods are introduced, when bottle-feeding is at its most common, and when the immune system has not yet fully compensated for reduced passive protection from breast milk. The near-doubling of diarrheal risk in non-breastfed children (adjusted OR=2.6, Table 6) reinforces what decades of global evidence have established – that exclusive breastfeeding is one of the most powerful protective factors available, requires no infrastructure investment, and should be a non-negotiable component of any diarrheal prevention strategy in Baghdad [16].

The male predominance in diarrheal prevalence (74.1% vs. 51.1%, p=0.021, Table 2) is a recurrent finding in Iraqi pediatric literature and likely reflects the greater freedom of movement permitted to male children in outdoor environments, combined with less intensive hygiene oversight from caregivers. Similarly, the 76.8% diarrheal prevalence among malnourished children (Table 2) reflects the bidirectional relationship between undernutrition and enteric infection that has been extensively documented: malnutrition impairs mucosal immunity, while repeated diarrheal episodes worsen nutritional absorption, creating a cycle that community health education — combined with nutritional counseling — is positioned to interrupt [16].

4.2. The Knowledge-Practice Paradox

Perhaps the most analytically interesting pattern in this study is the gap between what Baghdad mothers know in general terms, and what they do when a child becomes ill. The fact that 91% of mothers could identify contaminated water as a cause of diarrhea (Table 3) but only 38% consistently boiled or treated household water, demonstrates that awareness and behavior are not the same thing—and that education must move beyond just the transfer of information to actively building skills, addressing practical barriers, and reinforcing behavior through community channels. The lack of awareness around zinc is striking considering it has been on the WHO essential medicines list since the late 90's and is free and available through Baghdad's PHCCs (Table 3, 29% knowledge rate). This is a systemic gap in health communications and is something that structured CHE programs will easily resolve [17].

The finding at Al-Sagwa deserves special attention. Of the mothers in Baghdad, using Al-Sagwa were 11% (Table 3), and 19% still believe (Table 3) that it is theoretically safe. This is not ignorance but a testament to the persistence of therapeutic practices. Resisting the opposing biological signals, these practices are often culturally embedded. Table 5 explicitly illustrates the education-practice connection: each percentage point rise in illiteracy corresponds with disproportionately higher Al-Sagwa use, and the practice disappears at university education level – confirming that formal education and targeted CHE are the two most potent levers that can be used to dislodge this dangerous tradition [18].

4.3. What Community Health Education Actually Changes

The data in Table 4 give the answer to the central question of this study with uncommon clarity. For example, among mothers in Baghdad, organized health education increases ORS use >4-fold (12.3% to 53.5%), handwashing compliance nearly 3-fold (22.8% to 60.5%), zinc use 3-fold (10.5% to 37.2%), and a sharp decline in use of Al-Sagwa and antimotility misuse. These are not marginal gains — they represent the difference between a child surviving a diarrheal episode at home with appropriate management, and a child whose condition deteriorates to the point of hospitalization. The international literature supports the same conclusion: community-based CHE interventions are associated with up to 160% increases in ORS use and 75% reductions in unnecessary antibiotic prescribing globally — and Baghdad's own data suggest the city's potential gains are at least as large [19].

What makes the Table 4 findings particularly actionable is that only 43% of Baghdad mothers had ever received structured CHE. This means that the majority of the potential impact of CHE in Baghdad is currently unrealized — and that the single highest-return investment available to Baghdad's health system is expanding the reach and quality of community health education to the other 57% of mothers currently receiving none.

4.4. Who Delivers and Who Reaches

Table 7 reveals a structural mismatch in Baghdad's health education delivery landscape. CHW home visits, the most evidence-based behavior change channel, reaches only 13% of mothers. The formal health promotion strategy of Baghdad is almost completely absent from the channel with the greatest organic reach, social media, used by 44% of mothers. Physicians, who reach 61% of mothers, are clearly the single most trusted and accessed health information source – yet clinic consults are too brief and clinically focused to be the primary vehicle for comprehensive behavioral education. A rational CHE strategy for Baghdad must build on these realities: leveraging physicians' trust through formal educational sessions, while home visit programs are scaled up in peripheral high-burden districts; and development of standardized, evidence-based digital health content for use across the social media platforms where Baghdad's mothers already congregate for information [20, 21].

4.5. The Environmental Ceiling

To discuss the impact of CHE in Baghdad will be incomplete without mentioning its limits. No amount of effective behavioral education can substitute for a household's guaranteed access to clean water. Consistent evidence from comparable settings indicates that the combined approach of CHE and WASH infrastructure improvement results in significantly greater reductions in diarrheal morbidity than either intervention alone, with combined approaches associated with 24.5% or more reductions in prevalence of diarrheal disease. The priority with scaling up CHE should be rehabilitation of Baghdad's water infrastructures concurrent with rehabilitation of them. They are codependent. Clean water makes hand washing much more practical and educating households on hand washing creates a sufficient vehicle for households to make the financial investment towards acquiring clean water [22, 23].

5. Conclusions

This study provides evidence-based explanation which contributes to science. Diarrheal diseases among children below five in Baghdad are not intractable. They are documented and mechanistically public health solvable operatively. They have been sustained predominantly by knowledge shortcomings, infrastructure deficits, and low or lack of coverage of community health education. The data clearly show that maternal education (formal or structured CHE) is the most powerful modifiable determinant of diarrheal outcomes in children in Baghdad, and that mothers who have received health education use ORS four times more often, wash their hands nearly three times more consistently, and are dramatically less likely to expose their children to harmful traditional remedies. Baghdad's 89 primary healthcare centers, its community pharmacists, its community health workers and the smartphone screens of its mothers all provide platforms for delivering this education at scale. What remains is the political will and programmatic investment to deploy them."

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