

Nutritional Status, Personal Hygiene Practices, and Health-Seeking Behaviour Among Children in Child Care Institutions: A Mixed-Methods Cross-Sectional Study from Bhubaneswar, Odisha, India

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Abstract

Background

Children residing in Child Care Institutions (CCIs) in low and middle-income countries (LMICs) represent a particularly vulnerable group exposed to nutritional deprivation, inadequate hygiene, and constrained health-seeking resources. Despite a substantial burden of malnutrition among institutionalised children in India, integrated assessments combining anthropometric, hygiene, and qualitative health-seeking data remain scarce.

Objective

To assess nutritional status, personal hygiene practices, and health-seeking behaviour among children aged 5–14 years residing in CCIs in Bhubaneswar, Odisha.

Methods

A cross-sectional mixed-methods design was employed. Six CCIs were randomly selected from ten in Bhubaneswar. Complete enumeration yielded 157 eligible children (participation rate 77.3%). Nutritional status was assessed using WHO/NCHS anthropometric z-scores (height-for-age and BMI-for-age). Personal hygiene was evaluated via a 17-item structured questionnaire. In-depth interviews (IDIs) with six caretakers explored health-seeking behaviour and were analysed thematically using MAXQDA. Logistic regression was performed to identify factors associated with stunting, thinness, and hygiene practices.

Results

The prevalence of moderate-to-severe stunting was 33.1% and thinness affected 54.8% of children. Although female children demonstrated better personal hygiene practices than males (62% vs 37% very good; $p > 0.05$), the relationship was not statistically significant. Older age (12–14 years) was the strongest predictor of good hygiene practices: for 12–14 years (AOR 45.01, 95% CI 9.08–223.10; $p < 0.001$), and for 9–11 years (AOR 6.83, 95% CI 2.12–22.02; $p = 0.001$). Older children were significantly less likely to be thin: for 12–14 years (AOR 0.07, 95% CI 0.01–0.50; $p = 0.008$), and for 9–11 years (AOR 0.13, 95% CI 0.03–0.68; $p = 0.010$). Males were also significantly less likely to be thin (AOR 0.53, 95% CI 0.25–1.12; $p = 0.050$). None of the factors associated with stunting were statistically significant. Qualitative analysis identified funding constraints, caregiver agency, and reliance on government facilities as key determinants of health-seeking.

Conclusion

Stunting and thinness are highly prevalent among CCI children in Bhubaneswar. Older age children (9–11 years and 12–14 years) were found to be less thin and followed better hygiene practices. Males were also less likely to be thin. Sustained government funding for nutritious diets, hygiene education, and caregiver capacity-building is urgently required.

1. Introduction

Childhood constitutes a critical and formative period during which nutritional adequacy, hygiene, and supportive caregiving collectively shape lifelong health trajectories. For children deprived of parental care—particularly orphans—this developmental window is frequently compromised by institutional resource constraints, stigma, and inadequate attention to basic needs [1, 2]. Orphaned children residing in Child Care Institutions (CCIs) are therefore disproportionately at risk of undernutrition, poor hygiene, and reduced access to appropriate health services [3, 4].

Globally, UNICEF estimates approximately 140 million orphans, of whom 71.4 million reside in Asia [5]. India alone accounts for 31 million orphaned children, with 16,382 registered in CCIs within Odisha as of 2015 [5]. Despite government mandates under the Integrated Child Development Services (ICDS) and the National Rural Health Mission (NRHM) to safeguard child welfare, malnutrition remains alarmingly prevalent in institutional settings. Nationally, India is home to approximately 60 million underweight children, and child malnutrition contributes an estimated 22% to the national disease burden [6]. A study in Chennai reported 57.7% malnutrition among orphaned children [7], while findings from Bangladesh and Odisha document similarly high rates of stunting (35–60%) and thinness (48–53%) [8, 9].

Personal hygiene is inextricably linked to child morbidity: inadequate handwashing and sanitation practices in institutional settings substantially increase the risk of skin infections, diarrhoeal disease, and respiratory illness [10, 11]. Despite this, integrated studies simultaneously examining nutritional status, hygiene practices, and health-seeking behaviour in CCIs remain scarce—particularly in the Indian context. This study was designed to address that gap.

The aim of this study is to assess the nutritional status (stunting and thinness), personal hygiene practices, and health-seeking behaviour among children aged 5–14 years residing in CCIs in Bhubaneswar, Odisha, and to identify factors associated with these outcomes. Findings are intended to inform policy recommendations for improving child welfare within institutional settings.

2. Methods

2.1 Study design and setting

A cross-sectional mixed-methods study was conducted in Bhubaneswar, the capital city of Odisha, India, from April to July 2022. Six CCIs were randomly selected from the ten government-registered CCIs operating in Bhubaneswar. This study is reported in accordance with the Strengthening the Reporting of

Observational Studies in Epidemiology (STROBE) statement for cross-sectional studies; the completed STROBE checklist is provided as Supplementary File 1.

2.2 Sample size and participants

Complete enumeration was undertaken within the six selected CCIs, yielding 157 eligible children (participation rate 77.3%). Inclusion criteria: children aged 5–14 years of either sex, resident in the CCI for more than six months, and willing to participate. Exclusion criteria: children with severe acute illness, intellectual disability, chronic disease, or residency of less than six months. Written informed assent (from children) and consent (from CCI administrators acting as guardians) were obtained prior to data collection.

2.3 Measurement of variables

Anthropometric assessment

Height and weight were measured using a calibrated stadiometer and a digital weighing scale, respectively, following standardised WHO protocols. Duplicate measurements were taken; the mean was used for analysis. Nutritional status was classified using WHO/NCHS z-scores computed via WHO Anthro Survey Analyser software [6]: stunting as height-for-age z-score (HAZ) below -1 SD, and thinness as BMI-for-age z-score (BAZ) below -2 SD. Overweight was defined as BAZ above $+1$ SD.

Personal hygiene assessment

Personal hygiene was assessed using a 17-item structured questionnaire (available in English and Odia), covering handwashing, tooth brushing, nail trimming, bathing, and clothing hygiene (full instrument in Appendix A). A composite hygiene score was constructed: poor (0–33%), good (34–66%), and very good (67–100%). The tool was piloted among ten children in a non-sampled CCI to establish face and content validity.

Qualitative data

Health-seeking behaviour was explored through in-depth interviews (IDIs) with six purposively selected caretakers (one per CCI), using a semi-structured interview guide (Appendix B) covering illness recognition, home management, referral pathways, preventive practices, and funding constraints. Each IDI lasted 20–30 minutes, was audio-recorded with permission, and transcribed verbatim. Transcripts were translated from Odia to English where necessary.

2.4 Data collection

Quantitative data were recorded electronically via Open Data Kit (ODK) on mobile devices; each survey took 20–25 minutes. Sociodemographic variables (age, sex, religion, education, orphan status, reason for admission, duration of stay, and presence of guardian) were also captured.

2.5 Data analysis

Quantitative data were analysed using IBM SPSS Statistics v.26 and Microsoft Excel. Frequencies and percentages were computed for categorical variables. Chi-square tests assessed bivariate associations between sex and each outcome. Logistic regression models were fitted separately for three binary outcomes: good/very good hygiene practices, stunting, and thinness. Reference categories were selected based on prior evidence and clinical plausibility. All variables with $p < 0.20$ in bivariate analysis were eligible for multivariate modelling; the final models retained variables with $p < 0.05$. Results are reported as adjusted odds ratios (OR) with 95% confidence intervals (CI). Statistical significance was set at $p \leq 0.05$.

Qualitative data were analysed thematically using MAXQDA 2022. A framework approach was applied: initial open coding was followed by category development and theme consolidation. Themes were derived inductively from recurring patterns, and quotations were selected to illustrate each theme. Triangulation of qualitative and quantitative findings was performed at the interpretation stage.

2.6 Ethical considerations

Ethical approval

was obtained from the Institutional Ethical Review Committee of AIPH University. Permission to conduct the study was granted by the Chairperson of the Additional Child Welfare Committee, Bhubaneswar. Written informed consent was obtained from CCI administrators and written assent from participating children. Confidentiality was maintained throughout; data were anonymised prior to analysis.

3. Results

3.1 Sociodemographic characteristics

A total of 157 children (mean age 10.0 years, SD 2.5) participated. The sample comprised 57.3% females ($n = 90$) and 42.7% males ($n = 67$). The majority were Hindu (93.0%), in the 12–14 year age group (45.2%), and at middle school level (56.1%). The most common duration of stay was 1–2 years (36.3%). Poverty and the need for education were the principal reasons for admission (43.3%), followed by poverty alone (24.2%). Only 26.1% had a guardian other than their parents. Sociodemographic characteristics are presented in Table 1.

Table 1
Sociodemographic characteristics of study participants (n = 157)

Variable	Category	n (%)
Sex	Male	67 (42.7)
	Female	90 (57.3)
Age (years)	5–8	26 (16.6)
	9–11	60 (38.2)
	12–14	71 (45.2)
Religion	Hindu	146 (93.0)
	Muslim	6 (3.8)
	Christian	5 (3.2)
Education level	Primary (Classes I–IV)	58 (36.9)
	Middle (Classes V–VII)	88 (56.1)
	High (Classes VIII–X)	11 (7.0)
Duration of stay in CCI	1–2 years	57 (36.3)
	3–4 years	43 (27.4)
	5–6 years	37 (23.6)
	> 6 years	20 (12.7)
Reason for admission	Both parents deceased	26 (16.6)
	Poverty and education	68 (43.3)
	Poverty only	38 (24.2)
	Parental discord	6 (3.8)
	Abandoned	19 (12.1)
Orphan status	Both parents present	33 (21.0)
	Mother only present	54 (34.4)
	Father only present	28 (17.8)
	No parents (both deceased)	42 (26.8)

CCI = Child Care Institution.

3.2 Nutritional status

The overall prevalence of stunting (any degree) was 69.4% (109/157); however, only 33.1% had moderate-to-severe stunting ($HAZ \leq -2$). Thinness (any degree) affected 54.8% of children. Stunting and thinness were slightly more prevalent in female children compared to males, though the difference was not statistically significant ($p = 0.677$ and $p = 0.971$, respectively). Among females, 37.8% had mild stunting, 32.2% moderate stunting, and 3.3% severe stunting; corresponding figures for males were 34.3%, 28.4%, and 1.5%. Moderate and severe thinness were observed in 34.4% and 21.1% of females, respectively, versus 32.8% and 20.9% of males. Nutritional status by sex is presented in Table 2.

Table 2
Nutritional status (stunting and thinness) by sex (n = 157)

Indicator	Category	Female n (%)	Male n (%)	Total n (%)	p-value
Stunting (HAZ)	Mild ($HAZ - 1$ to -2)	34 (37.8)	23 (34.3)	57 (36.3)	0.677
	Moderate ($HAZ - 2$ to -3)	29 (32.2)	19 (28.4)	48 (30.6)	
	Severe ($HAZ < -3$)	3 (3.3)	1 (1.5)	4 (2.5)	
	Normal	21 (23.3)	19 (28.4)	40 (25.5)	
Thinness (BMI-for-age)	Mild overweight	3 (3.3)	4 (6.0)	7 (4.5)	0.971
	Moderate overweight	0 (0.0)	1 (1.5)	1 (0.6)	
	Moderate thinness	31 (34.4)	22 (32.8)	53 (33.8)	
	Severe thinness	19 (21.1)	14 (20.9)	33 (21.0)	
	Normal	40 (44.4)	31 (46.3)	71 (45.2)	

HAZ = height-for-age z-score; BMI = body mass index. p-values from chi-square test. Stunting categories defined per WHO growth reference.

3.3 Personal hygiene practices

Female children demonstrated superior hygiene practices across most domains. Handwashing with soap was more prevalent in females (90.0%) than males (74.6%). All children (100%) reported washing hands after toilet use; however, soap was used by only 91.1% of females and 82.1% of males on these occasions. Twice-daily tooth brushing was more common among females (61.1%) than males (40.3%). Regular bathing was near-universal (96.8%). The distribution of personal hygiene practices by sex is shown in Table 3.

Overall, 68.2% of children achieved a “very good” hygiene score, 22.3% a “good” score, and 9.6% a “poor” score. Female children scored higher than males (62% vs 37% in the very good category), though the difference was not statistically significant.

Table 3
Personal hygiene practices by sex (n = 157)

Hygiene practice	Response	Female n (%)	Male n (%)	Total n (%)
Handwashing method	Water only	9 (10.0)	17 (25.4)	26 (16.6)
	Water with soap	81 (90.0)	50 (74.6)	131 (83.4)
Handwash before eating	Yes	86 (95.6)	64 (95.5)	150 (95.5)
Handwash after toilet	Yes	90 (100)	67 (100)	157 (100)
Soap use after toilet	Yes	82 (91.1)	55 (82.1)	137 (87.3)
Sanitizer use	Yes	50 (55.6)	36 (53.7)	86 (54.8)
Tooth brushing frequency	Once daily	35 (38.9)	40 (59.7)	75 (47.8)
	Twice daily	55 (61.1)	27 (40.3)	82 (52.2)
Nail trimming frequency	Once weekly	86 (95.6)	60 (89.6)	146 (93.0)
	Twice weekly	4 (4.4)	7 (10.4)	11 (7.0)
Regular bathing	Yes	87 (96.7)	65 (97.0)	152 (96.8)
Clothes washed with	Water only	45 (50.0)	27 (40.3)	72 (45.9)
	Detergent and water	45 (50.0)	40 (59.7)	85 (54.1)

3.4 Factors associated with personal hygiene practices

Logistic regression identified age as the sole significant predictor of good/very good hygiene practices. Compared to the 5–8 year age group, children aged 9–11 years were nearly seven times more likely to have better hygiene practices (OR 6.83, 95% CI 2.12–22.02; $p = 0.001$), and those aged 12–14 years were 45 times more likely (OR 45.01, 95% CI 9.08–223.10; $p < 0.001$). Sex, education level, and orphan status were not significantly associated with hygiene practices. Results are presented in Table 4.

Table 4
Logistic regression: factors associated with good/very good personal hygiene practices (n = 157)

Variable	Adjusted OR (95% CI)	p-value
Age group (Ref: 5–8 years)		
9–11 years	6.83 (2.12–22.02)	0.001*
12–14 years	45.01 (9.08–223.10)	< 0.001*
Sex (Ref: Female)		
Male	0.84 (0.37–1.88)	0.670
Education (Ref: Primary school)		
Middle school	0.66 (0.24–1.85)	0.432
High school	0.71 (0.06–8.32)	0.788
Orphan status (Ref: No parents)		
Single/both parents present	0.60 (0.23–1.53)	0.283

Reference categories in parentheses. * $p < 0.01$. CI = confidence interval; OR = odds ratio.

3.5 Factors associated with stunting

No variable reached the a priori significance threshold ($p \leq 0.05$) in the stunting model. Children in the high school education group were 80% less likely to be stunted compared to those at primary level (OR 0.20, 95% CI 0.03–1.42; $p = 0.10$), suggesting a trend though not reaching conventional significance. Hygiene score was not significantly associated with stunting (Table 5).

Table 5
Logistic regression: factors associated with stunting (n = 157)

Variable	Adjusted OR (95% CI)	p-value
Age group (Ref: 5–8 years)		
9–11 years	1.23 (0.37–4.14)	0.730
12–14 years	2.14 (0.42–10.96)	0.360
Sex (Ref: Female)		
Male	0.76 (0.36–1.59)	0.460
Education (Ref: Primary school)		
Middle school	0.64 (0.22–1.91)	0.420
High school	0.20 (0.03–1.42)	0.100†
Orphan status (Ref: No parents)		
Single/both parents present	0.56 (0.26–1.19)	0.130
Hygiene score (Ref: Poor)		
Good	0.35 (0.09–1.36)	0.120
Very good	0.58 (0.16–2.15)	0.410

†Significant at $p < 0.10$ (trend only). OR = odds ratio; CI = confidence interval; HAZ = height-for-age z-score.

3.6 Factors associated with thinness

Age and sex were significantly associated with thinness. Children aged 9–11 years (OR 0.13, 95% CI 0.03–0.68; $p = 0.01$) and 12–14 years (OR 0.07, 95% CI 0.01–0.50; $p = 0.008$) were significantly less likely to be thin compared to the 5–8 year group. Male children were approximately 47% less likely than females to be thin (OR 0.53, 95% CI 0.25–1.12; $p = 0.05$). Education, orphan status, and hygiene score were not significantly associated with thinness (Table 6).

Table 6
Logistic regression: factors associated with thinness (n = 157)

Variable	Adjusted OR (95% CI)	p-value
Age group (Ref: 5–8 years)		
9–11 years	0.13 (0.03–0.68)	0.010*
12–14 years	0.07 (0.01–0.50)	0.008*
Sex (Ref: Female)		
Male	0.53 (0.25–1.12)	0.050**
Education (Ref: Primary school)		
Middle school	1.03 (0.37–2.85)	0.960
High school	0.48 (0.08–2.76)	0.410
Orphan status (Ref: No parents)		
Single/both parents present	1.00 (0.46–2.21)	0.990
Hygiene score (Ref: Poor)		
Good	0.38 (0.06–2.28)	0.290
Very good	0.28 (0.05–1.51)	0.130

* $p < 0.01$; ** $p = 0.05$. OR = odds ratio; CI = confidence interval; BMI = body mass index.

3.7 Qualitative findings: health-seeking behaviour

Thematic analysis of IDIs with caretakers identified 12 themes (Table 7). Illness recognition was primarily dependent on children self-reporting symptoms or peers notifying caretakers; passive surveillance through peer networks was commonly described. First-line responses were mostly home-based (warm water for stomach-ache, over-the-counter cold or antidiarrhoeal medication). Government facilities—particularly AIIMS Bhubaneswar—were the preferred referral destination for more serious illness due to cost considerations, and institutional vehicles facilitated access.

Preventive practices included daily KADHA administration and yoga during the COVID-19 pandemic. External collaboration with NGOs providing eye and dental screening camps was noted. Caretakers identified funding shortfalls—exacerbated by COVID-19-related salary reductions of approximately 40%—as the primary systemic barrier to comprehensive care. Figure 1 illustrates the inter-relationships among themes.

Table 7
Thematic analysis: health-seeking behaviour (in-depth interviews with caretakers, n = 6)

Theme	Illustrative quotation (IDI with caregiver)
Common illnesses	"Cough and cold are commonly seen in the children."
Chronic disease	"Yes, there is a child who is mentally abnormal; others are mentally well."
Health-seeking (child perspective)	"If a child is having pain in the stomach, friends inform us; some information comes through intermediaries, some directly."
Health-seeking (caregiver)	"If they do not get relief from warm water, we consult a doctor and give medicine per prescription."
Care during illness	"We give cough syrups and loose-motion medicine from nearby stores. For acute vomiting, we immediately consult an AIIMS doctor."
Availability of basic medication	"We have medicines for fever, cough, diarrhoea, stomach-ache, and headache."
Preference for healthcare facility	"We first prefer government hospital; we take children to AIIMS for health issues. Sometimes to a private hospital."
Transportation	"We have our own institutional vehicle to take children to hospital."
Preventive measures	"KADHA is compulsory every morning; we also do rooftop yoga and follow all COVID-19 protocols."
External collaboration	"Eye camps, dental check-up camps, and screening camps are organised periodically; referrals made when needed."
Funding constraints	"Government reduced salaries by 40% during COVID-19, so donors were unable to fund us as before."
Barriers to care-seeking	"Costs at private hospital were very high for diagnosis and treatment, so we admitted the child to a government hospital instead."

IDI = in-depth interview. Quotations translated from Odia; minor grammatical edits made for clarity.

4. Discussion

This mixed-methods cross-sectional study provides an integrated assessment of nutritional status, hygiene practices, and health-seeking behaviour among 157 CCI children in Bhubaneswar, Odisha. The principal findings are: (i) a high burden of stunting (33.1% moderate-to-severe) and thinness (54.8%); (ii) slightly but not significantly worse outcomes among female children; (iii) markedly better hygiene practices among older children; (iv) age as the dominant predictor of both better hygiene and lower thinness risk; and (v) funding constraints as the central systemic barrier to health-seeking in CCIs, as revealed by qualitative data.

The stunting prevalence of 33.1% in our study closely aligns with Ferdoushi et al., who reported 35% stunting among orphanage children in Bangladesh [15], and with national estimates for institutionalised

children in India [9]. However, our figure is substantially lower than the 60% reported by Huq et al. [11], possibly reflecting differences in age range, measurement timing, or CCI quality. Our thinness prevalence (54.8%) is higher than the 48% reported by Huq et al. [11], which may reflect the preponderance of older children in our sample (45.2% aged 12–14)—an age group typically experiencing rapid growth spurts in the absence of adequate dietary energy.

The finding that female children had slightly higher stunting and thinness prevalences is consistent with evidence from sub-Saharan Africa [9] but contrasts with NFHS-5 national data showing excess stunting among male children in India. This may reflect gender-specific differences in CCI dietary allocation or differential vulnerability to psychosocial stress, which warrants further investigation. The absence of statistical significance ($p = 0.677$ for stunting; $p = 0.971$ for thinness) should be interpreted in the context of limited power—a formal power calculation is recommended for future studies.

Hygiene practices in our sample were substantially better than reported in some earlier studies. Ahlawat et al. [8] found only 0.5% of children in Uttarakhand orphanages bathed regularly, compared to 96.8% in our study. This likely reflects differences in CCI infrastructure and caretaker engagement rather than measurement error. Girls demonstrating better hygiene than boys aligns with a body of evidence from school-based studies [16, 17], and reinforces the importance of age- and sex-appropriate hygiene education in institutional settings. The strong positive association between older age and hygiene practices (OR 45.01 for 12–14 years) is consistent with developmental acquisition of self-care skills and suggests that hygiene education programmes may need to focus disproportionately on younger children.

The inverse association between older age and thinness, and between male sex and thinness, may reflect physiological differences in fat mass distribution and energy requirements. The non-significant association between hygiene and nutritional outcomes is consistent with the systematic review by DeLacey et al. [9], which found that environmental hygiene interventions alone have limited effect on child growth in institutional settings without concurrent dietary improvements.

Qualitative data highlighted a pragmatic, tiered health-seeking pattern among caretakers, aligned with severity of illness. Caretakers demonstrated awareness of referral pathways, and institutional vehicles reduced transport barriers. However, dependence on walk-in over-the-counter medication for common conditions (cough, diarrhoea) and the absence of on-site nursing staff raises concerns about the quality of primary care. Funding instability—intensified by the COVID-19 pandemic—undermined dietary adequacy and caretaker capacity, echoing findings from Botswana and South Africa [10].

These qualitative findings, triangulated with quantitative results, suggest that structural interventions—particularly sustained government financing and caretaker training—are necessary complements to nutrition and hygiene programmes if outcomes are to improve.

4.1 Strengths and limitations

Strengths of this study include the mixed-methods design, complete enumeration within selected CCIs, standardised anthropometric measurement, electronic data capture minimising transcription error, and qualitative triangulation. Limitations include the cross-sectional design precluding causal inference; the small qualitative sample (n = 6 IDIs); absence of dietary intake data, physical activity, and morbidity records; the composite hygiene score not having been formally validated in this population; and the study being limited to CCIs in a single urban district, limiting generalisability to rural or other Indian settings. The logistic regression models are underpowered for some sub-groups (wide CIs), and future studies should conduct a priori power calculations and consider Firth regression for small-sample binary outcomes.

5. Conclusion

Stunting and thinness are highly prevalent among children residing in CCIs in Bhubaneswar, Odisha, with female children marginally more affected. Older age is the dominant predictor of both better hygiene practices and lower risk of thinness. Although female children demonstrate better hygiene than males, this difference is not statistically significant. Caretakers in CCIs demonstrate pragmatic health-seeking behaviour but are constrained by inadequate, unstable funding. To achieve meaningful reductions in malnutrition and improve the holistic well-being of institutionalised children, the government must provide sustained financial support for nutritious and diverse diets, invest in caretaker capacity-building, and implement age-appropriate hygiene education programmes targeting younger children in CCIs.

Declarations

Competing interests:

The authors declare no competing financial or non-financial interests.

Ethics approval and consent to participate:

Ethical approval was obtained from the Institutional Ethical Review Committee of AIPH University; permission was granted by the Chairperson of the Additional Child Welfare Committee, Bhubaneswar. Written informed consent (administrators) and assent (children) were obtained.

Consent for publication:

Not applicable.

Supplementary Information

Supplementary File 1: STROBE checklist for cross-sectional studies.

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Author Contribution

Subhashreemalini Sahoo: conceptualisation, methodology, investigation, data curation, formal analysis, writing original draft. Pradeep Kumar Panda: conceptualisation, supervision, methodology, formal analysis, writing—review and editing. Paramjot Panda: methodology, formal analysis, writing—review and editing. Bharati Swaraj Sahu: investigation, data curation, writing—review and editing. All authors read and approved the final manuscript.

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Data Availability

The data has been collected during the study period and is available on request to the corresponding author.

References

1. UNESCO. Regional training seminar on Guidance and Counselling Module 4: Behaviour Modification. Paris: UNESCO; 2000. pp. 1–69.
2. Routray S, Meher BK, Tripathy R, Parida SN, Mahilary N, Pradhan DD. Growth and development among children living in orphanages of Odisha, an eastern Indian state. *Reason*. 2015;110:75–83.
3. Singh A, Sekher TV. Orphans and their living arrangement in Indian households: understanding their educational and nutritional status. *Child Youth Serv Rev*. 2021;121:105868. <https://doi.org/10.1016/j.childyouth.2020.105868>.
4. UNAIDS/UNICEF/USAID. Children on the Brink 2004: a joint report of new orphan estimates and a framework for action. Geneva: UNAIDS; 2004.
5. UNICEF, Press. release. 2017. https://www.unicef.org/media/media_45279.html. Accessed 26 Aug 2022.
6. WHO. WHO Anthro Survey Analyser and other tools. 2022. <https://www.who.int/tools/child-growth-standards/software>. Accessed 26 Aug 2022.

7. Shukla B, Shukla D. Study to assess physical health status of children at selected orphanage in Salem. Chennai India. 2011;1(2):9.
8. Ahlawat P, Vyas S, Sharma N, Srivastava A, Srivastava A, Semwal J. Can personal hygiene act as a proxy indicator of morbidity profile? A study on orphans of Uttarakhand region. *Int J Community Med Public Health*. 2019;6(9):3835. <https://doi.org/10.18203/2394-6040.ijcmph20194008>.
9. DeLacey E, Tann C, Groce N, Kett M, Quiring M, Bergman E, et al. The nutritional status of children living within institutionalised care: a systematic review. *PeerJ*. 2020;8:e8484. <https://doi.org/10.7717/peerj.8484>.
10. Mnubi-Mchombu C, Ocholla DN. Information needs and seeking behaviour of orphans and vulnerable children, their caregivers, and service providers in rural regions in Namibia. *Mousaion*. 2014;32(1):23–45.
11. Huq AO, Chowdhury T, Roy P, Haque KF, Hossain MB. Health care facilities and nutritional status of orphans residing in selected orphanage in capital city of Bangladesh. *Int J Curr Microbiol Appl Sci*. 2013;2(10):118–25.
12. Belsey MA, Sherr L. The definition of true orphan prevalence: trends, contexts and implications for policies and programmes. *Vulnerable Child Youth Stud*. 2011;6(3):185–200. <https://doi.org/10.1080/17450128.2011.597796>.
13. Tonetti MS, Bottenberg P, Conrads G, Eickholz P, Heasman P, Huysmans MC, et al. Dental caries and periodontal diseases in the ageing population: consensus report of group 4 of the joint EFP/ORCA workshop. *J Clin Periodontol*. 2017;44(Suppl 18):S135–44. <https://doi.org/10.1111/jcpe.12681>.
14. Biswas J, Verma JS. Tackling child undernutrition in India: governance challenges need more attention. *IDS Bull*. 2009;40(4):111–24.
15. Ferdoushi A, Rana MM, Mahmud MS, Datta D, Akter F. Health and nutritional status of the selected orphanage children in Tangail City. *Res Rev*. 2014;3(1):11–5.
16. Motakpalli K, Indupalli AS, Sirwar SB, Jayaalakshmi KN, Bendigeri ND, Joshi DC. A study on health hygiene among school children in rural field practice area, AJIMS Mangalore, Karnataka, India. *Int J Bioassays*. 2013;2(10):1407–10.
17. Ali BJ, Gardi B, Othman BJ, Ismael NB, Sorguli S, Sabir BY et al. Educational system: the policy of educational system in Kurdistan Region in public kindergarten. *Int J Engl Lit Soc Sci*. 2021;6(3).
18. Guragain AM, Paudel BK, Lim A, Choonpradub C. Orphanhood and living arrangements of children in Nepal. *Asian Soc Sci*. 2015;11(12):84.
19. Latif A, Choudhary AI, Hammayun AA. Economic effects of student dropouts: a comparative study. *J Glob Econ*. 2015;3(2):1–4.
20. Gouda S, Sekher TV. Factors leading to school dropouts in India: an analysis of National Family Health Survey-3 data. *IOSR J Res Method Educ*. 2014;4(6):75–83.
21. UNICEF. The state of the world's children: girls, education and development. New York: UNICEF; 2004.

22. Raykar N, Majumder M, Laxminarayan R, Menon P. India health report: nutrition. New Delhi: Public Health Foundation of India; 2015.
23. Kohli N, Avula R, van den Bold M, Becker E, Nisbett N, Haddad L, et al. What will it take to accelerate improvements in nutrition outcomes in Odisha? Learning from the past. *Glob Food Secur.* 2017;13:38–45. <https://doi.org/10.1016/j.gfs.2017.02.008>.
24. Thomas D, Sarangi BL, Garg A, Ahuja A, Meherda P, Karthikeyan SR, et al. Closing the health and nutrition gap in Odisha, India: a case study of how transforming the health system is achieving greater equity. *Soc Sci Med.* 2015;145:154–62. <https://doi.org/10.1016/j.socscimed.2015.05.010>.
25. Mora JO, Nestel PS. Improving prenatal nutrition in developing countries: strategies, prospects, and challenges. *Am J Clin Nutr.* 2000;71(5 Suppl):S1353–63.
26. Tinker AG. Making motherhood safe. Washington, DC: World Bank; 1993.
27. Leslie J. Women's nutrition: the key to improving family health in developing countries? *Health Policy Plan.* 1991;6(1):1–9.
28. Tinker A, Daly P, Green C, Saxenian H, Lakshminarayanan R, Gill K. Women's health and nutrition. World Bank Discussion Paper No. 256. Washington, DC: World Bank; 1995.
29. World Bank. World Bank annual report 2024: a better bank for a better world. Washington, DC: World Bank Group; 2024.
30. McGuire J, Popkin BM. Beating the zero-sum game: women and nutrition in the Third World. Part 1. *Food Nutr Bull.* 1989;11(4):38–63.

Figures

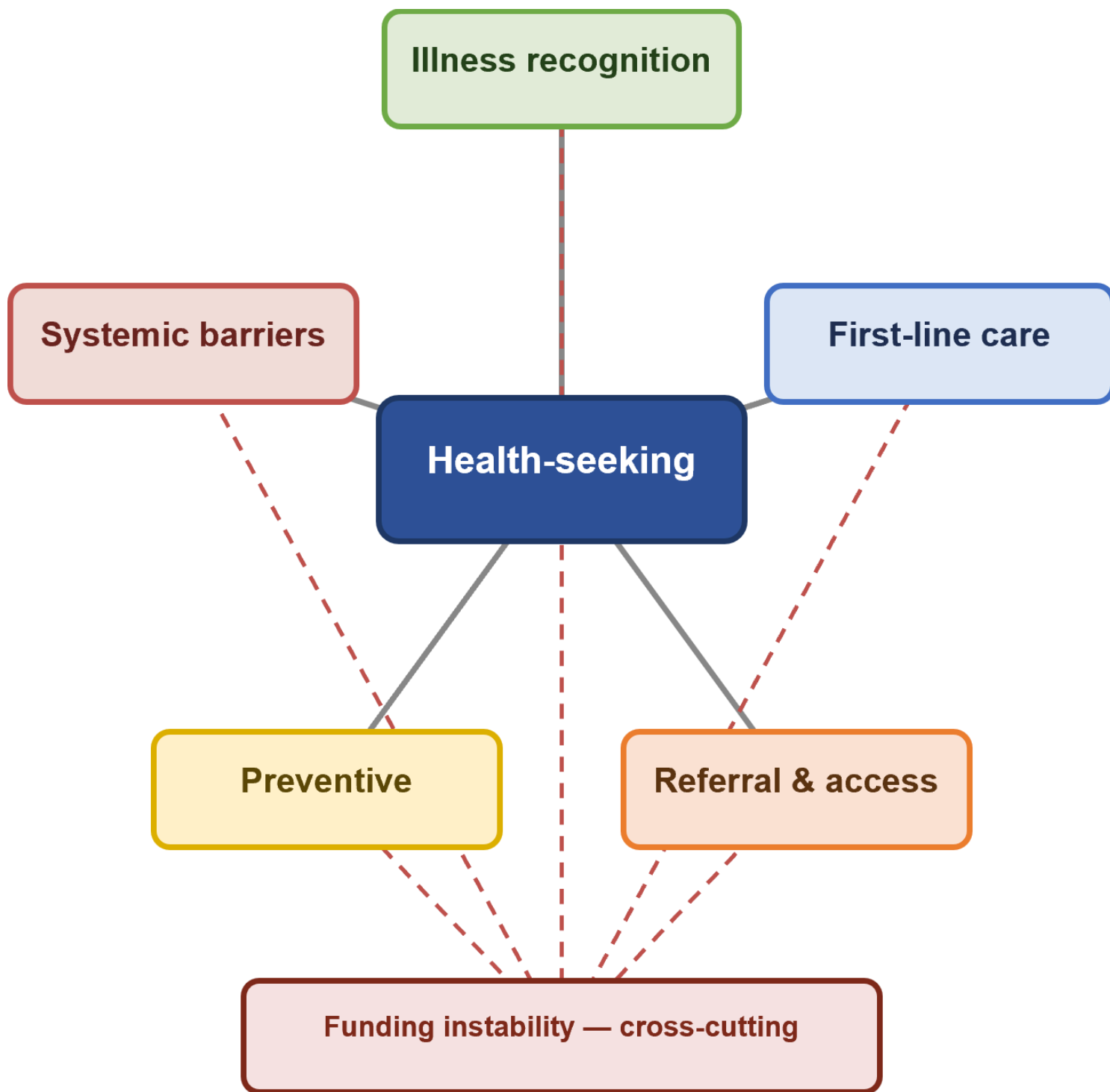


Figure 1

Conceptual framework of health-seeking behaviour among children in Child Care Institutions. Solid lines link the five thematic domains to the central construct; dashed lines indicate the cross-cutting influence of funding instability on every domain. Themes were derived from caregiver in-depth interviews (n = 6)

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