Housing Conditions, Self-Reported health status and Nutritional Status of 6-59 months Children in Bharatpur Metropolitan City, Nepal

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Introduction

- Housing includes not only the physical structure' providing shelter, but also the immediate surroundings ([1]).
- Housings are well-recognized as environmental and socioeconomic determinants of health ([2]).
- Especially children in the urban spend around 80-90% of their lives indoors and as most of this is spent inside the home ([3]).
- Though substandard housing affects all, Children's health is especially vulnerable to poor housing conditions ([4]).
- Ill health and child nutritional outcomes is interrelated and complex.
- Analysis of cohort studies ([5-6]) suggest that repeated incidence of morbidity, for instance - diarrhoea and other enteric significantly increase the risks of being stunted.
- The nutritional status of children under age 5 is an important measure of children's health.
- Nevertheless, there is limited body of knowledge on relationship between housing conditions and nutrition.
- Such inadequate empirical information about the relationships presents limited understanding of undernutrition, which has put a serious obstacle to reduce unacceptably high undernutrition as per expectation.
- It is proposed (Figure 1) therefore, to assess the association between housing conditions and nutritional status of 6-59 months old children in Bharatpur Metropolitan city when mediated by health status.

Figure 1: Conceptual framework of study (adapted from UNICEF 1990)

Nutritional status of 6-59 months old children
- Height-for-Age Z-score
- Weight-for-Age Z-score
- Weight-for-Height Z-score

Self-reported health status

Food insecurity | Maternal education | Wealth index

Housing conditions
- Tenure status
- Building (wall, floor and roof type) material
- Main fuel used for cooking
- Availability of separate room for kitchen
- Farming practice
- Source of drinking water
- Sanitation
- Presence of dampness and moulds
- Ventilation

Operational definitions

- Nutritional status
  - Undernourished - if z-score of any indices - HAZ, WAZ and WHZ is less than -2 standard deviation (SD),
  - Normal - if z-score of all indices - HAZ, WAZ and WHZ are greater than -2 SD but WHZ is not greater than +2SD,
- Housing conditions

  It is a composite indicator computed using parameters' scores based on Gaur's housing conditions ([7]) scoring and categorized into below average (0-9) and above average (10-18) housing conditions calculating theoretical mean as a cut-off point.

Methods

- A community based quantitative cross-sectional study was conducted in Bharatpur metropolitan city employing two-stage selection sampling design in 2017.
- A total of 648 households with children of age group 6-59 months were included in the study.
- The consent was sought from the mother of the participating child and was interviewed for the required information.
- Face to face interview along with direct observation was used for data collection using a structured questionnaire including observation checklist.
- A digital weighing machine and height board were used for anthropometric measurements following WHO standards.
- Eight research assistants were trained and employed for data collection for four weeks.
- Data was entered in EpiData 3.1 and analyzed in version 22 of Statistical Package for social Sciences (SPSS) software.
- Anthropometric calculations was done by using WHO Anthro version 3.2.2 software.
- Univariate analysis was done to report the characteristics where-as mediation analysis ([8]) using binary logistic regression was used to test the hypothesis with level of significance at 5 per-cent and confidence interval (CI) at 95 per-cent.

Results

- The findings of the study showed that the proportion of below average housing conditions among participants was about 15% (95% CI: 11.8-17.1) while the proportion of stunting, wasting and underweight were 24% (95% CI: 20.9-27.4), 10% (95% CI: 8.0-12.6) and 16% (95% CI: 13.0-18.8) respectively.
- In the bivariate analysis, Only 632 children were included excluding overweight where With nutritional status, 2 variables - housing conditions and maternal education were significantly associated and With health status, 3 variables - housing conditions, maternal education and food insecurity were significantly associated.
- In multivariate analysis, the results of the study showed that there was significant association between housing conditions and child health status (AOR=5.385, 95% CI: 2.466-11.763), between child health and nutritional status (AOR= 3.628, 95% CI: 2.458-5.354), and housing conditions and nutritional status of 6-59 months aged children (AOR=1.937, 95% CI: 1.202-3.121).
- Because all conditions of Baron and Kenny's 1986 mediation model ([8]) are met, it can be concluded that the child health is a mediator in the association between housing conditions and nutritional status.
- The housing parameters that were significantly associated with health status were sanitation, status of dampness and moulds, and ventilation status and those with nutritional status were status of dampness and moulds, and ventilation status.

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Table 1: Multivariate analysis of housing parameters with nutritional status and child health respectively (n=632)

Characteristics*	Child health		Nutritional status	
	Crude OR (95% CI)	Adjusted OR (95% CI)	Crude OR (95% CI)	Adjusted OR (95% CI)
Sanitation status				
Poor	35.44 (19.43-64.65)	7.99 (3.65-17.55)	3.024 (1.880-4.867)	1.205 (0.647-2.245)
Satisfactory	4.16 (2.526-6.87)	2.68 (1.40-5.13)	1.415 (0.882-2.269)	0.981 (0.567-1.695)
Good		Reference category		Reference category
Dampness and moulds				
Presence	14.29 (9.70-21.05)	7.46 (4.59-12.12)	3.012 (2.134-4.253)	2.032 (1.342-3.077)
Absence		Reference category		Reference category
Ventilation status				
Poor	29.05 (15.16-55.68)	5.90 (2.69-12.94)	3.670 (2.120-6.354)	1.992 (1.029-3.854)
Satisfactory	4.85 (2.57-9.16)	1.91 (0.894-4.08)	1.768 (0.998-3.133)	1.405 (0.737-2.680)
Good		Reference category		Reference category
Maternal Education				
No education	37.77 (11.48-124.31)	10.62 (2.74-41.26)	2.449 (1.351-4.441)	1.210 (0.600-2.440)
Primary	4.170 (2.650-6.560)	1.19 (0.61-2.33)	2.392 (1.517-3.772)	1.464 (0.867-2.473)
Some secondary	3.620 (2.442-5.366)	1.74 (1.01-3.02)	2.289 (1.523-3.440)	1.687 (1.075-2.649)
SLC and higher		Reference category		Reference category
Constant		0.043		0.158

* Only those variables which showed significant association and others were ignored here, OR Odds Ratio

Limitations

Health and nutrition status were multi-determinants nevertheless, the important factors listed in UNICEF model 1990 such as care of children, accessibility of health services, cultural practices and political dimensions were not measured due to time and resources constraints, thus they could confound the association. Besides it, the study did not address seasonality factors and some standard housing factors such as site, setback and lightning; which were very important factors while describing housing conditions and its effects.

Implication of the study's findings

The findings of the study indicated that housing conditions are important predictors of health and nutritional status of children, and demonstrates that it is possible for health services to work across sectors to improve the health of the population especially children directly and thus, preventing undernutrition to the larger extent, in addition to the current intervention of dietary intake and losses. Therefore, the study provides more impetus for concerned authority and health workers to look for opportunities for intersectoral action with their housing counterparts to address root causes for health inequalities lying outside the traditional healthcare sector.
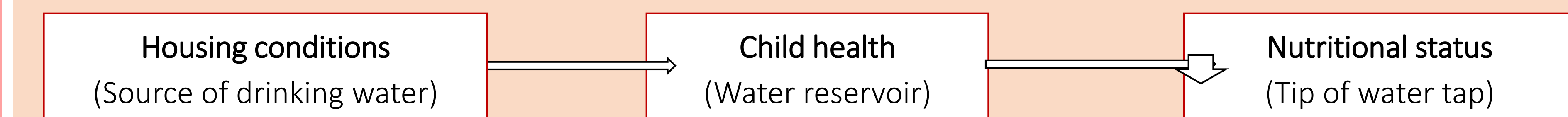
Housing conditions (Source of drinking water) → Child health (Water reservoir) → Nutritional status (Tip of water tap)

Figure 2: Metaphorical representation of housing, health and nutritional status

Conclusion

- Below average housing conditions is one of the predictors of morbidity and undernutrition among 6-59 months old children.
- Thus, the promotion of good housing conditions such as improved sanitation, proper ventilation, and prevention from dampness and moulds, should be included as nutrition-sensitive intervention to improve the health and nutritional status of children below 5 years of age in Bharatpur metropolitan city and in other similar settings.

References
1. The Right to Adequate Housing Geneva (Switzerland): OHCHR, UN-Habitat; 2009 [cited 2017]. Available from: http://www.ohchr.org/Documents/Publications/FS21_rev_1_Housing_en.pdf
2. Dedman D, Gunnell D, Smith GD, Frankel S. Childhood housing conditions and later mortality in the Boyd Orr cohort. Journal of Epidemiology & Community Health. 2001;55(1):10-5.
3. Baker M, Keall M, Au EL, Howden-Chapman P. Home is where the heart is--most of the time. The New Zealand Medical Journal. 2007;120(1264):U2769-U.
4. Oudin A, Richter JC, Taj T, Al-Nahar L, Jakobsson K. Poor housing conditions in association with child health in a disadvantaged immigrant population: a cross-sectional study in Rosengård, Malmö, Sweden. BMJ open. 2016;6(1):e007979.
5. Guerrant RL, Oriá RB, Moore SR, Oriá MO, Lima AA. Malnutrition as an enteric infectious disease with long-term effects on child development. Nutrition reviews. 2008;66(9):487-505.
6. Checkley W, Buckley G, Gilman RH, Assis AM, Guerrant RL, Morris SS, et al. Multi-country analysis of the effects of diarrhoea on childhood stunting. International journal of epidemiology. 2008;37(4):816-30.
7. Gaur KL. Socio-economic status measurement scale: thirst area with changing concept for socio-economic status. International Journal of Innovative Research and Development-ISSN 2278–0211. 2013 Sep 30;2(9).
8. Baron RM, Kenny DA. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of personality and social psychology. 1986;51(6):1173.