

Minimum acceptable diet and stunting among children aged 6-23 months in Dalit and Non-Dalit and associated factors: A cross-sectional comparative study of Dhanusha district, Nepal

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Abstract

Background

Nutrition contributes to the growth, development and survival of children, while inadequate feeding practices increase the risk of stunting. Inadequate feeding manifests severe impact on child physical and cognitive development. The aim of the study was to assess the status and to identify factors associated with minimum acceptable diet (MAD) and stunting among children aged 6-23 months in Dalit and Non-Dalit.

Methods

The study design was cross-sectional comparative and was conducted among mothers with their children aged 6-23 months children of Dhanusha district. A sample of 599 respondents was taken. Multistage simple random sampling was applied to the sample of which 299 were Dalit and 300 were Non-Dalit. Interview and anthropometry measurement and structure questionnaires were practiced as tools of data collection techniques. Descriptive and inferential analyses were carried out by using Statistical Package for Social Science.

Results

The prevalence of MAD and stunting were 131(43.8%) and 149(49.9%) among Dalit and 133(44.3%), and 117(39%) among Non-Dalit respectively. Children aged 6-11 months (AOR=0.25, 95 CI: 0.11-0.54), child having no illness (AOR=4.31, 95% CI: 1.56-11.88) and mothers with no knowledge on child feeding (AOR=0.31, 95% CI: 0.16-0.61) were significantly associated with MAD among Dalit. Children aged 6-11 months (AOR=0.37, 95 CI: 0.21-0.64), children having no illness (AOR=4.80, 95% CI: 2.23-10.32), mothers with no knowledge on child feeding (AOR=0.26, 95% CI: 0.16-0.42) and birth interval up to two years (AOR=1.92, 95% CI: 1.56-3.19) were also significantly associated among Non-Dalit. Nuclear family types (AOR=1.93, 95% CI: 1.11-3.34) among Dalit while no ante natal care (ANC) visit (AOR=3.20, 95% CI: 1.15-8.90), no media exposure (AOR=3.10, 95% CI: 1.11-8.64 and 6-11 months children (AOR=0.24, 95% CI: 0.10-0.57) in Non-Dalit were significantly associated with stunting.

Conclusion

The prevalence of MAD practices was observed similar in both the groups, but stunting was higher in Dalit than Non-Dalit. Being key associated factors of MAD practices, age of child, child illness and knowledge on child feeding existed in Dalit and Non-Dalit, while birth interval also among Non-Dalit. Nuclear family in Dalit while age of child, ANC visit and media exposure among Non-Dalit were the major factors of stunting. Maternal nutrition education, access and utilization of health services should help in improving the nutritional status of children.

Background

Being essential, nutrition of children contributes to survival, to develop and to grow among children [1]. Undernutrition prejudices cognitive and physical development and enhances the risk for children mortality and morbidity [2]. Stunting, a major drawback of children development, provide long term and irreversible profound effects on individuals as well as society [3]. Child feeding practices, an important for child growth and development more ever helps to make lower morbidity and mortality for under two years [4] while inappropriate feeding practices direct to the risk of malnutrition [5]. More than two-thirds of malnutrition occurs during the first 1000 days of life which is due to inappropriate feeding practices [6].

Worldwide, stunting, among 165 millions of children leads towards a serious public health concern [7]. Undernutrition among children is prevalent in developing countries [8]. From the past few decades of Nepal, the pattern of stunting is declining [9,10]. However, the high proportions of the child of this age still remain affected, therefore, undernutrition is a serious public health concern to Nepal [1]. From the ancient time in Nepal, "Dalit" were considered as a schedule caste, poorest and untouchable [11]. Dalit is divided into two groups; Hilly Dalit and Terai Dalit in Nepal [11]. Terai Dalit includes Chamar/Harijan, Musahar, Dushad/Pasman, Tatma, Khatwe, Dhobi, Baantar, Chidimar, Dom and Halkhor; whereas Hill Dalit includes Kami, Damai/Dholi, Sarki, Badi, Gaine and Unidentified Dalit [11]. People other than Dalit caste considers as Non-Dalits. The proportion of stunting was 37.4% at National level but it was high at the central Terai region (41.6%) among under-five aged children [12]. The proportion of minimum acceptable diet (MAD) was 18.9% in Dalit while it was 32.73% in Non-Dalit population [2]. Children of Dalit have lower MAD practices as compared to Brahmin/Chhetri, Newar and Janajati [2].

Children of the 1000 days of age are prone to high risk groups of undernutrition. Insufficient complementary feeding [8], family types [13] age of child [14,15,16] maternal education [14,16,17] and knowledge on child feeding being the key factors have contributed to stunting. Furthermore, socio-demographic, health and knowledge are also associated with MAD such as antenatal care (ANC) [15,18,19] age of a child [15,20,21], knowledge on child feeding [22,23] and child illness [20,24].

However, sufficient nutrition, a prerequisite for sustainable development goal [25], is a fundamental right of every child [26]. Appropriate MAD with dietary diversity reduces the threat of stunting [7]. Improving child feeding practices pave the way for the highest priority program with an aim to improve children nutrition and health [27]. Feeding practices and stunting trend improvements are being made but there is limited literature comparing the extent of nutrition among all social castes in Nepal. Therefore, this study unveils improvement on minimum acceptable diet and stunting and their associated factors in similar settings or the district. Thus, this study aims to assess the prevalence of minimum acceptable diet and stunting among children aged 6-23 months in Dalits and Non-Dalits and associated factors.

Methods

Study design and setting

A cross sectional comparative study design was conducted to compare between Dalit and Non-Dalit in Dhanusha district of Nepal. The research was accomplished between October 2016 to March 2017. The

total area of the district covers 1,180 square kilometers; and Maithili is the commonly spoken language[28]. The district is adjacent to the Bihar border of India. The selected Village Development Committees (VDC) is far 5-30 kilometers from headquarter (Janakpur).

Study population, Sample size calculation and sampling procedure

Children aged 6-23 months and their mothers in Dalit and Non-Dalit were the study population of Dhanusha district. The sample size was calculated by using two population proportion groups [29]. The prevalence of minimum dietary diversity of Dalit and Non-Dalit was taken as 20.1% and 31.32% respectively [2]. By taking power 85%, level of significance 5% and non-response rate 5%, the sample size was 599, where 299 from Dalit and 300 from Non-Dalit. Multi-stage proportionate simple random sampling was applied in the study. Initially, three out of seven electoral constituencies were selected and three VDCs were chosen from each electoral constituency randomly. Finally, four wards out of nine wards of each VDC selected randomly by using lottery method and a total nine VDCs were selected. For identifying children below two years (6-23 months), the record of immunization and vitamin A were used. Furthermore, the proportional allocation was considered to estimate the number of children to participate in each selected ward. In the case of more than one child, the young child was purposely selected. Mothers aged 18 years and above were involved in the study. Two repeated visits were made when mother-child pairs were not available at the time of data collection.

Data collection techniques, tools and procedure

Pre-testing was completed among 10% of the respondents in Bateshwar VDC. The data collection tool was adopted from Nepal Demographic Health Survey [9] and it was modified in the local context, the questionnaire was translated to the native language (Maithili) to maintain uniformity in the responses. Socio-economic and demographic, health, child feeding and anthropometry and information of mother/family were included in the questionnaire. Community Medical Assistants (CMA) were recruited as enumerators for data collection. Training was given to enumerators, and the training contains the questionnaire, ethical consideration, anthropometric measurements and data collection techniques. Face-to-face interviews were conducted with child mothers by using structured questionnaires and child height was measured by recommended standard measuring instruments.

Data quality and safety

One day training was given to enumerators. Pretested tool was used and each day cross-checked was made for completeness, clarity, consistency and accuracy by the researcher. The researcher regularly monitored and supervised the enumerators' through the study. Password protected laptop was used for data entry and analyzed by one door system.

Data processing and analysis

Data were edited, coded and entered into the EpiData 3.1 version. The data was exported in SPSS 16.0 version for analysis. For anthropometry analysis, the World Health Organization (WHO) anthropometry

nutrition survey tool was used. Nutrition-related data were analyzed by using the WHO Anthro plus software 3.2.2 version. The Z-score of height-for-age (HAZ) was calculated, HAZ less than -2 standard deviations (SD) was defined as stunted from the reference population.

In the descriptive analysis, frequency and percentage were used to summarize the study variables. A binary logistic model was used to find out associated factors. P-values of <0.2 in bivariate analysis were entered to the multivariable analysis to control the possible effect of confounders [30]. Hosmer and Lemeshow Chi-square were used to get the model fit. Enter method was used to see the independent association between dependent and independent variables. The adjusted odds ratio (AOR) with 95% confidence interval was used to notify the strength of association, and at 95% CI was used to declare the statistical significance in the multivariable analysis.

Ethical consideration

The research proposal was approved by the Institutional Review Committee of Institute of Medicine, Tribhuvan University, Maharajgunj; each respondent was informed on the objective, method and benefit of the study and written informed consent was taken before taking the interview. Using an identifiable number, confidentiality was maintained.

Results

Demographic, socio-economic, health and nutrition related characteristics

A total of 599 respondents were taken, 299 from Dalit and 300 from Non-Dalit (Table 1). The mean age of children was 14.5 ± 4.7 months for Dalit whereas it was 14.4 ± 4.6 months for Non-Dalit. Most of the child participants were female 170(56.9%) in Dalit but males 167(55.7%) were from Non-Dalit. Most of the child mothers were illiterate 248(83.0%) and housewife 176(58.9%) in Dalit group whereas they were housewife 198(66.0%) and illiterate 133(44.3%) in Non-Dalit group. About one-fifth of children who had illness in past two weeks in both Dalit 58(19.4%) and Non-Dalit 56(18.7%) (Table 1). Furthermost of child mothers had an adequate knowledge on child feeding in Dalit 155(51.8%) and Non-Dalit 180(60.0%). Minimum acceptable diet practices were similar in Dalit 131(43.8%) and Non-Dalit 133(44.3%). The prevalence of stunting and severe stunting were 149(49.9%) and 54(18.1%) in Dalit while 117(39.0%) and 36(12.0%) in Non-Dalit respectively.

Most of children were receiving minimum acceptable diet during the age of 12-23 months in Dalit 109(50.0%) and Non-Dalit 107(49.3%) (Table 2). The children with father's secondary and above education were getting MAD practices were 44(52.4%) from Dalit and 76(43.7%) from Non-Dalit. The children who didn't have illness in past two weeks were having MAD practices were 45(54.9%) from Dalit and were 123(50.4%) from Non-Dalit. The children, whose parents' main source of income agriculture, were 22(53.7%) from Dalit and were 51(50.0%) from Non-Dalit.

Factors associated with minimum acceptable diet

The result from bivariate logistic regression analysis showed that the MAD practices were found significantly associated with age of child (COR= 0.37, 95% of CI: 0.21-0.65), child illness in past two weeks (COR= 6.52, 95% of CI: 2.96-14.32), knowledge on child feeding (COR= 0.22, 95% of CI: 0.14-0.37), and household owning agriculture land (COR= 0.49, 95% of CI: 0.31-0.78) in Dalit. Similarly, the MAD practices were found significantly associated with age of child (COR= 0.47, 95% of CI: 0.28-0.80), child illness in past two weeks (COR= 4.68, 95% of CI: 2.26-9.69), knowledge on child feeding (COR= 0.19, 95% of CI: 0.11-0.31), household owning agriculture land (COR= 0.47, 95% of CI: 0.23-0.97), ANC visit (COR= 2.45, 95% of CI: 1.20-5.10), place-wise delivery (COR= 2.32, 95% of CI: 1.45-3.69), PNC visit (COR= 2.25, 95% of CI: 1.41-3.58), number of child (COR= 0.57, 95% of CI: 0.36-0.90), and mothers' occupation (COR= 0.56, 95% of CI: 0.34-0.90) among Non-Dalit (Table 3).

The findings from multivariable logistic regression analysis revealed that the minimum acceptable diet practices were not found significantly associated with sex of child, fathers' education, birth interval, family types, main source of family income and house hold owning agriculture land among Dalit. Similarly, the practices were not found significantly associated with family types, main source of family income, household owning agriculture land, ANC visit, place of delivery, post-natal care (PNC) visit, media exposure, number of child, and mother occupation in Non-Dalit (Table 3).

The MAD practices were found less likely among children aged 6-11 months as compared to children aged 12-23 months in Dalit (AOR=0.25, 95% of CI: 0.11-0.54) and Non-Dalit (AOR=0.37, 95% of CI: 0.21-0.64). The MAD practices were also found less likely among child mother who didn't have knowledge of child feeding as compared to child mother who had knowledge on child feeding in Dalit (AOR=0.31, CI: 0.16-0.61) and Non-Dalit (AOR=0.26, 95% of CI: 0.16-0.42). The MAD practices were found 4.31 times more likely among children who did not have illness in past two weeks than children who had illness among Dalit (AOR=4.31, 95% of CI: 1.56-11.88). Similarly, the practices were found 4.80 times more likely among children who didn't illness in past two weeks in Non-Dalit (AOR=4.80, 95% of CI: 2.23-10.32). The practices were also found 1.92 times more likely higher in the children with birth interval up to 2 years as compared to children with birth interval more than 2 years in Non-Dalits (AOR=1.92, 95% of CI: 1.56-3.19).

Factors associated with stunting

The findings from bivariate logistic regression analysis showed that stunting were significantly associated with family types (COR=2.01, 95% of CI: 1.17-3.43), knowledge on child feeding (COR=1.60, 95% of CI: 1.01-2.53) and media exposure (COR=1.62, 95% of CI: 1.02-2.58) Dalit while family types (COR= 2.09, 95% of CI: 1.12-3.90) and fathers' education (COR=1.66, 95% of CI: 1.04-2.66) in Non-Dalit.

The result of multivariable logistic regression analysis revealed that stunting were not found significantly associated with knowledge on child feeding, ANC visit, media exposure and timely initiation of complementary feeding (TICF) in Dalits (Table 4), while father education, birth interval, family types, household owning agriculture land, place of delivery, and mothers' occupation in Non-Dalits (Table 4).

The stunting was found 1.93 times more likely in children from nuclear family as compared to those from joint family in Dalits (AOR= 1.93, 95% of CI: 1.11-3.34). Furthermore, stunting was found 3.2 times more likely in child mother who did not have visit to ANC than child mother who had visited ANC in Non-Dalit (AOR= 3.20, 95% of CI: 1.15-8.90). Similarly, it was also found 3.1 times more likely among child mother who did not expose to media as compare to child mother who exposed to media in Non-Dalits (AOR=3.10, 95% of CI: 1.11-8.64). In addition, the stunting was protected among children aged 6-11 months than children aged 12-23 months in Non-Dalit (AOR= 0.24, 95% of CI: 0.10-0.57).

Discussion

The minimum acceptable diet gets a composite indicator of minimum dietary diversity and minimum meal frequency [31]. The findings revealed that the prevalence of MAD were similar in Dalit (43.8%) and Non-Dalit (44.3%). The similar magnitude of MAD practices mentioned in NDHS 2016[10]. However, this practice was high in Sri Lanka (63.3%) [32]. The resemblance of Dalit and Non-Dalit of MAD might be due to the occupations of the mothers and the same locality. The complementary feeding practices are generally irregular and unsupervised [33]. The current prevalence of MAD manifests that it still needs to be promoted to MAD practices.

The findings showed that stunting among children aged 6-23 months was higher in Dalit (49.9%) than in Non-Dalit (39.0%). This figure was higher than the national figure of Nepal. In comparison with the findings, Ethiopia (58.1%) [34] and India (52.3%) [35] had a higher prevalence of stunting but had lower in Sri Lanka (17.3%) [32] and Nepal (35.6%) [10]. The difference of stunting in Dalit and Non-Dalit might be due to the education of mother and father and the knowledge of mothers on child feeding. So, the existing magnitude of stunting recommended that the government should focus on the nutrition intervention program.

The findings from multivariable logistic regression analysis revealed that the minimum acceptable diet practices were found significantly associated with age of child, knowledge on child feeding and child illness in past two weeks in Dalit while age of child, knowledge on child feeding, child illness in past two weeks and birth interval in Non-Dalit. Furthermore, this study revealed that minimum acceptable diet practice was less likely among children aged 6-11 months as compared to children aged 12-23 months in Dalit and Non-Dalit. This study also showed that the practices were lower among children aged 6-11 months in Dalit (27.2%) and in Non-Dalit (31.3%) than children aged 12-23 months in Dalit (50.0%) and Non-Dalit (49.3%). The present findings also agree with results reported from other nations [15,18,19,21]. In Nepal, mother breast milk seems to be sufficient for the first year of life to feed their children whenever children show their interest and generally, mothers used to feed rice and legume to their children [33]. However, complementary feeding practices are essential in this age because breast feeding gets inadequate after six months of child [36]. Therefore, inadequate child feedings becomes risky for growth faltering among children of Nepal [36].

The findings revealed that the minimum acceptable diet was less likely among child mothers who did not have knowledge of child feeding as compared to child mothers who had knowledge on child feeding in Dalit and Non-Dalit. This study also showed that only about one-fourth of child mother having no knowledge of child feeding practiced MAD among their children in Dalit (26.2%) and Non-Dalit (22.7%). The results are in agreement with a different study from Nepal [23]. The evidence from systematic review showed that lack of knowledge was a key barrier of optimal complementary feeding practice [37]. In Nepal, a study showed the inadequate minimum acceptable diet practices would be due to poor knowledge on child feeding practices [19]. A study shows that lack of awareness regarding frequency of feeding as well as diversified nutrient taking behavior might be the risk of undernutrition among children. Therefore, maternal nutrition education helps to promote complementary feeding practice among children [15].

The result showed that MAD practices were more likely prevalent among the children with birth interval up to 2 years than children with birth interval above 2 years in Non-Dalit. This study also revealed that the MAD practice were higher in children having birth interval up to two years (55.7%) than children having birth interval above two years (43.4%) in Non-Dalit. The findings were different from a study conducted in South Ethiopia [38] and Nigeria [39] because of the different study's settings. A study showed more the increasing of the birth-interval more the decreasing of child undernutrition and mortality [40]. This might be due to mothers who fed her elder child and at the same time they fed younger children.

The findings showed that MAD practice was more likely among children who did not have illness in past two weeks as compared to children who had illness in past two weeks in Dalit and Non-Dalit. More than half of children having no child illness in past two weeks got MAD practices in Dalit and Non-Dalit. These results are in a good agreement with the study conducted in Sri Lanka [20]. In Nepal, more than half of child mothers (59%) fed the same amount of food during episodes of diarrhea and about one-fourth of child mothers (24%) fed lesser than usual feeding [41]. But more than one-fourth of mothers (29%) increased food during child illness as it mentions in NDHS [10]. Child feeding hampered due to child illness affects the health [20].

The study reveals that the stunting was protected among children aged 6-11 as compared to 12-23 months whereas only one-fifth of children aged 6-11 months had stunting in Non-Dalit. This results are similar to the study conducted in Ethiopia [34], Indonesia [42] and others [43]. Stunting was less likely among children below six months as they depend on breastfeeding [44]. Some mothers feed only breast milk up to a year and later they feed solid food whenever children show interest [33]. Poor child feeding practices become recognized contributors to undernutrition among this age [45,46].

This study manifested that the stunting were more likely prevalent among children living with the nuclear family than joint family in Dalit. The present findings are similar to others' work conducted in Nepal [47] and Kenya [48]. The findings contrast with a study conducted in Pakistan [49]. These findings showed about one-fourth of Dalit child mothers (24.1%) working as a daily wage/labor and they might be unable to care their children properly. Mothers involved in the work outside setting were taking their children with

them did not feed in time; such a situation has badly impact on child complementary feeding practices [33]. Children living in a joint family get appropriate care by grand-parents during busy time of mothers.

The findings stated that the stunting was more likely among child mother who did not visit ANC than child mother who visited ANC in Non-Dalit and half of children were stunting who did not visit ANC. The findings are similar to the study conducted in Indonesia [42]. Adequate ANC visits might help to enhance knowledge regarding appropriate child feeding practices and vails the opportunity for appropriate counseling regarding child care to mothers. This result indicated that the stunting was more likely prevalent among the mothers who did not expose to media than mother who exposed to media in Non-Dalit. These findings agree with a study from Bangladesh [50]. The media provides information regarding overall knowledge on child health and nutrition, and helps to reduce the stunting [50].

The comparative study showed the prevalence of minimum acceptable diet and stunting and their associated factors among children aged 6-23 months in Dalit and Non-Dalit. Naturally, it is not free from some limitations. The complementary feeding practices were not directly observed but the data came from responses of mothers; so the data might be exaggerated due to social desirability bias and recall bias of mothers.

Conclusion

The study revealed that the proportion of minimum acceptable diet practice resembles in Dalit and Non-Dalit children. This practice is quite close to the national figure of Nepal, but insignificant to the countries that have better health indicators. The practice of minimum acceptable diet is not satisfactory in the given region because of the key associated factors; age of child, knowledge on child feeding and child illness within past 2 weeks in both groups whereas birth interval only in Non-Dalit. The prevalence of stunting was higher in Dalit than Non-Dalit. But it also got higher than the national figure [10]. Stunting is higher in both groups which indicate the serious public health concern among children. In addition, type of family becomes an important associated factor of stunting among Dalit whereas age of child, ANC visit, and media exposure among Non-Dalit.

Therefore, the findings of the present study confirms that there has been quite room to improve infant and child feeding and reduce stunting among children in Nepal. Improving maternal nutrition education, access and utilization of health services and promoting the exposure to media should help in promoting infant young child feeding practices and reducing stunting.

Abbreviations

ANC: Ante natal care; AOR: Adjusted odds ratio; BCC: Behaviour change communication; CI: Confidence interval; CMA: Community medicine assistant; COR: Crude odds ratio; HAZ: Height for age; MAD: Minimum acceptable diet; NDHS: Nepal demographic health survey; PNC: Post-natal care; SD: Standard

deviation; SPSS: Statistical package for social sciences; VDC: Village development committee; WHO: World health organization.

Declarations

Competing interest

None of the authors have any competing interest to this manuscript.

Ethical approval and consent to participate

Ethical approval was obtained from the Institutional Review Committee of Institute of Medicine, Nepal [Ref No.95 (6-11-E) ²/073/074]. Permission was taken from the District Public health Office, Dhanusha. This study did not involve any invasive procedure and a type observational study. So, the study posed no risk to study participants. Accordingly, all eligible children of the mother were shared about the aim and method of the study and written Informed consent was taken. Furthermore, confidentiality was maintained and they had the right to withdraw at any time from the study.

Consent to Publish

Not applicable

Availability of data and materials

Data will be accessible upon request from the corresponding author.

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Authors' contribution

AKS conceived the study, developed the tool, coordinated data collection, conducted the inferential analysis and drafted the manuscript. RP, MDD, and RS supported during the proposal development (study design, methodology, and ethical approval). AP supported in editing of the manuscript. All authors have read and approved the final manuscript.

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Tables

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