

Glancing at School Nutrition Programs from the Perspective of Students: A Case Study of Primary Schools in Eastern Nepal

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Abstract

Introduction/Background: Developing nutritional awareness is paramount for school children as it significantly influences their knowledge, attitudes, and practices (KAP) towards nutrition, safeguarding them from deficiencies and malnutrition. Schools play a pivotal role in shaping children's nutritional understanding, fostering positive attitudes, and cultivating healthy practices. Focusing on nutrition-related KAP can instill the right behaviors early on, paving the way for a healthier lifestyle. This approach not only enhances the well-being of children but also lays the foundation for a lifelong commitment to good nutrition, ensuring a healthier and more prosperous future.

Aim/Objective: The main objective of this study is to compare the Knowledge, Attitude, and Practices (KAP) among male and female school children and assess association of school models/types with KAP in Halesi Tuwachung Municipality of Khotang district, Nepal.

Methodology: A cross-sectional survey in the field site in Eastern Nepal involved 187 school children drawn from four distinct educational institutions, collectively encompassing students enrolled in grades 4, 5, and 6. The data collection utilized a purposive sampling method to enhance the relevance and specificity, thereby ensuring the comprehensiveness and validity of the research findings.

Results: The research findings indicated that private institutions, namely YouMe School and Halesi Pathshala (Note 1), displayed notably higher average knowledge scores than public schools such as Shree Mahendradaya Secondary School and Shree Durkhim Secondary School. Furthermore, it was observed that female school students exhibited lower knowledge scores than their male counterparts. Regarding attitudes, no significant disparities were identified between school types, but, on average, female students demonstrated lower attitudes than their male counterparts. Regarding practices, the study revealed that female students tended to exhibit lower levels than their male counterparts.

Conclusion: The study demonstrated notable differences in Knowledge, Attitudes, and Practices (KAP) concerning nutrition among children enrolled in schools with diverse educational models or types. This research offered valuable insights into how the educational environment across different school settings could influence the nutritional KAP of young students.

Keywords: Nutrition, knowledge, attitude, practice, school children

1. Introduction

The ever-evolving comprehension of health and its multifaceted relationship with nutrition has garnered heightened attention in recent decades. In an era where the Sustainable Development Goals (SDGs) stand as a central paradigm for societal progress, the burgeoning significance of nutritional knowledge becomes manifest. This knowledge constitutes a pivotal compass guiding individuals toward informed decisions impacting personal health, local environments, and the broader global ecosystem. The discourse on nutrition accentuates the intricate

interplay between dietary choices and individual well-being and underscores its far-reaching implications for sustainable development and global health outcomes.

The concept and practice of nutritional knowledge encompass an overarching understanding of the interrelation between nutrition and health, including dietary recommendations and standards (Huang et al., 2021). Deficiency in nutritional knowledge correlates significantly with the adoption of unhealthy dietary patterns, imbalanced eating behaviors, and an elevated propensity for the onset of chronic illnesses and nutrition-related diseases (Wu et al., 2022; Ilori & Sanusi, 2022).

Schools are crucial in molding children's knowledge, attitudes, and practices concerning nutrition, profoundly impacting the health dynamics within families and broader societal contexts (Naing et al., 2022). The dearth of adequate knowledge regarding healthy dietary habits is a significant causal factor contributing to nutritional challenges, potentially leading to suboptimal practices, thereby engendering malnutrition and a spectrum of non-communicable diseases (Saeidlou et al., 2016). Studies consistently underscore the prevalence of limited nutritional awareness among young school children in developing countries (Weerasekara et al., 2020; 2021; Kigaru et al., 2015). Despite this trend, a notable study in Nepal revealed a commendable comprehension of nutritional knowledge within the examined cohort (Thapa et al., 2023). Notably, the absence of studies delving into the nutritional acumen among specific age groups of young children in Nepal remains conspicuous. Potential discrepancies in findings might be attributed to divergent study populations, such as the health-conscious cohort of athletes in Nepal, differing significantly from the nutritional awareness of young children (Thapa et al., 2023).

Moreover, disparities emerge between children in private and public schools, with those in private educational institutions demonstrating a superior grasp of nutritional knowledge (Ghosh et al., 2020). Furthermore, urban areas generally exhibit heightened nutritional awareness among students compared to rural regions (Kigaru et al., 2015). However, a definitive demarcation between students in these environments still needs to be discovered (Jeinie et al., 2021).

Nutritional attitudes incorporate the complex interplay of beliefs, thoughts, emotions, and behaviors concerning food (Alvarenga et al., 2008). Attitudes serve as influential determinants in initiating and perpetuating various health-promoting behaviors. Extant research conducted among adult populations consistently demonstrates a prevailing positive disposition toward nutrition (Thapa et al., 2023; Ghosh et al., 2022). Notably, gender differentials are evident, with females exhibiting more favorable attitudes towards procuring healthy, nutritious foods than their male counterparts (Weerasekara et al., 2020; Ghosh et al., 2020). However, an intriguing distinction emerges in urban settings where, despite this inclination, women tend to favor processed foods more than their rural counterparts (Weerasekara et al., 2020). Moreover, a study on the elderly revealed a prevailing negative attitude toward nutrition within this demographic (Hammouh et al., 2023).

Nutritional practice denotes observable actions or behaviors linked to specific eating patterns, discernible as beneficial or detrimental (Yalewdeg et al., 2020). Disparities in nutritional status among primary-level school children in Nepal are evident, with public schools exhibiting a higher prevalence of stunting than private schools (Koirala, 2019). Gender-related disparities are notable, as males are more inclined to choose healthy and balanced foods than females. Concurrently, a study indicates suboptimal nutritional practices among the elderly demographic (Hammouh et al., 2023).

Furthermore, research reveals subtle distinctions between private and public schools, where private schools display marginally lower daily consumption of green vegetables than their public counterparts in certain studies (Jeinie et al., 2021). However, findings from studies conducted in Bangladesh suggest a contrasting trend, highlighting better nutritional practices in private schools than public schools, potentially attributed to the specific composition of the study population, consisting exclusively of female students (Ghosh et al., 2020). Additionally, urban-rural differentials are conspicuous, with a remarkable preference for processed foods among a substantial proportion of urban women (41.5%). At the same time, their rural counterparts tend to avoid such choices (Weerasekara et al., 2020). A notable limitation in extant research emerges from its exclusive focus on a singular gender within the study population.

Despite the copious reservoir of knowledge in nutrition, a palpable gap persists between acquiring information about healthy dietary practices and the actual implementation thereof (Sengupta & Ghosh, 2019). The antecedent investigations underscore the dearth of comprehensive evidence concerning Knowledge, Attitude, and Practice (KAP) determinants, specifically among young school-aged children. In the context of Nepal, a discernable void is observed in the literature, as no extant study has delved into the KAP of early school-aged children encompassing grades 4 to 6. Furthermore, a paucity of empirical evidence exists regarding the comparative analysis of KAP between students enrolled in distinct educational models, i.e., private and public schools. Strikingly, studies have

yet to probe into the potential influence of school model types on the KAP profiles of students. The collaborative endeavors between the Government of Nepal and international partners have yielded promising outcomes by implementing a school garden intervention. Notably, the intervention resulted in consistent and statistically significant enhancements in school children's awareness of fruits and vegetables, knowledge of sustainable agricultural practices, understanding of food, nutrition, and Water, Sanitation, and Hygiene (WASH) practices, as well as the cultivation of healthier food preferences throughout the two-year experimental period (Schreinemachers et al., 2017). Given the understudied nature of KAP among young children, this study endeavors to bridge this gap by comparing KAP among male and female school children and assess potential associations of school models/types with KAP metrics.

2. Methods

This investigation is predicated upon survey data from four educational institutions within the Halesi Tuwachung Municipality, situated in the resource-constrained region of Khotang District, Nepal. Notably, the district typifies an area constrained by limited resources, wherein the prevalence of public educational institutions surpasses that of the more financially exclusive private educational establishments. The study includes YouMe School and Halesi Pathshala (refer to note 1), categorized as private schools, alongside Shree Mahendradaya Secondary School and Shree Durghim Secondary School, representing public educational institutions. The schools included in the study were selected through a combination of convenience and purposive sampling methodologies. The rationale behind this selection process was aligned with the overarching aim of the research, which sought to compare among children attending diverse school types. The inclusion of various school types was deemed essential for a comprehensive analysis, as schools such as YouMe and Halesi, characterized by distinct teaching modalities, were integral to the comparative framework. Notably, these alternative school types differed significantly from the conventional government-run schools, rendering them indispensable for achieving the study's specified objectives. The survey was conducted in March 2020, employing a purposive sampling method to select school-aged children from grades 4, 5, and 6 across each participating school. The survey was administered following the acquisition of consent from the respective school principals, culminating in a total sample size of 187 students.

The ethical approval for conducting the study was obtained from the relevant educational institutions in which the research was carried out. Additionally, explicit written consent was procured from the parents or legal guardians of the participating children, given their young age. The acquisition of parental consent was imperative due to the minors' status as school children, and it constituted a crucial ethical prerequisite for their inclusion in the study.

2.1 Data Collection and Data Recording

The data collection process for this study involved a team of five enumerators who underwent a comprehensive one-day training program elucidating the study protocols. The research was conducted within the premises of four distinct schools, with the active involvement of subject teachers to facilitate and oversee the process. Clear communication of the study's objectives and purpose was relayed to the respective teachers and participating students before administering the survey. The survey was offered to school children present on the day of administration without imposing any time constraints, fostering a relaxed environment conducive to thorough and calm responses. Enumerators promptly addressed any queries or uncertainties arising during the survey, ensuring clarity for the students.

After data collection, a designated research team member was responsible for data entry, which underwent meticulous scrutiny by another team member to ensure accuracy and completeness. Data anonymization was performed during the analysis phase to safeguard the privacy of the participating school children and maintain data integrity.

The study comprised a section on attitudes featuring six questions, one of which inquired about the perceived importance of having breakfast before school. Responses were recorded on a 3-point Likert scale ('0' - Not good, '1' - Not sure, '2' - Good), with the total attitude score calculated by aggregating scores across all six questions. Similarly, the study included a practice section with five questions, including an inquiry about whether students had breakfast before school, recorded as '1' for a 'Yes' response and '0' for 'No.' A composite practice score was computed by summing the points across the five questions.

2.2 Statistical Analyses

All data analyses and statistical computations were performed using the R statistical software. Descriptive analyses encompassed frequency and proportion calculations alongside determining medians with interquartile ranges, particularly for non-normally distributed data. Visual representations of outcome scores, stratified by the children's gender and school types, were depicted through boxplot graphs.

Statistical comparisons between groups involved the application of the proportion z-test to discern differences in frequencies. The non-parametric Kruskal-Wallis test was employed to compare medians across multiple groups, followed by post-hoc Dunn’s test for pairwise comparisons.

In addition, a multivariate linear regression model was executed for each outcome variable, incorporating an interaction term between gender and school types. These models were adjusted for potential confounding variables, including distance to school, gender, and children’s school grades.

3. Results

In the present cross-sectional study, 187 children were enrolled as participants. This cohort comprised approximately 41% of students from Mahendradaya Secondary School, 24% from YouMe School, 22.5% from Durchhim Secondary School, and 13.4% from Halesi Pathsala. Notably, the distribution of male and female student participants was balanced across the various school types. However, a significant disparity in the representation of Grade 4 students was observed, with Halesi Pathsala having a notably higher proportion than Shree Mahendradaya and Durchhim Secondary Schools. Conversely, Grade 5 students were uniformly distributed across all school types, as indicated in Table 1. It is important to highlight that none of the Grade 6 students were included in Halesi Pathsala. Furthermore, a significant variation was noted in the average time taken by students to commute to their respective schools, with students from Halesi typically experiencing the shortest travel times. In contrast, students from Durchhim School endured the lengthiest commutes, as elucidated in Table 1.

Table 1. Sample characteristics distribution in four types of school

	School (n=187)					p-value ^d
	Total, 187	YouMe School ^f (n,45 (%))	Mahendradaya secondary school ^g (n,76(%))	Durchhim secondary school ^g (n,42(%))	Halesi Pathsala ^f (n ,24 (%))	
Gender						
Female	96 (51.34)	19 (42.22)	41 (53.95)	22 (52.38)	14 (58.33)	0.53
Male	91 (48.66)	26 (57.78)	35 (46.05)	20 (47.62)	10 (41.67)	0.53
Grade						
Grade 4	62 (33.16)	20 (44.44)	18 (23.68)	10 (23.81)	14 (58.33)	0.003*
Grade 5	51 (27.27)	10 (22.22)	18 (23.68)	13 (30.95)	10 (41.67)	0.28
Grade 6	74 (39.57)	15 (33.33)	40 (52.63)	19 (45.24)	-	0.001*
Median time taken to reach school, minutes	15 (1 - 50)	25 (10 – 60) ^a	10 (1-30) ^{a,b}	30 (5- 60) ^{a,b}	5 (3-10) ^a	<0.01* ^e
Availability of drinking water at school	187 (100)	45 (100)	76 (100)	42 (100)	24 (100)	1
Availability of water to wash hands and in the toilet in school	167 (89.33)	45 (100)	57 (75)	41 (97.61)	24 (100)	<0.01*
Knowledge	14 (7-15)	14 (12-14) ^c	14 (13-16) ^{b,d}	13 (11-14) ^{a,d}	15.5 (14.75-17.00) ^{a,b,c}	<0.01* ^e
Attitude	12 (6-12)	11 (10-12)	12 (10-12)	12 (10.25-12)	12 (11-12)	0.40 ^e
Practice	5 (2-5)	4 (1-5)	5 (4-5)	5 (4-5)	4 (4-5)	0.06 ^e

*: Statistically significant (<0.05),

^{a,b,c}: values with the same superscript are statistically significant.

^d: Proportion z test

^e: Kruskal-Wallis test

^f: Private School

^g: Public School

Within the surveyed schools, the presence of drinking water was reported in all the cases. A unique finding emerged regarding the perceptions of water availability for handwashing and sanitation facilities. Specifically, while approximately 75% of students from Mahendradaya School acknowledged the availability of water for handwashing and toilet use, nearly all students from the remaining three schools affirmed the presence of adequate water within their respective institutions. Upon conducting univariate comparisons, no significant disparities were observed in the attitudes and practices across the schools. However, a marked distinction was noted in the schools' knowledge levels. Halesi Pathsala students demonstrated notably higher knowledge levels than their counterparts in all three other schools. Furthermore, students from Mahendradaya School exhibited a higher level of knowledge than students from Durchhim School, as outlined in Table 1.

A nuanced understanding of the disparities in knowledge, attitude, and practice among students was unveiled in the context of adjusted linear regression models. The analysis revealed that, on average, female students exhibited significantly lower levels of knowledge than their male counterparts ($\beta=-1.38$; $p=0.05$). However, a distinctive finding emerged when comparing female students from Halesi Pathsala, who displayed notably higher levels of knowledge than male students attending YouMe School ($\beta=3.06$; $p=0.01$).

Similarly, in the realm of attitudes, a pattern emerged indicating that female students generally portrayed lower levels of attitude than male students ($\beta=-0.86$; $p=0.01$). Additionally, a positive correlation between grade progression and attitude was observed. Notably, female students from Durchhim demonstrated higher levels of attitude than male students at YouMe School, as illustrated in Table 2.

Furthermore, the examination of practice through adjusted regression models indicated a trend where three schools showcased lower levels of practice than YouMe School. However, this difference did not achieve statistical significance. Halesi Pathsala exhibited notably lower levels of practice than YouMe School ($\beta=-0.48$; $p=0.01$). While a trend suggested that females displayed lower practice levels than male students, this disparity did not reach statistical significance ($\beta=-0.32$; $p=0.10$). Additionally, it was observed that female students in all three schools displayed higher levels of practice in comparison to male students at YouMe School, as delineated in Table 2.

Table 2. Knowledge, attitude, and practice predictors among children

	Knowledge				Attitude				Practice			
	Est.	St.Er.	t	p	Est.	St.Er.	t	p	Est.	St.Er.	t	p
Intercept	14.07	0.51	27.42	<0.01	10.92	0.25	43.49	<0.01	4.50	0.14	32.47	<0.01
Mahendradaya secondary school	1.07	0.60	1.77	0.08	0.12	0.29	0.40	0.69	-0.01	0.16	-0.05	0.96
Durchhim secondary school	-1.11	0.69	-1.60	0.11	-0.31	0.34	-0.91	0.36	-0.19	0.19	-1.02	0.31
Halesi Pathsala	0.23	0.88	0.26	0.80	0.33	0.43	0.77	0.44	-0.48	0.24	-2.03	0.04
Female	-1.38	0.70	-1.97	0.05	-0.86	0.34	-2.52	0.01	-0.32	0.19	-1.66	0.10
Grade 5	-0.16	0.45	-0.36	0.72	0.42	0.22	1.88	0.06	-0.03	0.12	-0.27	0.78
Grade 6	-0.68	0.43	-1.57	0.12	0.46	0.21	2.18	0.03	0.11	0.12	0.92	0.36
Mahendradaya* Female	0.50	0.89	0.57	0.57	0.53	0.43	1.23	0.22	0.45	0.24	1.87	0.06
Durchhim* Female	1.27	1.01	1.26	0.21	1.14	0.50	2.31	0.02	0.59	0.27	2.18	0.03
Halesi Pathsala* Female	3.06	1.19	2.56	0.01	0.71	0.58	1.21	0.23	0.81	0.32	2.49	0.01

4. Discussion

4.1 Demographics and School Conditions

In this study, 96 female and 91 male school children participated, unanimously affirming the presence of drinking water in their respective schools. The majority consistently reported access to water for handwashing purposes and in its use at school toilets.

4.2 Disparities in Knowledge Scores

The research revealed that private schools, YouMe School and Halesi Pathshala, exhibited higher average knowledge scores than public schools, Shree Mahendradaya Secondary School and Shree Durchhim Secondary

School. This trend aligns with earlier studies in Nepal, illustrating a superior understanding of health implications related to dietary choices among students in private institutions (Bohara et al., 2021). Factors contributing to this disparity may include an all-encompassing curriculum, an active parental engagement, and more targeted school feeding initiatives, particularly in private schools.

The distinctive school feeding programs instituted by YouMe School and Halesi Pathshala, both classified as private educational institutions, are posited as potential contributors to the elevated levels of knowledge discerned among their students compared to their counterparts enrolled in public schools. Shree Durhchim Secondary School and Mahendradaya Secondary School, emblematic of government-run educational establishments, predominantly adhere to a cash-based school feeding modality. In stark contrast, private institutions such as Halesi Pathshala pioneered a unique nutritional program, specifically implemented by a parent-involved home-based meal system. This innovative paradigm entails parents directly provisioning nutritionally balanced meals to their children, a practice executed either within the school premises or facilitated through the school's canteen, thereby affording particular advantages to students hailing from remote locales. An additional exemplar of a private educational institution, YouMe School, operationalizes a home-based meal strategy, a multifaceted approach aimed at fostering nutritional cognizance and endorsing well-balanced dietary habits among its students. Furthermore, this approach is complemented by regular annual nutritional screenings and home visits by school personnel. These visits, conducted collaboratively by educators, serve the dual purpose of acquiring pertinent nutritional data and assessing sanitary conditions in conjunction with the parents of students enrolled at You Me School.

4.3 Gender Disparities in Knowledge, Attitude, and Practice

A discernible gender disparity is observed in our study, with female school children exhibiting lower knowledge scores than their male counterparts. Intriguingly, this finding contrasts a study conducted in East Malaysia by Jeinie et al. (2021), where females demonstrated superior performance in terms of nutritional knowledge relative to their male counterparts. This incongruity may be attributed to dissimilarities in the contextual parameters and scopes of the respective studies. While the East Malaysia research primarily focused on an adult demographic, our investigation was specifically tailored to assess the knowledge levels of young children. Moreover, it is imperative to underscore the rural setting of our study, which could potentially contribute to the observed gender differences. The constrained access to quality education, more pronounced in rural areas of Nepal, coupled with deeply ingrained traditional gender roles and pervasive societal attitudes towards gender and education, emerges as plausible explanatory variables for this observed phenomenon.

Our study reveals a notable absence of disparity in attitude scores across different school types, and this association persists even after meticulous adjustments for potential confounding variables. This finding contrasts with a study conducted in Bangladesh, specifically involving adolescent schoolgirls, wherein public-school children exhibited higher attitude scores than their private school counterparts, presenting a notable departure from our study's outcomes (Ghosh et al., 2020). The elevated attitude scores discerned among public school students in Bangladesh may be ascribed to a slightly varying context; a diverse socio-economic background, varied cultural practices, and dietary habits. The extant contextual disparities are presumed to have contributed to nuanced distinction in perceptions and preferences.

Furthermore, our research underscores a gender-based divergence in attitude scores, with females displaying, on average, lower scores than their male counterparts. This aligns with findings from a study by Jeinie et al. (2021), where a significantly higher percentage of males preferred healthy and balanced food choices than their female counterparts. The heightened emphasis on prioritizing male students and their increased involvement in nutritional activities in the Nepalese context could account for a more concentrated nutrition education effort directed toward boys, thereby fostering a more favorable attitude toward nutrition among this particular demographic.

In our research, a noticeable gender-based discrepancy is evident, with female school children displaying lower levels of nutritional practice than their male counterparts. This finding contrasts with a study conducted in East Malaysia, which reported that male students exhibited a higher frequency of fast-food consumption and a lower intake of vegetables and milk at least once a week than their female counterparts (Jenie et al., 2021). Notably, the dissimilarities between our research and the East Malaysia study could be ascribed to the latter's focus on an adult population, while our investigation was exclusively centered on children. The methodological distinctions between the two studies likely contributed to the observed outcome variations.

Moreover, our research uncovered no identifiable difference in practice scores between different types of schools: YouMe School and Halesi Pathshala (private schools), Shree Mahendradaya Secondary School, and Shree Durhchim Secondary School (public schools). This lack of association persisted even after meticulous adjustments for potential confounding variables. In contradistinction, a study conducted among adolescent schoolgirls reported

that private school children exhibited superior nutritional practices to their public-school counterparts (Ghosh et al., 2020). This disparity could be attributed to our study, which encompasses both male and female children, while the previous study focused exclusively on girls. Additionally, our study population comprises children, whereas theirs consisted of adolescents, introducing a notable age-based distinction.

4.4 Study Characteristics and Limitations

Our study uniquely addresses a gap in the existing literature by concentrating on young children, a demographic that has received limited attention in previous research that predominantly focuses on adults. Including various school types and genders in our study enhances the representativeness and generalizability of the findings, contributing to a more comprehensive understanding of the examined phenomena. Adopting a cross-sectional design in our research allows for the presentation of data at a specific point in time, facilitating the examination of associations between variables.

However, it is important to acknowledge certain limitations inherent in our study. The unequal representation of students across different grade levels may introduce a potential confounding factor, thereby limiting the extent to which grade level can be reliably considered an influencing variable on the outcome measures. Notably, Halesi Pathsala's unique academic structure, culminating in class 5, introduces a distinctive feature compared to other schools that encompass students up to class 6. This structural difference may impact the generalizability of our findings to higher grade levels. Considering these aspects when interpreting and extrapolating the implications of our study's outcomes is imperative.

5. Conclusion

In conclusion, this research offers a comprehensive evaluation of nutritional Knowledge, Attitudes, and Practices (KAP) among primary-level school children within the Halesi Tuwachung Municipality of Khotang District, Nepal. The utilization of a purposive sampling method across diverse educational institutions lends depth to our comprehension of nutritional disparities within resource-constrained regions. This study strategically emphasizes gender differences and distinct school models in delineating disparities in nutritional KAP among school students. Notably, private schools exhibit a heightened level of nutritional knowledge, primarily attributable to the commendable school feeding programs implemented by these institutions. The discernible gender differences disclosed in the research highlight lower nutritional knowledge scores among female students, necessitating a nuanced approach to nutrition initiatives that caters to the needs of both male and female school children.

The implementation of robust school feeding programs by private educational institutions not only contributes to the overall health enhancement of students but also plays a pivotal role in augmenting nutritional education in resource-constrained areas. This research significantly contributes to the ongoing discourse concerning the intricate interplay between nutrition and education. It underscores the imperative for comprehensive, context-specific measures to ameliorate the overall health of school children, particularly in regions characterized by limited resources.

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Data availability

Available upon request

Competing Interests statement

We declare that there are no competing conflicts of interest.

Provenance and Peer Review

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Notes

Note 1. Although Halesi Pathsala is a non-profit school, it has been registered under a private limited company. For the sake of this paper, we have categorized the school as a Private School.

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