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ORIGINAL ARTICLE

Nutritional Status of Primary School Children in Ilorin-West LGA, Kwara State, Nigeria

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Keywords

Nutritional status; School-aged; Stunting; Wasting; Obesity

ABSTRACT

Background: Malnutrition in children remains a global health problem in developing countries including Nigeria. Nearly half of all under-five deaths in Africa and South-East Asia can be traceable to malnutrition. The nutritional status of primary school children in Ilorin-West Local Government Area of Kwara State is not known, therefore the study set out to determine this and its associated factors.

Methods: This study was a descriptive cross-sectional study carried out between February and May 2016 across 16 primary schools in Ilorin-West LGA. Four hundred and eighty school children aged 6-12 years were recruited into the study through a multi-stage sampling technique. Anthropometry was taken following standard procedures; weight was measured with a digital bathroom weighing scale (Camry, Model: EB9323H, China), while height was measured with a stadiometer (Seca Model: 213, USA). Anthropometric indices were determined. Data collected was analysed using the IBM Statistical Package for Social Sciences (SPSS) Tm version 20.0 for windows.

Results: The prevalence of underweight, stunting, wasting and obesity were 3.0%, 5.0%, 4.4% and 1.0%, respectively. Stunting was more prevalent among female pupils, pupils attending the public primary schools and children of mothers with no formal education, while obesity was more prevalent in the private primary schools.

Conclusion: The prevalence of obesity recorded in this study confirms the emerging concept of 'the double burden of malnutrition,' and poses a public health challenge to policy makers. It is recommended that community nutrition enlightenment campaigns be strengthened and possibly school meals be re-introduced to both private and public schools.

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INTRODUCTION

Malnutrition in children remains a global health problem in developing countries including Nigeria.[1] It refers to a group of pathological disorders resulting from an imbalance between the intake of essential nutrients and the body's requirement for

these nutrients.[2] It is a spectrum of conditions which include undernutrition and overnutrition.[2] Malnutrition is part of the vicious cycle of poverty and disease; with the poorest populations more at risk of undernutrition.[3, 4]

In 2015, the United Nations Children's Fund (UNICEF) reported the global prevalence of stunting as 23.2% and one out of three of these children live in Sub-Saharan Africa.[1] On the other hand, the global prevalence of overweight/obesity is said to be on the rise; affecting even the developing countries. Globally, there was a reported increase in the number of affected under-fives from 31 million in the year 2000 to 42 million in the year 2015.[1] Almost half of these children lived in Asia and one quarter in Africa.[5] In the year 2013, the prevalence rates of stunting and overweight were reported as 4.9% and 2.7%, respectively among urban Senegalese children.[6]

In Nigeria, several studies [7–10] have reported varying prevalence rates of malnutrition across the country. The 2013 Nigeria Demographic Health Survey (NDHS) reported 37%, 29% and 18% as national prevalence rates for stunting, underweight and wasting, respectively.[11] A study among school children in Lagos State, South-west Nigeria reported a prevalence of 12.1% for stunting,[12] while a similar study in Benue, North-central Nigeria, reported that half of all school children sampled were undernourished.[13] The prevalence of obesity among school adolescents in Kano, Northern Nigeria was 0.94%.[14]

Malnutrition has profound negative consequences for children's health and survival. Undernutrition reportedly contributes to nearly half of all under-five mortality in Africa and Asia.[1] It causes recurrent infections, poor appetite, delayed physical and mental development, low weight-for-age, among others.[15] On the other hand, overnutrition and its attendant health risks are associated with a decreased life expectancy.[16] Children with obesity have acute and chronic problems which include abnormal bone growth, degenerative diseases, cardiovascular disorders, diabetes mellitus, psychological problems such as low self-esteem, depression and suicidal ideations.[16] Furthermore, the effects of undernutrition and over-nutrition are long-lasting and go beyond childhood. Undernutrition causes cognitive and emotional impairment, with undernourished children consequently becoming less productive adults;[1] and children with obesity having a higher risk of developing non-communicable diseases in adult life.[5] These two conditions undoubtedly affect the quality of life and productivity adversly. The potential grave consequences of malnutrition make it imperative to identify the at-risk group and possibly proffer prompt interventional strategies to curb the menace.

Differences in nutritional status between children living in the rural and urban areas have been clearly documented by different authors.[7, 8, 17] The 2016-17 Multiple Indicator Cluster Survey (MICS) reported that 49% of children living in rural parts of

Nigeria were stunted as against 30% living in the urban areas.[18] Previous studies[19, 20] in Kwara State captured only the rural areas comprising mainly of children of peasant farmers. This may not be truly representative of the nutritional status of children in the state as the urban area was not captured. Furthermore, data on nutritional indices amongst the school-aged group was not reported. The nutritional status of school aged children in Ilorin-West Local Government Area (LGA), which is an urban area is unknown. This study therefore set out to determine the nutritional status of primary school children in Ilorin and the associated factors.

METHODOLOGY

This cross-sectional study was conducted among public and private primary school children in Ilorin-West LGA between February and May, 2016. Ilorin-West LGA has 260 registered primary schools, 55 public and 205 private primary schools in a ratio of 1:4. Ilorin is located on latitude $8^0$30'N and longitude $4^0$35'E.[21] Ilorin is made up of people from various ethnic groups; predominantly Yoruba, Hausa, Fulani, Nupe, Kanuri, and Igbos. Ilorin has three Local Government Areas (LGA) - Ilorin West, East and South. Ilorin has a total of 668 primary schools, 145 secondary schools and 10 tertiary educational institutions.[22]

Apparently well primary school pupils aged between 6-12 years, whose parents/guardians gave informed consent to participate were included in the study. While children with known chronic illnesses like sickle cell disease were excluded. The sample size was calculated using the Cochran's formula.[23] For this study, a prevalence of stunting of 56.5%, reported in a previous study in Kwara State was used.[20] The tolerable margin of error was set at 5% and a 10% correction for non-response was made. Thus a minimum sample size of 415 was estimated for the study. For ease of subject recruitment, 480 school aged children were eventually recruited into the study.

The subjects were selected through a multi-stage sampling technique. Stage 1 included selection of schools - six percent (6%) of the schools in Ilorin West LGA were used. i.e., 16. Using the school lists provided by Kwara State Ministry of Education, the primary schools were stratified into registered private and public primary schools and proportional allocation was used to select the number of public to private schools used based on the calculated ratio of public to private schools in the LGA. i.e., 55:205 =1:4. Therefore, three (3) public and 13 private schools were selected. A table of random numbers was then used to select three (3) public and 13 private schools sampled based on their serial numbers on the school register from the Ministry of Education. This was done separately for the public and private schools.

Stage 2 involved the selection of pupils - the number of children selected in each primary school was obtained by dividing the total number of pupils to be recruited (sample

size) by the total number of schools (16) to be sampled in Ilorin West LGA. i.e., 415/16 = 25.9. For easy recruitment of subjects, 30 pupils were eventually recruited from each selected primary school. In each selected primary school, the pupils were stratified into their classes (basics 1-6) and pupils were recruited from each class. The number of children selected from each class was calculated by dividing the total number of children to be selected from that school by 6 (representing 6 classes from basics 1 to 6), i.e., 30/6 = 5. Therefore, 5 children were recruited from each class in the selected primary school in Ilorin West LGA.

In a situation where there was more than one arm in a class, simple random (by balloting) method was used for the selection of a single arm of the class which formed the sampling frame. In each class, using the class register, the pupils were stratified based on their sex; and the ratio of the boys to girls in the class was determined. Proportional allocation was then used to determine the number of boys and girls to be recruited in the class based on their ratio. Simple random sampling by balloting was used to select the required number of boys and girls to make a total of 5 pupils recruited in each class.

A structured self-administered questionnaire was used for data collection. The questionnaire was developed after reviewing similar studies. The questionnaires were given to the selected subjects to give their parents or guardians to fill in order to obtain the relevant dietary history, family history and socio-demographic information from them. In a case in which a parent was not literate, the parent was invited to the school and the questionnaire was administered in an interview form to the parent. The social class of each subject was determined using Oyedeji classification of social class.[24] The mean of four scores (two for the father and two for the mother) to the nearest whole number was the social class assigned to the child. Before the commencement of the main study, content validity of the questions in the instrument was assessed by the authors. Also, criterion validity of the instrument was assessed by pretesting it among 60 children in two randomly selected schools (1 public and 1 private school) in Ilorin South Local Government Area which was not the LGA used for the main study. The pre-test helped us to identify wrongly phrased items in the questionnaire and also helped to assess the internal consistency of the questions. Identified ambiguous questions were either rephrased or removed entirely. Recruitment of subjects was done by the researcher and two trained assistants, who were Paediatric resident doctors duly trained by the researcher. The study was carried out over a period of three months covering one school term.

Weight and height were taken using standard methods recommended by the WHO.[25] Height was measured with a stadiometer (Seca Model: 213, USA) with an accuracy of 0.1cm. Each subject had his/her height measured in the upright position with his / her shoes removed; back,

shoulders and buttocks perpendicular to the central axis, heels against the footboard, knees together, and arms hanging loosely at the sides and the head in the Frankfurt plane.[25] Each pupil was asked to stand erect with his back touching the vertical backboard of the stadiometer, looking straight ahead and holding his breath during the measurement. The moveable headpiece of the stadiometer was brought onto the upper most point on the head with sufficient pressure to compress the hair. The measurement was read off at maximal inspiration. Three measurements were taken and the average calculated and recorded.

Weight was measured with a digital bathroom weighing scale (Camry, Model: EB9323H, China) with an accuracy of 100g. The weighing scale was placed on a wooden platform to ensure an even and solid surface. Each pupil was weighed in plain school uniform; extra clothing such as sweaters were removed and the pockets were emptied. The pupil was asked to stand still over the centre of the scale with the body weight evenly distributed between both feet. The arms were hanging freely by the sides of the body with the palms facing the thighs, the head held up and face forward. The weight was read off and recorded. The weighing scale was adjusted to zero reading before each measurement. Anthropometric indices (weight-for-age, height-for age, BMI-for-age) were derived from the readings.

Data collected was analysed using the IBM Statistical Package for Social Sciences (SPSS) Tm version 20.0 for windows. Body Mass Index (BMI) was calculated as body weight in kilograms divided by height in meters squared (weight/height^2).[25] Height in meters was calculated by dividing height measured in centimetres by 100. WHO Anthroplus, software for analysing anthropometric parameters was used to calculate BMI-for-age, height-for-age, and weight-for-age z scores based on the WHO Growth Reference dataset.[26] A child whose height-for-age was less than 2 standard deviations (SD) for age and sex was considered stunted while weight-for-age less than 2 SD for age and sex was classified as underweight. A child whose BMI-for-age and sex is less than 2 SD was considered as wasted, while BMI-for-age and sex greater than 2 SD was classified as obese. Children that belonged to Oyedeji social classes I and II were classified as being from the Upper Social Class, those from social class III were classified as being from the middle social class, while those from social classes IV and V were classified as being from the Lower social class.

Frequency distribution tables of variables were generated. Measures of central tendency (mean, median and mode) and dispersion (standard deviation, variance) of quantitative variables were determined. Differences between proportions of categorical variables were evaluated using the Chi-square test or the Fischer's exact test. The confidence level was set at 95% and level of significance at $p<0.05$. Ethical clearance was obtained from the Ethics and Research Committee of the University of

Ilorin Teaching Hospital. Approval was sought from the State Ministry of Education and Head Teachers of the selected schools. Written informed consent was obtained from the parents of eligible subjects, in addition, assent was sought from pupils.

RESULTS

Four hundred and eighty (480) children were enrolled from sixteen primary schools in Ilorin West LGA. The mean ±SD age of the subjects was 8.6 ±1.8 years. Two hundred and thirty-eight (49.6%) of the children were males with male to female (M:F) ratio of 1:1. Most (76%) of the pupils had mothers with at least a secondary level of education. The other socio-demographic parameters are as shown in Table 1.

The overall mean weight ±SD and height ± SD of the total study population was 26.3± 6.0kg and 129.4±10.4cm, respectively. Using the WHO classification, underweight was found in 12 (3.0%), stunting in 24 (5.0%), wasting in 21 (4.4%) and obesity in 5 (1.0%) of the pupils. (Table 2). The prevalence of underweight was significantly higher among children 10-12 years, 5 (6.6%) when compared with the younger the subjects, 7 (2.2%) [p=0.043]. Although, underweight was recorded in a higher proportion 2 (8.3%) among children of mothers with no formal education, it was not statistically significant (p=0.311), as shown in Table 3.

Table 1: Socio-demographic Characteristics of the Pupils

Variable	Frequency (n=480)	Percent
Age (years)		
6-9	319	66.5
10-12	161	33.5
Sex		
Male	238	49.6
Female	242	50.4
Mother's education		
NFE*	33	6.9
Primary	82	17.1
Secondary	235	49.0
Post-secondary	130	27.0
Social class of pupil		
Low	46	9.6
Middle	165	34.4
High	269	56.0
Type of school		
Private	390	81.3
Public	90	18.8

NFE – No formal education

Table 2: Nutritional status of the Pupils based on the WHO Classification.

Variable	Frequency (n = 480)	Percent
WAZ score**		
< -2	12	3.0
-2 to +2	373	94.4
> +2	10	2.6
HAZ score		
< -2	24	5.0
-2 to +2	429	89.4
> +2	27	5.6
BAZ score		
< -2	21	4.4
-2 to +2	454	94.6
> +2	5	1.0

n=395, weight for age z score not available for children > 11years; WAZ: weight-for-age Z score; HAZ: height-for-age Z score; BAZ: BMI-for-age Z score;

Table 3: Relationship between WAZ Score and socio-demographic characteristics of the pupils

Variable	WAZ Score < -2 n (%)	-2 - +2 n (%)	> +2 n (%)	Total**	χ^2	*p*-value
Age group (years)						
6-9	7 (2.2)	302 (94.7)	10 (3.1)	319	5.661F	0.043*
10-12	5 (6.6)	71 (93.4)	0 (0.0)	76		
Sex						
Male	6 (3.0)	188 (95.4)	3 (1.5)	197	1.622	0.445
Female	6 (3.0)	185 (93.4)	7 (3.5)	198		
Mother's education						
No formal	2 (8.3)	21 (87.5)	1 (4.2)	24	6.223F	0.311
Primary	1 (1.8)	55 (96.4)	1 (1.8)	57		
Secondary	8 (4.1)	181 (93.3)	5 (2.6)	194		
Post-secondary	1 (0.8)	116 (96.7)	3 (2.5)	120		
Social class of pupil						
Low	1 (3.0)	31 (93.9)	1 (3.0)	33	3.154F	0.468
Middle	6 (5.0)	112 (93.3)	2 (1.7)	120		
High	5 (2.1)	230 (95.0)	7 (2.9)	242		
Type of school						
Private	11 (3.3)	314 (94.3)	8 (2.4)	333	0.608F	0.715
Public	1 (1.6)	59 (95.2)	2 (3.2)	62		

n=395, weight for age z score not available for children > 11years; χ^2: Chi square test; F: Fisher's exact test; *: p value <0.05; WAZ: weight-for-age Z score

The prevalence of stunting was also significantly higher among the older subjects [children 10-12 years], 17 (10.6%) when compared with the younger the subjects 7 (2.2%), [p<0.001]. A comparison of the HAZ across both sexes showed that the proportion of females with stunting (7.4%) was significantly higher than that of the males (2.5%) (p=0.026). Mothers with post-secondary education had the lowest proportion of stunted children; (0.8%). Furthermore, the proportion of pupils with stunting in public schools (10.0%) was significantly higher than those in private schools; (3.8%), (p=0.036). This is as shown in Table 4.

Though not statistically significant, a larger proportion of females (0.4%) when compared to males (1.7%) were obese and a larger proportion (1.5%) of the obese children had mothers with post-secondary education. The largest proportion (6.1%) of underweight children belonged to mothers with no formal education. This was also not statistically significant, (p=0.417). Obesity was recorded in 5 (1.0%) children, who were all from private schools. Also, the proportion of children with wasting in public schools (6.7%) was higher than in private schools (3.8%), although this was not statistically significant, (p=0.305). The other parameters are as shown in Table 5.

DISCUSSION

Majority (94.4%) of the study subjects had normal weight-for-age. Only 3% of the subjects were underweight. This value is similar to the 3.3% reported among primary school children in Enugu State, Nigeria,[27] but much lower than the 18.8% recorded

Table 4: Relationship between HAZ Score and socio-demographic characteristics of the pupils

	HAZ Score					
	< -2	-2 - +2	> +2	Total	χ^2	*p*-value
Variable	**n (%)**	**n (%)**	**n (%)**			
Age group (years)						
6-9	7 (2.2)	287 (90.0)	25 (7.8)	319	23.283	<0.001*
10-12	17 (10.6)	142 (88.2)	2 (1.2)	161		
Sex						
Male	6 (2.5)	221 (92.9)	11 (4.6)	238	7.287	0.026*
Female	18 (7.4)	208 (86.0)	16 (6.6)	242		
Mother's education						
No Formal	3 (9.1)	29 (87.9)	1 (3.0)	33	10.345F	0.088
Primary	7 (8.5)	71 (86.6)	4 (4.9)	82		
Secondary	13 (5.5)	209 (88.9)	13 (5.5)	235		
Post-secondary	1 (0.8)	120 (92.3)	9 (6.9)	130		
Social class of pupil						
Low	4 (8.7)	40 (87.0)	2 (4.3)	46	6.051F	0.175
Middle	12 (7.3)	145 (87.9)	8 (4.8)	165		
High	8 (3.0)	244 (90.7)	17 (6.3)	269		
Type of school						
Private	15 (3.8)	351 (90.0)	24 (6.2)	390	6.664	0.036*
Public	9 (10.0)	78 (86.7)	3 (3.3)	90		

χ^2: Chi square test; F: Fisher's exact test; *: p value <0.05; HAZ: height-for-age Z score

Table 5: Relationship between BAZ Score and socio-demographic characteristics of the pupils

	BAZ score					
	< - 2	-2 - +2	>+ 2	Total		
Variable	**n (%)**	**n (%)**	**n (%)**		**χ^2**	**p value**
Age group (years)						
6-9	10 (3.1)	305 (95.6)	4 (1.3)	319	3.660F	0.165
10-12	11 (6.8)	149 (92.5)	1 (0.6)	161		
Sex						
Male	10 (4.2)	227 (95.4)	1 (0.4)	238	1.688F	0.485
Female	11 (4.5)	227 (93.8)	4 (1.7)	242		
Mother's education						
No Formal	2 (6.1)	31 (93.9)	0 (0.0)	33	5.402 F	0.417
Primary	3 (3.7)	78 (95.1)	1 (1.2)	82		
Secondary	14 (6.0)	219 (93.2)	2 (0.9)	235		
Post-secondary	2 (1.5)	126 (96.9)	2 (1.5)	130		
Social class of pupil						
Low	3 (6.5)	43 (93.5)	0 (0.0)	46	1.646 F	0.788
Middle	6 (3.6)	158 (95.8)	1 (0.6)	165		
High	12 (4.5)	253 (94.1)	4 (1.5)	269		
Type of school						
Private	15 (3.8)	370 (94.9)	5 (1.3)	390	2.032 F	0.305
Public	6 (6.7)	84 (93.3)	0 (0.0)	90		

χ^2: Chi square test; F: Fisher's exact test; BAZ: BMI-for-age Z score

among school children living in rural areas of Anambra State, South-east, Nigeria.[28] The similarity between the present study and the study at Enugu could be due to the fact both studies were carried out in urban areas, where the populace is better

enlightened about good nutrition, while the study at Anambra was carried out among children in the rural area. This corroborates the report of previous studies that children in urban areas are better nourished than those who live in the rural areas. [8, 29]

Most of the study subjects had normal height-for-age. The low prevalence of stunting (5%) found in this study is similar to the finding of 4.9% among school children in Senegal,[6] but lower than previously reported in Abeokuta and Lagos, South-West Nigeria.[7, 8] The better nutritional status in this study may be attributable to the fact that majority of the study subjects had mothers with higher educational qualification (with at least a secondary school certificate). Low maternal education has been reported to be a risk factor for malnutrition.[9] This buttresses the report of UNICEF that if all mothers achieved at least a secondary education, there would be 1.5 million fewer deaths from malnutrition in Sub-Saharan Africa.[30] Furthermore, the higher a woman's educational level, the better her finances and contribution to family income; hence the better the nutritional status of her children. The reason could also be due to the fact that majority of the study subjects were from the higher and middle social classes, with only a few from the lower social class. This study demonstrated that mothers with post-secondary school education had the least number of children with stunting.

The prevalence of obesity in this study was consistent with earlier reports from Kano State, Nigeria,[14] but much lower than the 15.4% and 9.4% previously reported in urban Khartoum in Sudan[17] and Lagos, south-west Nigeria,[31] respectively. The difference in prevalence seen with the urban Lagos report may possibly be due to difference in diet and lifestyle between the present study site and Lagos. Furthermore, the study in Khartoum employed a different cut-off value (of *z*-score of +1) for determining obesity as against the cut-off value of *z*-score of +2 used in this study. The difference in methodologies could have been responsible for the disparity in prevalence recorded.

Underweight was significantly more prevalent among the 10-12 year age-group. This is similar to reports from Sagamu, Nigeria that prevalence of underweight increased with increasing age.[32] Furthermore, stunting was significantly more prevalent in the older age group (10-12 years) than the younger age group. This is consistent with the findings from South-east Nigeria,[33] but contradicts the report from Senegal.[26] This may be due to the fact that stunting is a long term consequence of malnutrition and signifies chronic under-nutrition (from childhood) in them.

A higher proportion of females than males were stunted; and the difference was statistically significant (p = 0.026). This is contrary to the findings from Senegal[6] and Onitsha,[34] Nigeria that stunting was more prevalent among males than females, but consistent with the reports among school children in Enugu,[33] Nigeria that stunting

was significantly more prevalent among girls than boys. The finding in this study may be due to the fact that male children are more desirable in the environment where this study was carried out; consequently leading to preferential treatment that may positively influence their nutritional status when compared to girls.[35]

School type was significantly associated with stunting as demonstrated in this study; as the public schools had a higher proportion of stunted pupils when compared with the private schools. This corroborates the report from Abeokuta, Nigeria that attendance of public school and low social class were positively associated with stunting.[9] This is also in agreement with findings of poorer nutritional indices among children from public schools in Onitsha, South-east Nigeria.[34] Furthermore, UNICEF reported that children from the poorest populations were more than two times more likely to be stunted than children from the richest populations.[1]

The proportion of subjects with obesity in this study was higher among children of the younger age-group (6-9 years) and also higher in females than males. This is in keeping with earlier reports from different parts of the country.[10, 29-30] The gender difference in the prevalence of obesity may be accounted for by hormonal variations between boys and girls especially with the beginning of puberty. Furthermore, girls are more likely to live sedentary lifestyles, while the boys take part in more physical activities such as athletics and outdoor sports.[37] This puts the boys at less risk for obesity, when compared with girls.

In this study, the highest proportion of obese children were from the high social class. Furthermore, all the obese children were from the private schools. This is similar to the findings from Ile-Ife[10] and Lagos,[12] Nigeria. This is possibly due to the higher tendency of children from the private schools to be from the higher social classes. This confers on them a higher risk of having sedentary lifestyles from increase in screen viewing times and extensive use of media devices when compared with their counterparts in public schools.[38] Also, pupils in this group are more likely to eat more energy-dense foods and refined sugars when compared with pupils in public schools.[38] Pupils from the public schools, on the other hand, have more likelihood of walking long distances to school due to their low socioeconomic class; this eliminates sedentary lifestyle in them and consequently reduces the risk of obesity in them. The fact that a large proportion of obese children in this study had mothers with post-secondary education and mothers with no formal education had the highest proportion of underweight and stunted children buttresses the fact that a mother's educational status positively or negatively influences her children's nutritional status.

Limitations

This study was conducted amongst primary school pupils, and the result may not be generalizable over all school-aged children

in Kwara State, since children not enrolled in schools were not captured. A community study among the school aged children may still be needed.

Conclusion

From this study, it can be concluded that majority of the school-aged children in Ilorin-West LGA are well nourished. The prevalence of stunting was higher among girls when compared with boys; among the 10-12 year age-group and also in pupils attending public schools. Obesity was more prevalent in pupils from the private schools. This study also established that mother's level of education and school type are factors associated with malnutrition.

Recommendations

It is recommended that community nutrition enlightenment campaigns be strengthened and possibly school meals be re-introduced to both private and public schools. Awareness should also be created on the emergence of obesity as a public health problem in our society.

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