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Suman Singh Baghel
Ex-Faculty School of Nutrition, Food Science and Technology, College of Agriculture, Hawassa University, Hawassa, Sidama Region, Ethiopia

Astuti Verma
National Centre of Excellence for SAM Management, Project Planning & Monitoring Unit, Kalawati Saran Children Hospital, Lady Hardinge Medical College, New Delhi, India

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A comparative study on food security, feeding practices and dietary diversity score among under five children in cash crop producing and non-cash producing household in Sidama Zone, Southern Region, Ethiopia

Suman Singh Baghel and Astuti Verma

Abstract
Malnutrition is universal health problem of children in developing countries due to poor child feeding practices, lack of appropriate care, low dietary intakes and low dietary diversity. Therefore, this study was designed to assess the child feeding practices (aged 24-59 months) in cash crop producing household and non-cash crop producing household in Sidama zone, SNNPR, Ethiopia. A community based comparative cross-sectional study was conducted on randomly selected 616 under-five children from Wondogent (cash crop producing household) and Dore Bafano (non-cash crop producing household) woredas, SNNPR, Ethiopia. The multi-stages sampling methods were employed to select 616 children (308 children in cash crop producer's area and 308 non-cash crop producer's area households). Household food security was assessed by HFIAS, Feeding practices by structured questionnaire and Dietary diversity score (DDS) was assessed using a 24 hours recall method. Statistical Package for Social Sciences (SPSS) version 20.0 was used to perform statistical analysis. The study indicated that children's daily meal frequency, breakfast, midmorning, afternoon and bedtime snack were more among children in cash crop producing households than non-cash crop producing households ($p<0.05$). Also a significant difference was observed in dietary diversity scores ($x^2 = 13.1$, $p<0.001$), child feeding practices ($x^2 = 12.1$ $p = 0.002$), consumption of dairy products ($x^2 = 15.32$, $p<0.001$) and other vitamin A rich fruits and vegetables ($x^2 = 8.37$, p=0.004) of children between cash crop and non-cash crop producing households. The finding revealed that the child feeding practices and dietary diversity scores of children from cash crop producing households were better compared to those from non-producing household. Therefore, all responsible bodies should be intensified and emphasis on non-cash producing households to improve the nutritional status, child feeding practices, dietary diversity scores and household food security status of children under - five years old.

Keywords: Cash crop, pre-school children, dietary diversity score, food habits, household food security

Introduction

Malnutrition in children remains one of the most important public health and developmental problems in the developing world, mainly affecting the poor and under privileged (Poel *et al*., 2008) [20]. Reducing malnutrition among children under the age of five remains a huge challenge in developing countries of the world. Household food insecurity is a critical variable for understanding the nutritional status of children in low income countries as it is associated with poor diet, food insecurity, and poor child health (Ali *et al.* 2013) [1]. As a strategy to support food security via generating additional income, cash crop production has been promoted in many African countries (Sharma and Zeller, 2000) [25].

Child under-nutrition in Ethiopia is a concern for the households with poor economic level and it covers large areas and affects significant number of people (RHVP, 2007) [23].

Dietary diversity is a way of conceptualizing optimal nutrient intake to increase the variety of foods across and within food groups (WHO, 2012) [30]. However, its limitations can increase child malnutrition. Diets that are diversified reflect higher dietary quality and greater possibility of meeting daily Energy and nutrient requirements (Ghattas, 2014) [11]. Ensuring minimum dietary diversity is particularly critical for vulnerable children because

Correspondence
Suman Singh Baghel
Ex-Faculty School of Nutrition, Food Science and Technology, College of Agriculture, Hawassa University, Hawassa, Sidama Region, Ethiopia

they need energy and nutrient dense foods to grow and develop both physically and mentally and to live a healthy life (FAO, 2010) [10]. Appropriate feeding practices have also been one of the most important for children under five years to tackle child's malnutrition (Birara, 2015) [4].

The nutrition, growth and development of under-five children depend not only on sufficient food, but also on good child feeding and care practices (Raphael *et al*., 2011) [22]. However, a household's capacity to provide feeding and care is dependent on the availability of resources or the absence of constraints within the household (Birara, 2015) [4].

In Ethiopia, the scope of both undernutrition and food insecurity is very high in rural areas where lively hood depends on backward farming system (Sarah *et al*., 2013) [24]. Child under nutrition in Ethiopia is a concern for the households with poor economic level and it covers large areas and affects significant number of people (RHVP, 2007) [23].

Malnutrition among children under five years of age is a chronic problem in most regions of Ethiopia, including the study region (SNNPR). It has been shown that early nutritional improvements can have a powerful positive impact on the population's health, which is a prerequisite to economic development (Hoddinott *et al.* 2013) [15].

The specialization in cash crop area production allows farm households to increase their overall income by producing a commodity which provides a higher income. They can then use the cash income obtained from sales of produce to buy food as well as consumption goods and achieve a higher level of welfare, including food security (Alston & Pardey, 2010) [19]. The cash crop production reduces rural poverty because it contributes to the diversification of livelihoods thus increasing household's average income earning potential which in turn increases the household's spending potential on food and non-food items. The benefits from cash cropping accrue to non-cash crop producers by providing employment particularly since producing cash crops is typically labour-intensive (Poulton *et al.,* 2006) [21]. Moreover there were very limited studies in Ethiopia including South region on feeding practices and nutritional status of under-five children. So the present investigation was carried out to assess and the child feeding practices (aged 24-59 months) in cash crop area district and non-cash crop producing district household in Sidama zone, SNNPR, Ethiopia.

Methodology
This study purposively selected two districts, Wondo Gent and Dore Bafano in Sidama zone, SNNPR, Ethiopia. A community based comparative cross- sectional study was conducted to assess the feeding practices, dietary diversity score and food security among under -five children in the age of 24-59 months specific study the area.

Study Population
All children aged 24-59 months in Wendo Gent and Dore Baran District In Sidama Zone, SNNPR, Ethiopia were the source population.The study population included all the children aged 24-59 months randomly selected from cash crop (Yuwo, Aruma and Eddo) and in non-cash crop (Dore, Gelecha and LABU) Kabels. A systematic random sampling was used to select study children from the source population. The children were identified by their immunizations card and birth certificate available at heal.

Inclusion and Exclusion Criteria: All children aged 24 to59

months and mothers/caregivers who were there residents of the study area at least for 6 months were included for the study. Whereas Children aged 24 to 59 months who had deformities, which cause difficulty for measurement and who were chronically sick at the time of study were excluded. Children and mothers/caregivers who were not found at home during three visits were also excluded from the study.

Sampling Procedures
A sample size of 616 children (308 from each group) was calculated by EpI info version 3.03statistical software for two-population proportions formula. A multi-stages sampling method was used for selection of samples. First, two Weredas, Wendo Gent and Dore Bafano, were purposively selected from Sidama Zone and stratified in to two cash crop producing and non-cash crop producing area. From sixteen kabels of cash crop producing area (Wendo Gent) and twenty three kables of non-cash crop producing area (Dore Bafano), from both of them three kables from each area were randomly selected for the study. In each kebele sample was determined by proportional allocation on the bases of total number of children aged 24-59 months. Finally, the children were selected by systematic random sampling selected from each Kebele using list of households in each category.

Data Collection Procedures
Data was collected from mothers/care givers who have children in age 24 to 59 monthsfrom each household by direct interviewing. Pre tested and structured questioner was used to collect data on socio economic and demographic characteristics.

Socio Demographic and Economic Data
The socio-demographic variables such as; age of the child and mothers, sex of child, head of the household, family size, occupation, education status, and ethnicity were collected.

The wealth index catalogue principal component analysis (PCA)
The wealth index (WI) is a composite index composed of key asset ownership variables; it is used as a proxy indicator of household level wealth (DHS, 2014) [7].

The indicator was constructed using household asset view(chair, table, bed, electricity, radio, television, mobile phone, horses, donkey, cows, bulls, goats and sheep, cart), housing condition(house type, roof materials, number of rooms, wall type and floor type), land size in hectare, quantity of domestic animals, ownership of improved water and sanitation facilities via a principal component analysis. Each asset was assigned a score of (0) and (1) where an increased value reflected better status a wealth category composed of fifteen variables was formed. Continuous and categorical variables, which were transformed into dichotomous indicators, were examined using PCA to produce a common factor score for each household. Variables with smaller Eigen were excluded from the list.

These factors were then summed to get a single wealth index. The study participant were ranked according to the wealth index score and divided into quintiles, low, medium and high. (Vyas and Kumaranayake, 2006) [28].

Child Feeding Practices
An interviewer administered questionnaires concerning feeding practices of the child. Mothers/caregivers were

requested to response child's meal per/day, when the child eats meal, food child dislike, breakfast, midmorning, afternoon and bedtime snack, leftover food, pressured, restricted to eat meal. Finally, it was grouped into: Good feeding practices if mean score was grater or equal to mean (≥4) and poor if mean score was less than mean (<4).

Household Food Security
Household Food Insecurity Access Scale (HFIAS) was used to assess household food security. Nine-item questionnaire with three domains of food insecurity, anxiety/uncertainty about the household food supply, insufficient quality of food (including variety and food preferences), and insufficient food intake and its physical consequences, was used. The mother responses indicate a frequency of occurrence of the following: never, rarely (1 to 2 times), sometimes (3 to 10 times), and often (>10 times) for each of the questions over the previous 30 days. This was then used to calculate HFIAS scores. HFIAS scores range from 0 to 27, with a higher score indicating greater food insecurity (Jennifer *et al.*, 2007) [13]. The last three questions of the HFIAS were used to calculate the Household Hunger Scale (HHS). The three questions inquired about whether participants "had no food in the house," "went to sleep hungry," or "lacked food for 24 hrs." The household score recodes the responses to each frequency-of-occurrence question from three frequency categories ("rarely," "sometimes," and "often") into two frequency categories ("rarely or sometimes" and "often"). Each household will have score between 0 and 6. These values are then used to generate the household indicators which in turn are categorized into little to no hunger (0-1) in the household, moderate hunger (2-3) in the household, and severe hunger (4-6) in the household (Ballard *et al.* 2011) [3].

Children's Dietary Diversity
The Diet Diversity Score (DDS) and a 24-hour recall method were conducted with Mothers/caregivers regarding their child's intake. The seven food groups namely grains, roots, tubers; legumes, nuts, seed; dairy products, flesh foods (meats, fish, poultry); eggs, oils/fats and vitamin A rich fruits and vegetables were used in this study (WHO, 2010) [29]. A child with a dietary diversity (DDS) of<4, was classified as poor dietary diversity and high if a child dietary diversity (DDS) was ≥ 4.

Data Analysis
Data were edited, coded, entered and analyzed using SPSS for windows version 20.0.

Ethical Considerations
Ethical clearance was obtained from the Institutional Review Board (IRB) of the college of medicine and health sciences of Hawassa University. The purposes and importance of the study was explained at all levels. Informed consent was obtained from the study participants before data collection. Confidentiality was maintained by not sharing the information gathered from the respondents.

Result and Discussion
Socio-Demographic characteristics of the study participants
The basic determinants of under- nutrition in children under - five years are rooted in poverty and involve interactions between socio-economic and demographic conditions (UNICEF, 2013) [24]. The present study was carried out on 616 households of which 308 were cash -crop producing households and 308 were non-producing households with an overall response rate of 99 percent. The mean age of mother was 32.56±6.867 and 33.14±6.78 years and children were 42.71±11.6 and 42.68±11.25 months respectively from cash crop and non-cash crop producing households. The average family size of cash crop and non-cash crop producing households was 6.42±1.52 and 5.28±1.43 respectively. Majority, 82.6 and 80.5 percent of the households in cash-crop producers and non-producing households were from Sidama ethnic group respectively. The educational level of mothers in cash crop producing and non -producing households revealed that only 8.4 and 7.14 percent mothers were had elementary education and majority of mothers, 48.05 and 49.02 percent were illiterate respectively. The sex ratio of children the present study showed low percent of female in both group then males. The per cent of females were 47.41 and 49.65 respectively in cash crop and non-cash crop producing households.

Table 1: Socio-demographic characteristic of the study participants

Characteristics	Wendo Gent (*n* 308) (Cash crop producing households)		Dore Bafano (*n* 308) (Non-cash crop producing households)	
	Frequency	**Percent**	**Frequency**	**Percent**
Age of Mother (Years)				
Mean ± SD	32.56±6.867		33.14±6.78	
Age of Children (Months)				
Mean ± SD	42.71±11.6		42.68±11.25	
Family Size				
Mean ± SD	6.42±1.52		5.28±1.43	
Sex of Children				
Male	162	52.59	155	50.35
Female	146	47.41	153	49.65
Ethnicity				
Sidama	254	82.6	248	80.5
Amhara	16	5.1	14	4.5
Gurage	9	2.9	18	5.9
Others	29	9.4	28	9.1
Head of Households				
Father	240	77.9	236	76.6
Mother	36	11.88	42	13.6
Both	32	10.22	30	9.8

Educational Level of mothers				
Unable to read and write	148	48.06	151	49.03
Grade 1-4	53	17.21	62	20.13
Grade 5-8	81	26.29	73	23.7
Grade 9-10	26	8.44	22	7.14

Occupational and Economical Characteristic of the Study Participants

Socioeconomic inequalities play an important role on health and nutrition. (Alkerwi *et al.* 2007) [2] People with high socioeconomic status (SES) have more purchase power for healthier food habits compare to low SES have dietary profiles less consistent with nutritional recommendations or dietary guidelines, hence contributing to their poorer health status. (Darmon and Drewnowski, 2008) [6]. Therefore, both social inequity and diet quality, reflected by healthy dietary behaviours are areas of active public health concern.

Occupational and Economical status of the households are presented in table 2. Occupational Status of mother showed that 17.53, 54.22 and 28.25 percent from cash crop producing households and 39.62, 47.07 and 13.31 percent from non-cash crop households were housewife, farmer and daily labour respectively whereas, Occupational Status of father revealed that that 63.96, 13.63 and 22.41 percent from cash crop producing households and 52.28, 27.27 and 20.45 percent from non-cash crop households were farmer, daily labour and others respectively. Wealth index of household revealed that cash crop producing household showed 15.91, 49.35 and 34.74 percent and non-cash crop household showed 23.05, 57.79 and 19.15 respectively for low, middle and high wealth index respectively. Occupational status of children's mothers and fathers and wealth status were significantly different ($p<.05$) between in cash crop producing and non-cash producing households.

Table 2: Occupational and economical characteristic of the study participants

Characteristics	Wendo Gent (*n* 308) (Cash crop producing households)		Dore Bafano (*n* 308) (Non-cash crop producing households		P value
	Frequency	Percent	Frequency	Percent	
Occupational status of mothers					
House wife	54	17.53	122	39.62	0.005*
Farmer	167	54.22	145	47.07	
Daily labour	87	28.25	41	13.31	
Occupational status of Fathers					
Farmer	197	63.96	161	52.28	0.004*
Daily Labour	42	13.63	84	27.27	
Others (Government employee, merchant)	69	22.41	63	20.45	
Wealth Index					
Low	49	15.91	71	23.05	<0.002*
Middle	152	49.35	178	57.79	
High	107	34.74	59	19.15	

Chi-square test, Independent sample test, * statistically significant difference observed at *p<0.05*

Feeding Practices of Study participants

Appropriate child feeding practices and optimal nutrition during childhood is critical to ensuring optimal child health and development (WHO, 2010) [29]. For the growth and development of a child, the impact of feeding practices is more significant than lack of food (UNICEF, 2013) [24]. Inappropriate feeding of the child during early childhood due to lack of mothers/caregivers knowledge stands out as a major determinant of childhood malnutrition (FAO, 2010) [10].

Feeding practices of children is depicted in table 3. The table showed that 57.9 percent children in non-cash crop producing households and 41.5 percent children in cash crop producing households had daily meal frequencies of at least 4 which demonstrated a highly significant statistical difference ($p<0.002$). The study revealed that children in non-cash crop producing households had low proportion of daily meal ≥4 compared to those in cash crop ($p<0.05$). This could be due to an indication that being cash crop is a way to increase child's daily meal frequencies. Studies conducted in Ethiopia and Zambia showed that the proportion of daily meal frequency ≥4 among children during the survey was high (Disha *et al.,* 2012) [8]. On contrary, a study done in Ethiopia (Ghate, 2014) [12] reported that proportion of daily meals ≥4 among children during survey was lower compared to current study. This could be due to that the present survey was conducted in the harvesting season of cash crop producing that may increase food availability, accessibility and utilization by communities at household level. Moreover, this finding showed that there was statistically significant difference between children from cash crop producing households and non-cash crop producing households in the frequency of mini meals such as; breakfast (p=0.004), midmorning snacks ($p<0.003$), afternoon snacks ($p<0.029$) and bedtime snacks ($p<0.002$). Regarding child's mini meals, this study showed that high proportion of children from non-cash crop producing households did not take breakfast and midmorning snack compared to those from cash crop producing ($p<0.05$).Poor child feeding practices were reported both the study areas. But the proportion of poor child feeding practices in non-cash crop households were significantly higher (38.31 percent) than those cash crop producing households (26.29 percent) (x2 =7.11, $p<.008$). The present study showed that 61.4 percent of children were restricted from meal in non-cash crop producing households compared to 37.33 percent in cash crop producing household. Likewise, 48.4 percent versus 36.5 percent ($p<0.001$) of children were pressurized to eat meals in non-cash crop producing and cash crop producing households, respectively. However, the proportions of children who consumed leftover foods were not different between non-cash crop producing, 41.56 percent and cash crop producing households, 37.98 percent households (p=.0677)

Table 3: Feeding practices of the children

Food Groups	Wendogent (n-308) Cash Crop Producing House holds		Dore Bafano (n-308) Non-Cash Crop Producing House holds		Chi-Square Test	P-value
	Frequency	Percent	Frequency	Percent		
Child's meal Frequency						
≥4	178	57.9	128	41.5	19.1	<0.002*
≤3	130	42.1	180	58.5		
Did the child eat breakfast in the past 24 hours?						
Yes	220	71.43	187	60.7	8.8	0.004*
No	88	28.57	121	39.3		
Did the child eat midmorning snack in the past 24 hours?						
Yes	120	38.96	67	21.8	21.87	<0.003*
No	188	61.04	241	78.2		
Did the child eat afternoon snack in the past 24 hours?						
Yes	175	56.8	146	47.4	4.797	0.029*
No	133	43.2	162	52.6		
Did the child eat bedtime snack in the past 24 hours?						
Yes	73	23.7	37	12	12.1	<0.002*
No	235	76.3	271	88		
Do you restrict child during his/her food?						
Yes	115	37.33	189	61.4	8.81	0.003*
No	193	62.67	119	38.6		
Do you pressurize the child to eat his/her food?						
Yes	111	36.5	149	48.4	8.81	0.003*
No	197	63.5	159	51.6		
Is there any food that the child dislike						
Yes	197	63.96	189	61.36	0.687 7.11	0.408
No	111	36.04	119	38.64		
Child feeding Practices						
Good	191	62.01	118	38.31	7.11	0.007*
Poor	117	37.99	190	61.89		

Chi-square test, Independent sample test, * statistically significant difference observed at *p<0.05*

Dietary Diversity Score of Study Participants:
Children dietary diversity is a key element of high quality diet and increasing the variety of foods consumed by most dietary guidelines (WHO, 2010) [23]. As dietary diversity is improved, it ultimately increases the energy and nutrients intake and thus, is significantly associated with weight-for-age, length-for-age and weight-for length (Christina, 2011) [5]. Dietary Diversity Score of children is presented in Table 3. Dietary Diversity Score showed that consumption of cereals were comparable, 99.3 and 99.67 per cent respectively in both cash crop and non-cash crop producing households. Among cereals roots, tubers and Kocho were the most common food groups consumed among children in both groups. A study done in Sri Lanka, reported that the main food groups (staple foods) consumed by children in a household were cereals, roots and tuber products while flesh foods and dairy products were generally less consumed (Kandeepan et al., 2016) [16]. The legumes consumption of cash crop producing households was 85.7 per cent whereas the non-cash crop producing households showed 81.2 percent consumption. An insignificant difference was observed between two groups in the consumption of cereals and legumes. A highly significant difference (*p<0.002***) was observed in the consumption of dairy products which was 44.8 and 26.2 percent respectively in cash crop and non-cash crop producing households. A 20.7 and 14.9 percent consumption of Meat, poultry and fish was found in cash crop and non-cash crop producing household respectively whereas the consumption eggs was 20.78 and 14.9 percent respectively in cash crop and non-cash crop producing households. No difference was found between the two groups in the consumption of flesh food and eggs. Again

highly significant difference (0.003**) was found in consumption of Vitamin A rich fruits and vegetables in cash crop and non-cash producing households which were 30.5 and 12.0 per cent respectively. Similarly, Naser et al. (2015) [12] illustrated that high proportion of dairy products and vitamin rich fruits and vegetables were consumed among children in cash crop households than those in non-cash crop producing households and difference was statistically significant. Farmers in cash crop households may produce largely dairy products and horticulture produce through better irrigation arrangement to generate household incomes and this may increase the consumption of these food groups. A 45.4 and 28.89 percent and of children in cash crop producing and non-cash crop producing households had DDS ≥4, with statistically significant difference (x2=13.1 *p<0.001***). Ntwenya et al., (2015) [18] reported a similar finding and concluded that the risk for inadequate dietary diversity was higher in non-cash crop households compared to cash-crop households. This might be due to the reasons that being cash crop producing household availability of variety of food helps to increase dietary diversity score compared to non- cash crop producing households. Emphasizing dietary diversity especially in developing countries is particularly important for micronutrient status and nutrient adequacy. However, it was shown to be strongly dependent on household's socioeconomic status (Ali et al., 2013) [1]. Families with greater incomes tend to have diets that are more diverse and their children grow better for a number of reasons (Tadiwos and Degnet, 2013) [26], but lower intakes of food sources have also been observed among children in the low income households.

Table 4: Dietary diversity scores of children in cash crop producing and non- cash crop producing households

Food Groups	Wendogent (n-308) Cash Crop Producing House holds		Dore Bafano (n-308) Non-Cash Crop Producing House holds		Chi-Square Test	P-value
	Frequency	Percent	Frequency	Percent		
Cereals / Root / Tubers						
Yes	306	99.4	307	99.67	2.08	0.15
No	2	0.6	1	0.33		
Legumes / Nuts						
Yes	264	85.7	250	81.2	2.09	0.148
No	44	14.3	58	18.8		
Dairy products						
Yes	138	44.8	81	26.3	15.44	<0.002*
No	170	55.2	227	73.7		
Meat, Fish, Poultry						
Yes	64	20.78	52	16.9	1.029	0.31
No	244	79.22	256	83.1		
Eggs						
Yes	64	20.78	46	14.9	1.86	0.172
No	214	79.22	262	85.1		
Vitamin A rich Fruits and Vegetables						
Yes	94	30.5	37	12.0	8.37	0.003*
No	214	69.5	271	88.0		
Dietary Diversity Score						
High	146	47.4	89	28.89	13.1	<0.001*
Low	162	52.6	219	71.11		

Chi-square test, Independent sample test, ** statistically significant difference observed at $p<0.05$

Household Food security
Ethiopia is one of the seven African countries that constitute half of the food insecure population in Sub-Saharan Africa (Birara, 2015) [4]. About 10% of Ethiopia's citizens are chronically food insecure and 2.7 million people required emergency food assistance in 2014 and 238,761 children required treatment for severe and acute malnutrition in 2014 (Endalew *et al.,* 2015). The household food security of the households is presented in table 5. The table revealed that 51.62 and 21.43 percent children respectively from cash crop and non-cash crop producing households were food secure. Among cash crop producing households 15.92, 20.45 and 12.01 percent children were mild, moderate and severely food insecure respectively whereas the non -cash crop producing household showed 23.05, 33.12 and 22.4 percent children were mild, moderate and severely food insecure respectively.

Table 5: Household food security of the study participants

Characteristics	Wendo Gent (n 308) (Cash Crop Producing households)		Dore Bafano (n 308) (Crop Producing households)	
	Frequency	Percent	Frequency	Percent
Food Secure	159	51.62	66	21.43
Mild food secure	49	15.92	71	23.05
Moderately food secure	63	20.45	102	33.12
Severely food insecure	37	12.01	69	22.4

Conclusion
This study demonstrated that there was statistically significant difference in child feeding practices, child's daily meal, mini meals, frequency and restriction of child during meals between non-cash crop and cash crop producing households. Consumption of dairy products, egg product, vitamin rich fruits and vegetables and dietary diversity scores were significantly higher among children in cash crop producing households than non-cash crop producing households. Household food security of cash crop producing household was better than non-cash crop producing household.

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