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INFANT NUTRITIONAL PATTERNS AND TRENDS IN SUB-SAHARAN AFRICA: EVIDENCE FROM DEMOGRAPHIC AND HEALTH SURVEYS 1986-1998¹

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Introduction

The problem of malnutrition is an important health and welfare problem among infants and young children in Sub-Saharan Africa. It results in increased risk of illness and death. In addition, malnutrition can result in a lower level of cognitive development, which results in lower educational attainment. Malnutrition also has inter-generational effects. Infants born to women who themselves were malnourished during early childhood are smaller than infants born to better nourished women. Infants born with low birth weight, defined as less than 2.5 kg, are at greater risk of illness and death compared with normal weight infants.

The number of deaths arising from malnutrition among children in Sub-Saharan Africa is relatively high. In Mali an estimated 57 percent of all deaths among children under the age of five years are related to malnutrition (Haggerty et al. 1998) whereas in Kenya and Senegal the percentage is 38 percent (Macro International 1996 Kenya; Macro International Senegal 1996). Recent studies indicate that in some countries in Sub-Saharan Africa the toll of hunger and malnutrition is increasing rather than decreasing. This poses a serious health challenge with policy implications. For example, inadequate nutrition may stunt growth and increase mortality of infants. Understanding the changing patterns of malnutrition in Sub-Saharan Africa is thus critical in devising effective strategies and programs in combating the problem.

This paper provides an overview of the nutritional situation in Sub-Saharan Africa looking at patterns and trends. The analysis is based on data from the first, second and third phases of the Demographic and Health Surveys (DHS). To explore variations within Sub-Saharan Africa in levels of malnutrition, we focus on countries for which we have ample nutritional data from the DHS, such as Cameroon, Ghana, Kenya, Madagascar, Mali, Niger, Rwanda, Senegal, Tanzania, Uganda, Zambia and Zimbabwe. The paper begins with a description of the sources of data. The patterns of malnutrition based on the percentage of children who are stunted and underweight as well as the patterns of breast feeding are then described. In the third section we examine trends in malnutrition based on the percentage of children who are stunted, wasted and underweight. And finally comes the discussion and conclusion. The results reveal that many children in Sub-Saharan Africa are malnourished, even though there are significant geographical differences. Levels of malnutrition also appear to be on the increase in many countries in the region.

Data and Methods

Until recently statistical data on infant nutritional patterns in Sub-Saharan Africa were virtually absent. To estimate patterns and trends in malnutrition, this paper has drawn upon data from Nutritional Chart Books derived from Demographic and Health Surveys conducted since the early 1980s. Three major rounds of DHS surveys have been conducted since the late 1980s. DHS I conducted between 1985-1990; DHS II from 1991-1994 and DHS III 1995-1998.

The DHS surveys are nationally representative sample surveys designed to provide information on fertility, mortality, family planning and maternal and child health. The individual questionnaires are based on information on fertility, nuptiality, fertility preferences, family planning, infant and child mortality, maternal mortality, child health, breastfeeding, nutritional status of mothers and young children, and more recently HIV/AIDS. Data collected at the household level concern characteristics of all household members, housing characteristics and possession of certain specific durable goods. At the community level, data were collected on the availability of health and family planning services for each community. Nutritional data collected on children usually include weight, height, age, breastfeeding history, and feeding patterns. The size of the sample varies from country to country. For example in the 1995/96 Mali DHS a sample of 9704 women aged 15 to 49 years belonging to 8716 households and 2474 men from 15-59 years belonging to 2869 households were interviewed, whereas in the 1998 Ghana DHS a total of 4,843 women aged 15-49 and 1,546 men aged 15-59 were interviewed (Statistical Service of Ghana 1999).

Nutritional status is measured by three indicators: stunting, wasting and underweight. We also draw on estimates of breast-feeding patterns in terms of their duration and exclusivity. The indices of nutritional status are expressed as standardized (z-score) deviation units from the median of a reference population recommended by the World Health Organization (WHO). The rationale for the use of the reference population is based on the finding that well nourished children in all population groups for which data exist follow similar growth patterns before puberty and thus, exhibit similar distributions with respect to height and weight at given ages (Martorell and Habicht 1986). The reference population used here is the international reference population defined by the United States National Centre for Health Statistics (NCHS). Here children who fall below two standard deviations from the reference median are regarded as malnourished.

Stunting, defined as height-for age, more than two standard deviations below (-2SD) the median of the NCHS reference population, is the failure to grow adequately in height in relation to age. It reflects past or chronic malnutrition and results from inadequate food intake over a long period of time and /or repeated episodes of illness, particularly diarrhoea. In other words, the children are too short for their age. Stunting is a good long-term indicator of the nutritional status of a population because it is not markedly affected by short-term factors such as season of data collection, epidemic

illnesses, acute food shortages, or recent shifts in social or economic policies (Macro International 1998).

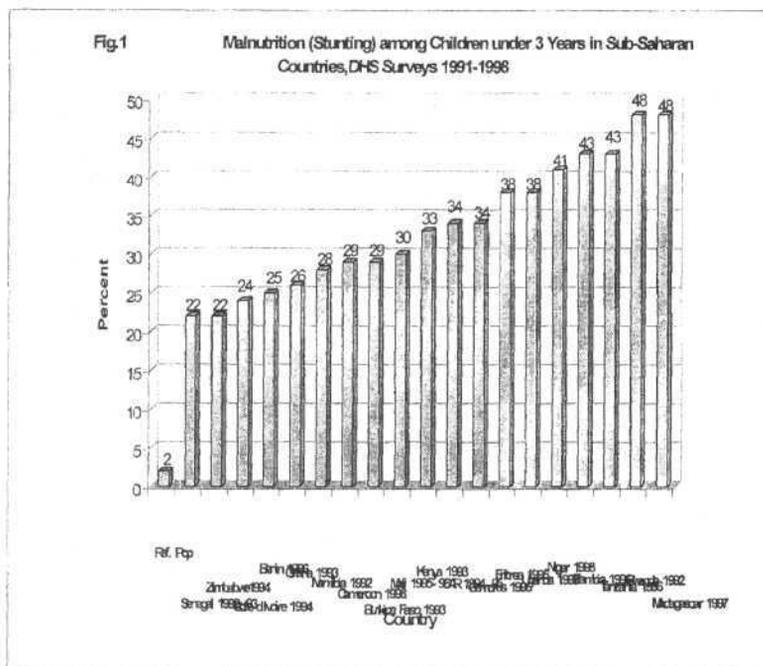
Wasting, defined as weight-for height more than two standard deviations below (-2SD) the median of the NCHS reference population, is the failure to gain weight adequately in relation to height and reflects recent or acute malnutrition. Wasting results from a recent shortage of adequate nutrition and /or recent or current acute illness, especially diarrhoea. In other words the child becomes too thin for his or her height. Underweight, defined as weight-for-age more than two standard deviations below (-2SD) the median of the NCHS reference population, is a composite indicator that reflects either chronic or acute malnutrition, or both. It does not add additional information beyond that provided by the indicators of stunting and wasting, however, it is often used as a general indicator of a population's health status. This condition can result from either chronic or acute malnutrition, or a combination of both.

With regard to data quality there are several issues that might affect the interpretation of anthropometric findings. It is important to know whether the children who were measured are representative of the larger population; whether the height and weight measurements are accurate, and whether the age information is reliable (Sommerfelt and Stewart 1994). Comparison of nutritional status among Sub-Saharan countries must be done with caution, as the season in which anthropometric data are collected can greatly affect the proportion of children categorized as stunted, wasted, or underweight. For example, data for the 1988 GDHS was collected during a hot, rainy period (February to June 1988) while the 1993 GDHS was conducted during a relatively dry period following the harvest (September 1993 to February 1994) (Agble et al. 1995).

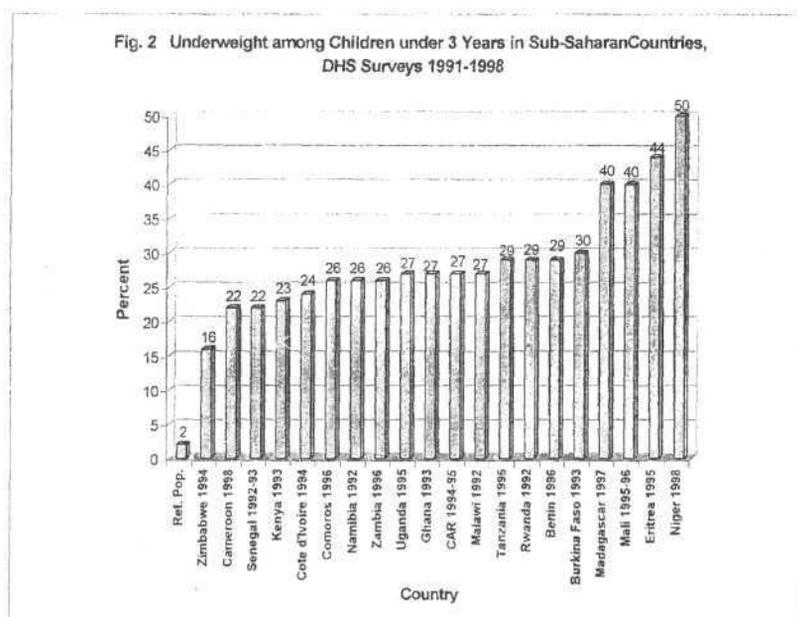
Some shortcomings with respect to the analysis of the trends of malnutrition should be noted. First not all the countries participated in the round of surveys. Second, anthropometric data was not collected for all the surveys. Third the age of the children varied from one survey to the other. Because of these problems, not all countries are included in the assessment. We include only those for which we have at least two rounds of survey data. Secondly, the ages of the children differ. For example whereas in the analysis of patterns we restrict the data to children under 3 years, the trends are based on the most convenient estimates between the surveys provided. We provide three periods for purposes of the trends based on the DHS data. 1986-1990, 1991-1994 and 1995-1998.

Patterns of Malnutrition

Despite these data limitations, there are noticeable and significant regional differences in the proportion of children suffering from malnutrition in Sub-Saharan Africa. Fig 1 shows the level of stunting among children under 3 years in Sub-Saharan African countries between 1986-1998. Figure 2 shows the level of underweight among the same category of children and the time period. The



Source: DHS Nutrition Chart Books on Individual Countries 1991-1998



Source: DHS Nutrition Chart Books on Individual Countries 1991-1998

statistics clearly show that children in Sub-Saharan Africa are malnourished irrespective of the geographical area.

The percentage of children less than 3 years who are stunted ranges from 22 to 48 percent. Levels of stunting are relatively low in countries such as Senegal (22 percent), Zimbabwe (22 percent) and Cote d'Ivoire (24 percent). Countries with the highest levels of stunting are made up of Madagascar,

(48), Rwanda (48), Malawi (49), Tanzania (43) and Zambia (43). In the middle of this range can be found countries such as Ghana (26) and Benin (25 percent). Significant regional differences also emerge in levels of underweight.

The percentage of children below 36 months who are underweight ranges from 16 to 50 percent. Niger has the highest underweight count of 50 percent with Zimbabwe the lowest (16 percent). Of particular interest are countries within the Sahelian region. Eritrea reported a percentage of 44, Mali, 40 percent, Burkina Faso 30 percent, Niger 50 percent. Consistent with the findings for stunting we find relatively low underweight figures for Zimbabwe, Cote d'Ivoire and Senegal.

Important differences also emerge with respect to urban and rural areas. Demographic and Health Survey data show that rural areas generally have higher rates of stunting compared to urban areas. In Senegal for instance the rate of stunting was 15 percent for urban areas and 31 percent for rural areas. Zimbabwe recorded 18 percent for urban and 23 percent for rural areas. Kenya, Mali and Ghana follow a similar trend with the urban areas recording 21 percent, 22 percent and 16 percent respectively as against 35 percent, 33 percent and 30 percent for rural areas.

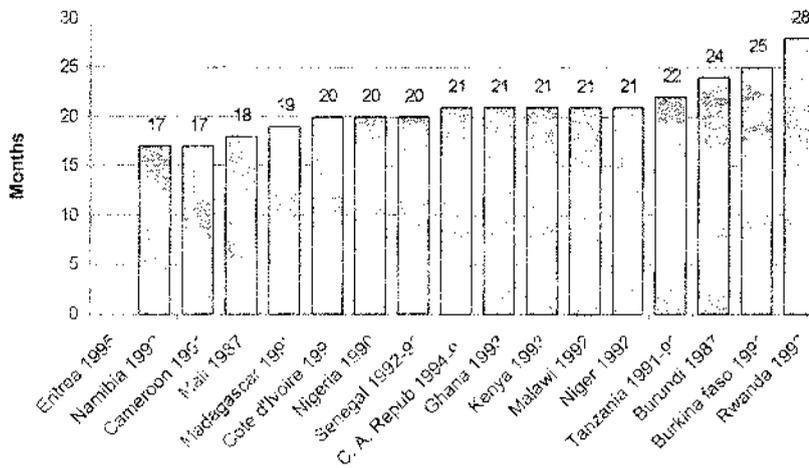
The picture for underweight children is not different. There are significant differences in the levels of underweight between urban and rural areas with higher rates prevailing in the rural areas. For example in Senegal, rural areas recorded 26 percent as against 14 percent in urban areas. Ghana also recorded 32 percent for rural areas and 18 percent for urban areas. In Zimbabwe however, the variation between urban and rural levels is much less. Urban areas recorded 13 percent and rural areas 17 percent.

The levels of wasting on the other hand follow a different pattern. In Zimbabwe, Kenya and Mali there are no significant differences between urban and rural areas. Zimbabwe and Kenya record 6 percent and 24 percent respectively for urban and rural areas. This shows a slightly higher incidence in levels of wasting. Kenya recorded 5 percent for urban and 6 percent for rural areas. There are slight variations in the figures recorded for Ghana and Senegal. Urban areas recorded 9 percent in Ghana and 7 percent in Senegal as against 13 percent and 10 percent for the rural areas respectively.

Patterns Of Breast-Feeding

Like the indicators of malnutrition discussed, breast-feeding is also a critical factor in infant nutrition and growth, health and survival. Since the mid 1980s Demographic and Health Surveys have demonstrated for a number of countries that the median duration of breast-feeding varies among countries within Sub-Saharan Africa (see *Fig. 3*). Countries with relatively high duration of breast-feeding include

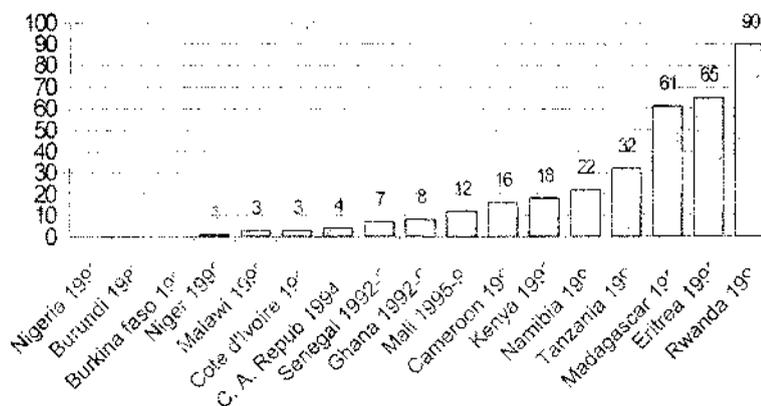
Fig. 3 Median Duration (Months) of Breastfeeding Sub-Saharan Africa Countries



Source: Adapted From Macro International (1997) page 12

Rwanda, Burundi and Burkina Faso. Reckoning of exclusive breast-feeding however gives quite a different picture and the distribution is crucial. Internationally recognized guidelines for breast-feeding suggest that all children should be breast-fed exclusively for at least four months. However DHS country results have shown that in only very few countries does the percentage of children under four months of age being exclusively breast-fed exceed 30. As shown in Figure 4, only in Rwanda, Eritrea, Madagascar and Tanzania does the percentage of exclusive breast-feeding exceed 30 percent. This indicates that substitutes such as water, powdered milk, porridge and other foods are introduced very early in most countries (*see figure 4*). But there are high risks of other foods being contaminated and causing diarrhoea.

Fig. 4 Infants Under 4 months who are Exclusively Breastfed Sub-Saharan African Countries



Source: DHS Malnutrition Chart Books 1986-1998

Trends In Malnutrition

An analysis of the nutritional situation through time also provides interesting patterns (see Table 1). There is overwhelming evidence from the DHS to show that malnutrition has been increasing in most of the countries in Sub-Saharan Africa. The situation in West Africa, especially the Sahelian region, is very disturbing. Data from Mali shows that the nutrition situation has worsened markedly since the 1987 Malian Demographic and Health Survey (MDHS). Between 1987 and 1995/96, among children between 3 to 35 months of age, the proportion stunted appears to have increased by 38 percent (from 24 to 33 percent), the proportion wasted appears to have more than doubled rising from (from 11 to 25), and the proportion underweight may have increased by 42 percent (31 to 44) (Haggerty et al. 1998).

Data from the 1991 and 1998 Cameroon Demographic and Health Surveys (CDHS) also show significant increases in all the three indicators of malnutrition. The percentage of children under 3 years who are stunted increased from 23 percent in 1991 to 29 percent in 1998; wasting increased from 4 percent in 1991 to 6 percent in 1998 and underweight increased from 16 percent to 22 percent during the same period (Macro International, USAID 1999). The nutritional situation in Niger has also worsened. The proportion of children stunted increased from 36 percent in 1991-1994 to 41 in 1995-98, wasted increased from 18 to 21 and underweight from 44 to 50 percent.

A comparison of the Senegal Demographic and Health Survey (EDS) 1986 and 1992/93 provides a basis for looking at nutritional trends in the country over the years. During the EDS 1 only children 6 to 36 months of age were included, therefore comparisons in the text between 1986 and 1992/93 are based on the 6 to 36 months age range. Compared with the results from the 1986 EDS 1, which included anthropometric data for children age 6 to 36 months only, there has been no change in the prevalence of malnutrition during this six-year period. Although slight changes in the prevalence of stunting and wasting are observed, they are small and not significantly different (Macro International, MOH Senegal, 1996).

In Ghana among children aged 3 to 35 months the level of stunting increased from 28 to 30 percent between 1988 and 1993. The percentage of children underweight also went up from 30 to 31 percent whereas wasted children increased from 8 to 12 percent within the same time periods (Agbie et al. 1995). The recent statistics on nutrition from the 1998 GDHS shows that there has been some improvement in the nutritional status of Ghanaian children (Statistical Service of Ghana 1999). However, in the absence of detailed information on the nutritional situation as usually pertains in the Nutritional Chart Books we are unable to make any definitive analysis of the contemporary situation.

The picture in Eastern and Southern Africa is also not very encouraging. Data on Tanzania shows that the percentage of children under 5 years who are stunted has not changed between the period of the TDHS 1991-92 and the TDHS 1996. However, there was a significant

TABLE 1: Infant Nutritional Trends in Sub-Saharan Africa *

COUNTRY	DHS, 1985-1990	DHS, 1991-1994	DHS, 1995-1998
EAST AND SOUTHERN AFRICA			
Tanzania		Stunted 43 Wasted 6 Underweight 29	Stunted 43 Wasted 7 Underweight 31
Zimbabwe	Stunted 30 Wasted 1 Underweight 13	Stunted 24 Wasted 6 Underweight 18	
Zambia		Stunted 40 Wasted 5 Underweight 25	Stunted 43 Wasted 4 Underweight 24
Madagascar		Stunted 45 Wasted 6 Underweight 36	Stunted 48 Wasted 7 Underweight 40

TABLE 1 (continuation)

COUNTRY	DHS, 1985-1990	DHS, 1991-1994	DHS, 1995-1998
WEST AFRICA			
Mali	Stunted 24 Wasted 11 Underweight 31		Stunted 33 Wasted 25 Underweight 44
Ghana	Stunted 28 Wasted 8 Underweight 30	Stunted 20 Wasted 12 Underweight 31	
Niger		Stunted 36 Wasted 18 Underweight 44	Stunted 41 Wasted 21 Underweight 50
Senegal	Stunted 23 Wasted 6 Underweight 22	Stunted 25 Wasted 8 Underweight 22	
Cameroon		Stunted 23 Wasted 4 Underweight 16	Stunted 29 Wasted 6 Underweight 22

Sources: DHS Nutrition Chart Books on Individual Countries 1985-1998

*Zimbabwe, children 3 to 35 months; Niger, children under 3 years; Madagascar, children under 3 years; Zambia, children age 1 to 59 months; Tanzania, children under 5 years; Mali, children 3 months to 3 years of age;

Cameroon, children under 3 years of age; Senegal, children aged 6 to 36 months of age; Ghana, children 3 to 35 months.

increase in the percentage who were underweight and those who were wasted. There was an increase in the percentage of underweight children from 29 to 31 percent. Also the percentage of wasted increased from the 1991-1992 figure of 6 to 7 percent (Macro TDHS, 1998).

The 1994 Zimbabwean Demographic and Health Survey collected data on children less than 3 years of age whereas the 1988 ZDHS collected data on children less than 3 years of age whereas the 1998 ZDHS collected data on children aged 3 months to 5 years. To allow for comparison of trends using these two surveys, results from both surveys were re-analysed using the common age range of 3 to 35 months. The comparison shows a decline in the prevalence of stunting during the 6 year period from 30 to 24 percent. In contrast, the prevalence of wasting increased from 1 to 6 percent and underweight increased from 13 to 18 percent (Macro International, MOH Zimbabwe; University of Zimbabwe 1996).

In Madagascar the evidence also suggests that the nutritional status of Malagasy children under 3 years of age has worsened between the period 1992 and 1997. The percentage of children under 3 years that are stunted increased from the 1992 level of 45 to 48 in 1997. The percentage of children wasted also increased from 6 to 7 percent and underweight children rose from 36 to 40 percent (Macro International, USAID, Madagascar, 1998).

Changes in malnutrition rates among children age 1 to 59 months between the period 1992 to 1996 in Zambia is also interesting. The percentage of stunted children increased from 40 percent to 43 percent. However, there was a decrease in underweight from 25 to 24 percent. Similarly, the percentage of wasted children went down from 5 percent to 4 percent (Macro International/USAID Zambia 1997).

Discussion And Conclusions

The results presented here for levels of malnutrition over time and across countries within the Sub-Saharan African region reveal interesting geographical patterns. Levels of malnutrition appear to be increasing particularly with respect to underweight and wasting. Significant differences also exist with respect to breast-feeding patterns. Among the countries studied, the problem of underweight seems to be more profound in the Sahelian region with high percentages being recorded in Mali, Niger and Burkina Faso. Stunting follows a different pattern with very high percentages been recorded in Eastern and Southern Africa notably Burundi, Rwanda, Madagascar and Tanzania. It is also interesting to note that even though Senegal and Cameroon have relatively low malnutrition levels there has been a significant increase in recent years. Tanzania, Mali, Niger and Madagascar have high malnutrition levels and the trend appears to be worsening. The relatively low levels of exclusive

breast feeding raises several issues with respect to possible contamination of other foods which could lead to diseases such as diarrhoea.

The relatively high rate of underweight among countries in the Sahelian region reflects the poor weather conditions in that region as well as low socio-economic levels. The poor climatic regime makes it extremely difficult to cultivate a variety of crops year round. Poverty is also a major factor as most of the countries in this region are poor economically. The apparent high levels of stunting in countries in Southern Africa may be explained by poverty as well as civil wars.

What factors have accounted for changes in malnutrition levels in recent years? While the analysis does not provide data for explaining these trends, some inferences could be made. Three factors are instrumental. First and most important is the economic difficulties most countries within the region have undergone in recent years. This has made supporting a family increasingly difficult. Not only had male wage rates begun to stagnate by the end of the 1980s, but there have also been substantial increases in the cost of social services such as health, education and transport along with an escalation on the goods and services.

A second, related factor is changes in the labour force behaviour of mothers and in the arrangements they make for the care of their preschool children. Since infant feeding is not a single event but a process which takes place daily over months, the woman's absence from home can have adverse effects on the child's nutritional status. There is a general perception that African mothers' work burdens and constraints are increasing just as many of their traditional supports are dwindling. These are happening in an era of market driven reforms and globalisation. A result is that many women are having to work more intensively for longer hours and often further away from home—with potentially profound consequences for nursing and mothering.

The third factor is mainly geographical and political. The effects of climate and poor cultivation practices have led to environmental degradation in many regions. Crop yields have declined owing to the decline in soil fertility. This may have particular relevance for the Sahelian countries. The effect of civil war in countries such as Rwanda is also likely to have affected the state of child health and nutrition. Many of the displaced women have to resort to food aid by international bodies.

Even though the DHS Chart Books and Nutrition Surveys do provide excellent sources of data for analysing infant nutritional patterns and trends in Sub-Saharan Africa, more micro level analysis of infant nutritional patterns and their determinants in Sub-Saharan Africa is needed. A critical nexus of research issues—involving changes in women's work and time; infant feeding practices; economic, political, agricultural and health related factors need to be studied in depth in order to better understand the situation. Evidently, all these factors have had a direct impact on nutrition levels of infants.

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