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**Comparative study of mothers nursing an infant ≤ 1 year
of age in the Highlands and the Lowlands of Bale, Ethiopia:
Food intake and feeding practices, post-partum
amenorrhea, contraceptive use, child spacing and
nutritional status.**



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1. Summary

Introduction

In Bale Zone, south-eastern Ethiopia, a randomized cross-sectional study was carried out in February 2005. The main aim of the survey was to obtain representative information about food intake and feeding practices, postpartum amenorrhea, contraceptive use, child spacing as well as nutritional status of infants and nursing mothers in the Highlands as compared to the Lowlands.

Method

The study area included seven peasant associations in Ginnir Woreda which were randomly selected for data collection. The target group was mothers with one infant below 12 months of age and at least one other child.

Structured interviews were conducted with 355 randomly selected women using a pre-tested questionnaire. General background information like religion, age group, education level, marital status and family size was also collected.

To assess the dietary intake of the selected women, a structured pre-tested 24-hour dietary recall and a food frequency survey were conducted.

In addition the weight, height, mid-upper-arm circumference, and triceps-skinfold thickness of the mothers as well as the weight and length/height of their infants were measured. Further in-depth information was collected through key informant interviews and a focus group discussion.

General background information

The majority of women belonged to the Oromo ethnic group (93.8%) and the most common religion was Muslim (90.7%). The highest percentage of mothers in the Highlands (30.0%) and Lowlands (30.6%) belonged to the age group 25 to 29.9 years. At their 1st marriage the women were on the average 16.8 years old (range 12 to 28 years). The mean age of the infants included in the survey was 6.8 months (6.7 months in the Highlands and 7.0 months in the Lowlands).

72.3 % of the mothers in the Highlands and 79.1 % of the mothers in the Lowlands were illiterate. On average, a family had 6.4 members (range 3 to 17 family members). The average number of living children was 4.1 (range 1 to 11 children). It needs to be stressed that the majority of mothers interviewed had not yet completed their reproductive period. Mothers in the age group 15 to 19.9 years had already given birth to an average of 1.8 children, and at an age between 25 and 29.9 years they had delivered approximately 3.7 children.

Food intake

According to the *food frequency questionnaire* (n = 355) the main staple food was wheat, which was consumed at least once a day by more than 84.5% of the mothers. Tef and barley were also consumed quite often. Therefore, the majority of plant protein was provided by cereals. Milk and eggs, in respective order, were the main sources of animal protein. The consumption of meat was very low, e.g. only 7.9% of the nursing mothers consumed any meat at all during the seven days preceding the survey. Considering the seasonal availability, the consumption of different types of fruits and vegetables was also limited, e.g. only 12.9% of the mothers consumed bananas on a daily basis.

A *24-hour dietary recall* of a sub-sample of 60 women was administered and analysed. The average daily energy intake was 1858.7 kcal/person in the Highlands and 1844.6 kcal/person in the Lowlands, which constitute 62.9% and 62.0% of the energy requirement for lactating women.

With respect to *macronutrients*, the intake of carbohydrates was sometimes above the recommended range of 55-70%. In 73.3% of all women included in the survey the contribution of carbohydrates to the total energy intake was higher than 70%.

The high contribution of carbohydrates to total energy intake was mainly due to a lack of calories from fat (on average 17% of the total energy intake) which was below the recommended range of 20-35% of total energy intake. The protein requirements of 10 to 12% were met by nearly all mothers; but the quality of the protein is quite low because it mainly originates from cereals. Certain essential amino acids may be lacking because the variety of plant food reported was also low.

With respect to *micronutrients*, the fulfilment of vitamin A, B1, B2 and zinc requirements was better in the Highlands while the ascorbic acid level was higher in the Lowlands. On average, none of the mothers met their needs for calcium ($\leq 57.5\%$), zinc (≤ 76.0), potassium ($\leq 60.0\%$), vitamin B1 ($\leq 39.4\%$), and vitamin B2 ($\leq 9.8\%$).

It is very likely that these energy and micronutrient deficiencies contribute overall to the insufficient nutritional status of the mothers.

With respect to reported *shortage of food*, 24.0% of the households in the Highlands and 33.6% of the households in the Lowlands suffered from food shortage at some time during the year. According to these deficiencies, 31.3% of the households in the Lowlands and 18.1% of the households in the Highlands receive food aid mainly in form of wheat, maize, oil, and Famix.

Food taboos during the reproductive period are quite common in Ethiopia. 20.0% of the mothers stopped consuming special types of food or fluids during their last pregnancy. 43.2% of the mothers in the Highlands stopped consuming cow milk, while only 22.2% in the Lowlands did so. In addition, many women stopped eating any type of meat (40.9% in the Highlands and 33.3% in the Lowlands).

After delivery, 72.4% of the mothers in the Highlands and 65.7% of the mothers in the Lowlands received special foods or fluids. The duration of the time during which the mother received special foods or fluids differed significantly ($p < 0.001$) between the Highlands and the Lowlands (17.4 days vs. 9.5 days). The majority of the women received porridge prepared from barley or sometimes from wheat and soup most often made of oat.

Infant feeding practises

Nearly all women (99.7%) *started to breastfeed* their newborn baby, but more than one third (37.4%) waited at least 1 hour or more after birth before they initiated breastfeeding. According to International Recommendations mothers should start as soon as possible but not later than 1 hour after birth. 19.7% of the women even waited up to 3 days before offering breast milk. Consequently, 34.1% of all newborns received *pre-lacteal feedings*. A solution of water with sugar was the type of fluid given most frequently (66.9% of the infants) in both areas. 9.3% of the women reported squeezing out and discarding *colostrum*. The most common reason mentioned was to avoid stomach pain in the newborn child.

The average duration of *exclusive/almost exclusive breastfeeding* was 5.02 months, with almost no differences between the two areas.

The *frequency of breastfeeding* was found to remain high during the first 12 months of life despite the relative early introduction of complementary foods.

During the day the mean frequency of breastfeeding during the first 6 months of life was 8.2 and at night 9.6. During the second part of the first year the frequency of breastfeeding was almost similar with 8.1 times during the day and 9.3 times during the night. The common practice of co-sleeping seems to contribute to a higher frequency of breastfeeding during the night.

A smaller proportion of mothers (17.7%) reported the use of a *feeding bottle* at some time during the first year of life. In the Lowlands, significantly fewer ($p < 0.001$) mothers used a

feeding bottle (7.5%) compared to the Highlands (24.0%). 80.0% of the infants in the Lowlands received diluted cow milk and only 10.0% were fed with unmodified cow milk, while in the Highlands a smaller proportion of infants (54.7%) were offered diluted cow milk and 39.6% received unmodified cow milk by feeding bottle. 36.4% of the infants fed with unmodified and therefore undiluted cow milk by feeding bottle were below 6 months of age. The majority of mothers started offering pure cow milk as a *complementary feeding* or a thin porridge prepared mainly from barley or wheat.

Vaccination and supplementation programmes

The vaccination coverage was significantly ($p < 0.001$) higher in the Lowlands: 91.0% of the mothers in this area stated that their infant had received at least one vaccination since his or her birth as compared to 64.7% of the women in the Highlands. The vaccination against measles had the lowest coverage of all kinds of other vaccinations and reportedly only reached 41.2% of the children aged 11-12 months.

Supplementation of vitamin A for mothers (should be given up to 8 weeks after delivery) and infants (2 doses, one every four to six months for children aged 6-12 months) was also significantly ($p < 0.001$) higher in the Lowlands where 91.0% of the mothers and 91.8% of the infants received a higher dose of vitamin A compared to 54.3% and 63.8% respectively in the Highlands.

Caring practices

Asked if they ever leave their infants alone, nearly half of the women (48.2%) stated "yes" (51.1% in the Highlands and 43.3% in the Lowlands). 19.3% of these infants were ≤ 6 months of age. Most often a sister or the grandmother takes care of the infants during the absence of the mother. 13.1% of the infants who were left alone for the whole day were less than 6 months old. In most of these cases, the infants were fed with unmodified cow milk during the absence of their mother.

Lactational amenorrhea

The average duration of lactational amenorrhea was 2.7 months (2.6 months in the Highlands and 2.9 months in the Lowlands). This seems to be an underestimation due to the non-menstrual bleeding occurring at about the 56th day postpartum. About 82% of the mothers had had their menses before they got pregnant again with their last child. The mean duration of *sexual abstinence* after a delivery was 2.2 months. The time was slightly higher in the Highlands (2.4 months) compared to the Lowlands (2.0 months).

The majority of mothers knew about two *methods of contraception*, the pill (87.6%) and injections (85.0%). Knowledge about other methods was very low and there was almost no difference between the Highlands and the Lowlands, except for the knowledge that breastfeeding (lactational amenorrhea) is a means of contraception. In the Highlands more women knew about the contraceptive effect of breastfeeding than in the Lowlands (29.9% vs. 18.7%).

Asked directly, if they knew about lactational amenorrhea as a family planning method, 49.8% of the women in the Highlands and 37.3% of the women in the Lowlands said "yes". However, only 17.2% of the mothers in the Highlands and 11.9% of the mothers in the Lowlands reported using it actively as a method to prevent a new pregnancy.

Child spacing

The overall median birth interval was 22.5 months. Nearly twice as many women in the Lowlands (30.7%) as in the Highlands (16.4%) gave birth again within 18 months after their last delivery. 51.6% of the most recent deliveries occurred less than 24 months after the preceding birth indicating a rather short period of child spacing in the studied area.

Anthropometric measurements of nursing women

Regarding the anthropometric data of the women, the average weight was 51.2 kg and the average height was 158.8 cm. There was little difference between the two areas. The mean *body mass index* (BMI) was 20.3 kg/m². 23.9% of the mothers had a BMI \leq 18.5 kg/m². The highest percentage of women was found to have a BMI within the range 20.0-24.9 kg/m². Of the 23.9% of women with a BMI \leq 18.5 kg/m², 84.1% were mildly malnourished and 16% moderately malnourished. No woman was found to be severely malnourished (BMI < 16 kg/m²).

The mean mid-upper arm circumference (MUAC) was 25.6 cm (range: 21.3-36.7 cm). There were no differences between Highlands and Lowlands except the percentage of women "at risk" for malnutrition (MUAC 21.0-22.9 cm), which was higher in the Lowlands (16.9%) than in the Highlands (8.9%).

In addition, the mean triceps-skinfold thickness (TST) with 13.9 mm (range: 4.6-36.4 mm) indicates lower fat stores of women in the Lowlands versus the Highlands (15.6mm; range: 4.7-37.8 mm).

Anthropometric measurements of infants

Taking the commonly used cut-off point of <-2 SD from the reference data as an indicator of malnutrition, 12.5% of all measured infants aged 1-12 months were below the cut-off point of the height/age ratio (HFA) thus indicating chronic malnutrition. 13.9% of the infants were below the same cut-off point for the weight/age ratio (WFA) indicating underweight and 8.5% were found to be below the -2 SD of the height/weight ratio (WFH) indicating acute forms of malnutrition like wasting and oedematous malnutrition.

9.2% of the infants below 6 months of age were already suffering from chronic malnutrition (below the cut-off point for HFA), 5.4% of the infants in the same age group were underweight (below the same cut-off point for WFA) and 6.2% were found to be wasted (below the -2 SD of WFH). With regard to the infants over 6 months of age, a considerably higher proportion suffered from stunting, underweight and wasting (14.4%, 18.9% and 9.0% respectively) indicating that the extent of malnutrition increases as the infant becomes older.

The average Z-Score of all infants aged 1-12 months was - according to chronic malnutrition - HFA: -0.38 ± 1.47 , underweight - WFA: -0.61 ± 1.23 , and wasting - WFH: -0.34 ± 1.31 and confirmed that underweight seems to be the predominant form of malnutrition among infants.

The mean Z-Scores for HFA, WFA and WFH of the infants in the Lowlands (-0.46 ± 1.58 , -0.73 ± 1.25 , and -0.37 ± 1.29 respectively) were worse than the Z-Scores of the infants in the Highlands (-0.32 ± 1.39 , -0.53 ± 1.22 , and -0.33 ± 1.33 respectively) again indicating a slightly better nutritional status of infants in the Highlands.

According to the percentage of infants being below -2 SD from the reference data, 15.0% of the infants in the Lowlands and 11.0% of the infants in the Highlands were below the cut-off point for chronic malnutrition (HFA), and 18.0% of the infants in the Lowlands and 11.4% of the infants in the Highlands were below the cut-off point for underweight (WFA). In addition, more infants in the Lowlands (9.8%) were affected by wasting (< -2 SD for WFH) than in the Highlands (7.8%).

The survey findings should be used to establish recommendations on how to improve the health and nutritional situation of nursing mothers and their infants in the study area. The public should be made more aware, that pregnant or lactating women have increased energy and nutrient needs. Therefore a higher intake of fruits, vegetables, animal products, fat-rich seeds or nuts, the use of wholegrain flour and red tef, and the traditional fermentation have to be promoted. Food taboos have to be abandoned. With regard to infant feeding, good breastfeeding and complementary feeding practices should be promoted like exclusive breastfeeding for the first six months of life. The promotion of LAM and its use is also of great importance to lengthen the birth intervals in the surveyed area.