# COMMUNITY-BASED HYGIENE EDUCATION TO REDUCE DIARRHOEAL DISEASE IN RURAL ZAIRE: A PROSPECTIVE, LONGITUDINAL STUDY

by
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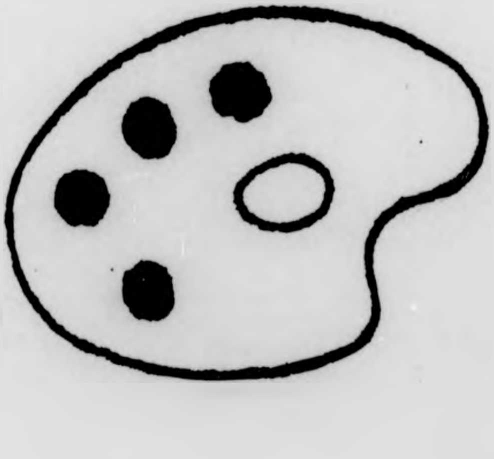

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## ABSTRACT

A randomized, controlled trial of an educational intervention to improve personal and domestic hygiene practices and to reduce diarrhoeal morbidity was conducted in Bandundu, Zaire. Diarrhoeal histories of 2082 weaning aged children living in 18 village clusters (sites) were obtained between October and December 1987, and structured observations of hygiene behaviours associated with food preparation, meal sharing, child feeding, child defecation, and yard cleanliness were made in 300 randomly selected sentinel families. This baseline information was used to design a non-formal educational intervention. The intervention was implemented by trained community volunteers for 6 months beginning in July 1988. A second diarrhoeal and second observational study were conducted between October and December 1988, in order to evaluate the intervention.

After the intervention, children in intervened sites had an 11% lower risk of diarrhoea ($p<.025$), fewer days of diarrhoea ($p<.025$), and shorter durations of episodes ($p=.04$) than control children, and the largest differences were among children aged 24-35 months. Diarrhoeal reductions were positively associated with community volunteer performance and hence, intervention quality, in all sites.

Hygiene practices, post-intervention, were significantly better among intervened compared to control sentinel families. Preventive behaviours were practised much more frequently after the intervention than before, in both study groups, however the improvements among intervened families were substantially greater, leading to the conclusion that the intervention was responsible for about a 10% reduction in bad behaviour. Behavioural improvements were positively associated with diarrhoeal reductions, after controlling for child

age, and with intervention quality in all sites.

Children in intervened sites had higher mean W/A z-scores at the end of the intervention than control children ($p<.05$), with children aged 24-35 months appearing to benefit most. The post-intervention change in children's W/A, from October-December 1988, was larger among intervened than control children ($p<.0003$), and from pre- to post-intervention, the change in W/A (October-December) improved significantly more among intervened than control children. Improvements in child growth corresponded to diarrhoeal reductions and to the quality of intervention in sites.

In summary, the results of the study suggest that a non-formal, community-based educational intervention to improve personal and domestic hygiene behaviour may be an effective strategy to reduce childhood diarrhoea in Zaire.

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# CHAPTER 1. INTRODUCTION

## 1.1. Study background and rationale

Diarrhoea still remains one of the most important causes of death worldwide. Each year probably 4 million or more young children die as a result of the disease[1]. Diarrhoea is a major cause of childhood morbidity in developing countries, with estimates of 700 million to 1 billion episodes occurring annually in Africa, Asia and Latin America[2,3]. Infants and small children, lacking adequate immune response, experience the highest rates of diarrhoea of invasive pathogenic origin. In the first few years of life annual incidence rates of up to 10 episodes per child are common in many developing countries[4,5]. Children may be debilitated by diarrhoea through dehydration, anorexia, inadequate feeding, nutrient malabsorption and increased catabolism. The consequences of early recurrent diarrhoea are growth faltering, impaired mental development[6] and, ultimately, death.

In third world countries poverty, crowded living conditions, poor sanitation, water of insufficient quality and quantity and poor personal, domestic and food hygiene practices contribute to the high rates of diarrhoeal mortality and morbidity. Low educational attainment and some cultural and religious practices may exaccerbate these problems. Prevention and treatment of diarrhoea are typically hampered by the unavailability of health facilities, lack of transport, insufficient food and fuel, and inadequate communications.

In young children, pathogenic organisms that cause diarrhoea are transmitted primarily through the "faecal-oral" route[7-9]. Faeces may be ingested through contaminated food or water, or directly via hands, objects, dirt or animals. Diarrhoeal risk through faecal-oral transmission is highest during the weaning period, both because weaning foods are frequently more highly contaminated than other foods, and because children are crawling and exploring at this age, and thus more exposed to pathogen ingestion.

Significant therapeutic improvements in the control of diarrhoeal diseases have occurred. In particular, the introduction of oral rehydration therapy (ORT) has led to huge declines in childhood deaths and hospital admissions due to diarrhoea[1,10]. ORT has been extremely effective in preventing dehydration and death due to acute watery diarrhoeas. Today, increasing the accessibility to and use of ORT is the major focus of most national diarrhoeal disease programmes.

Whilst ORT represents a milestone in global efforts to reduce diarrhoeal mortality, it is not a panacea for the disease. ORT has had limited impact on deaths due to chronic or dysenteric diarrhoea[11], and unclear effects on diarrhoeal morbidity. Thus, there is an urgent need for broadly applicable interventions to reduce diarrhoeal morbidity and lower mortality not averted by ORT. The World Health Organization has given high priority to research to develop and evaluate such interventions[12]. In particular, improving personal and domestic hygiene practices might reduce diarrhoeal incidence substantially. Handwashing, and other simple improvements such as proper disposal of animal and human faeces, might decrease diarrhoea by breaking the transmission of diarrhoeal pathogens via the faecal-oral route. Handwashing promotion, specifically, appears to have reduced the incidence of diarrhoea in young children in clinic[13], nursery[8] and community[14] settings.

Although the findings of many studies suggest that the promotion of good hygiene may be an effective diarrhoea prevention strategy, our understanding of the potential effectiveness of hygiene education is incomplete. First, despite the seemingly abundant evidence and support for such a strategy, there is actually a paucity of generally applicable information regarding the magnitude of the possible reductions in diarrhoea. A review of studies of handwashing and diarrhoeal pathogen transmission led Feachem[8] to estimate that effective educational programmes to improve personal and domestic hygiene might reduce diarrhoeal morbidity by 14% to 48%. It is noteworthy, however, that this estimate was based on just 3 studies, 2 of which focused exclusively on handwashing and were conducted in highly controlled clinic or nursery settings; such large reductions may not be possible in less controlled (ie community) environments. To date, a total of only 3 studies of community-based hygiene education (independent of programmes providing water supply and sanitation inputs) appear to have been reported. These include: an educational intervention in Guatemala[15], which addressed a range of domiciliary practices and reported reductions in diarrhoeal incidence of 14% to 36% (the other study in Feachem's review); a handwashing intervention in Burma[14], which reported a 30% reduction of diarrhoeal incidence; and a educational intervention to promote domestic hygiene in Bangladesh[16], from which a 26% reduction in diarrhoeal incidence was reported. Only a limited assessment of the potential effectiveness of hygiene education can be derived from these few studies: The intervention in Burma, firstly, addressed just one behaviour, ie. handwashing, and therefore cannot be used to draw inferences about the effectiveness of hygiene education when other behaviours are included. Moreover, in the study from Bangladesh, whilst substantial reductions in diarrhoea among children in intervention communities were reported, behaviours targeted by the intervention did not appear to have improved, making interpretation of that study's findings difficult. The study from Guatemala, which reported improvements in behaviours as well as diarrhoeal rates, may be the only study which cogently demonstrates the potential impact of domestic hygiene education. The validity of this study's findings seems high, since the study appears to have avoided the most serious methodological flaws known to occur in similarly focused investigations[17].

One of the reasons for the dearth of generalisable information is that hygiene education, apart from handwashing, has been rarely tested as an intervention. A number of studies, however, associated with "integrated" environmental programmes to improve water supply and sanitation facilities, have incorporated a hygiene education component[18-21]. Whilst it seems intuitively obvious that the promotion of good hygiene would improve the diarrhoeal efficacy of water supply and sanitation inputs, integrated environmental programmes provide little information on the extent to which hygiene education per se can reduce diarrhoea. There may be two reasons: first, in most such programmes (discussed further in section 4.1) hygiene education is included to promote the use of new services, and is not formally controlled. Therefore, assessment of its effects tends to be extremely confounded. Second, in order to understand cause and effect relationships, or to reinforce evidence indicating diarrhoeal impact, assessment of behavioural change is required, which is difficult, not only because some community members will be non-compliant[22], but also because our methodologies for studying human behaviours are still very crude. In principle, randomized trials might bypass some of these difficulties, but in practice few properly randomized studies have been planned.

Our understanding of the effectiveness of hygiene education to improve child nutritional status is also extremely limited. It has been argued that certain child anthropometric indicators may be at least as responsive as diarrhoeal rates to improvements in hygiene, because of the biological link between infection, diarrhoea and nutritional status[23]. Essentially, factors that affect nutrient ingestion, absorption and utilization may, particularly in developing countries, be strong determinants of child body size: there is much evidence demonstrating that diarrhoeal morbidity affects child growth and nutritional status[24-27]. Diarrhoeal rates, however, are difficult to measure accurately in the community, due to misclassification, underreporting, and poor recall of the length of episodes. Nutritional anthropometry, on the other hand, is less subject to measurement error and may, therefore, be a reliable alternative measure of the health impact of interventions to reduce diarrhoeal disease. To date, several evaluations of such interventions have reported the impact on nutritional status, but because few have been properly randomized, controlled or statistically analysed[9,17], there are many questions still unanswered. In particular, we know very little about the relationships between specific measures of diarrhoea (eg. duration, severity, incidence, prevalence), and specific indicators of child growth (ie. growth velocity, attained weight and height).

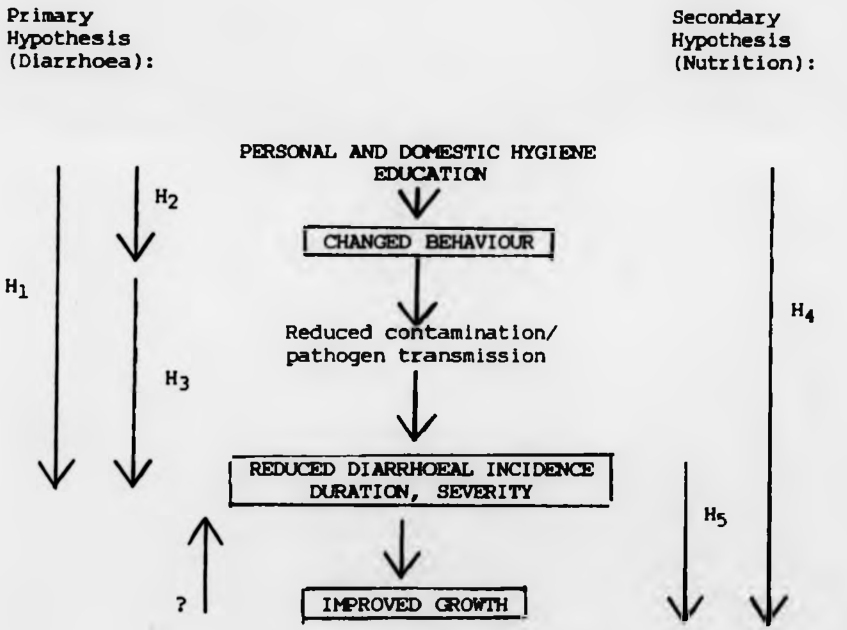
In summary, simple improvements in personal and domestic hygiene behaviour might decrease the burden of diarrhoeal diseases substantially. Whilst there are many reports underlining the diarrhoea-lowering potential of hygiene education, large gaps in our understanding of the design, implementation and level of effectiveness of such educational interventions exist. In the past, hygiene education has been frequently included as an ancillary component of integrated environmental programmes, and its specific impact has not been elucidated. Our knowledge of the effectiveness of hygiene education to improve nutritional status is, similarly, scant. The urgent need to reduce diarrhoeal morbidity, together with the potential effectiveness and feasibility of hygiene education as a diarrhoea prevention strategy, led to the development of the research project described below.

## 1.2. Objectives of the study and main hypotheses

The present study was designed to investigate whether diarrhoeal morbidity during the weaning period could be reduced in rural Zaire by a non-formal, community-based hygiene education intervention. The educational intervention was based on messages intended to improve personal and domestic hygiene, including (1) handwashing before food preparation and before eating, (2) handwashing after defecation and washing of both the child's hands and buttocks after child defecation, (3) proper disposal of human faeces, and (4) increased disposal of animal faeces from the yard, by sweeping twice per day. The intervention was implemented over a 6-month period by trained community volunteers. A randomized, controlled trial design was used to evaluate the intervention's impact on diarrhoeal morbidity, hygiene behaviours, and child growth.

The main hypothesis of the study ($H_1$) is that promotion of improved personal and domestic hygiene practices can lead to reductions in diarrhoeal morbidity among weaning age children (Figure 1.1). For community-based hygiene education to be effective, it must be true that: hygiene education can lead to changes in behaviours associated with diarrhoea ($H_2$) and such behaviour changes lead to improvements in diarrhoeal incidence, duration and/or severity ($H_3$).

FIGURE 1.1. Study hypotheses. (Data collection restricted to those variables in boxes.)



A secondary outcome of interest is improved child growth (Figure 1.1). Therefore, a further hypothesis ($H_4$) is that: hygiene education can lead to improved child growth through changes in behaviour and reduced diarrhoeal morbidity ($H_2$ and $H_3$ above), and furthermore that the reductions in diarrhoea can lead to improved child growth ($H_5$).

## 1.3. The choice of study location

The province of Bandundu, Zaire, was chosen as the study location because it offered several suitable characteristics. Childhood malnutrition has been a major health problem in this province for many years, and the current estimate is that about 17% of all children ≤5 years of age are moderately malnourished[27]. Low birth weight (ie. <2500g) is an associated endemic problem, with estimates in 1985-86 suggesting that 24-29% of all children are born underweight[27]. Diarrhoeal diseases and malaria are the two leading causes of death among young children in the province. Diarrhoeal diseases are also a major cause of childhood morbidity, with available data suggesting an annual diarrhoeal prevalence rate for pre-school children of about 10%[29,30]. In young children, there are normally two diarrhoeal peaks each year, one between May and June (a short, wet season), and the other (higher peak) between August and November, at the start of the long rainy season (see Section 1.4 below). Whilst WHO has an active Diarrhoeal Diseases Control Programme in Zaire, and access to ORT is generally high throughout the country, few diarrhoea prevention programmes or policies have been implemented in this province. Partly, this can be attributed to difficulty of access to most areas, due to poor roads and scarce, expensive transport and fuel. The region is generally characterized by extreme poverty, very high unemployment (most rural inhabitants are subsistence farmers, and city dwellers typically live in large extended families which may be supported by 1 or 2 working members only), poorly developed infrastructure, and scarcity of water and food in many areas. There is a single main quasi-paved road leading from Kikwit, the principal commercial and economic centre of the province, west to Kinshasa, the national capital, located 530 km away (Figure 1.2). Over the past 12 years, a great deal of nutrition research has been conducted in Bandundu province, partly because this road provides access, but mainly because a field station of the Zaire National Nutrition Planning Centre (CEPLANUT) is located in Kikwit. Because CEPLANUT and other groups have conducted research in the province for many years, the population is cooperative and friendly towards research workers. There is little migration among the rural inhabitants, except for a small proportion of palm-oil factory workers.

## 1.4. Bandundu, Zaire: Background of the study area

The Republic of Zaire is a large country in south-central Africa. With a total land area of 2.3 million $km^2$, Zaire is approximately 5 times the size of France, or 3/4 the size of the United States of America. The population is approximately 28 million, about 70 to 80% of whom are engaged in agriculture. Due to its geographical immensity, Zaire's climate is quite varied, depending on the region, and is aptly described as an 'inter-tropical' zone.

The Bandundu province of Zaire lies in the west of the country (Figure 1.2). It is separated from the Republic of Congo to the west by the Zaire River: to the southwest lies Kinshasa and the Bas Zaire

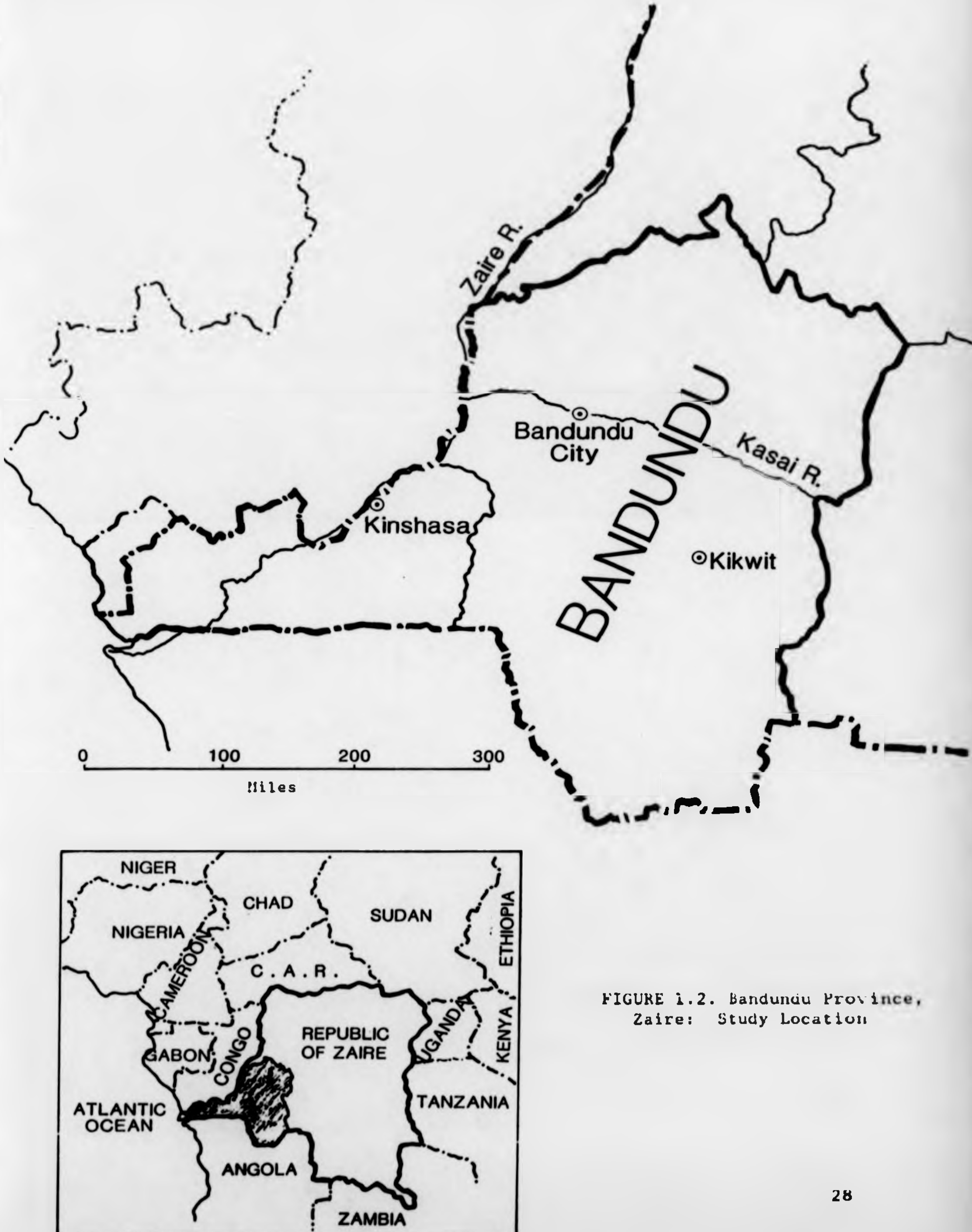



FIGURE 1.2. Bandundu Province, Zaire: Study Location

province; to the south is Angola; and to the east and north are the provinces of Kasai Occidentale and Equateur, respectively. The total land area of approximately 300,000 $km^2$ is subdivided into 2 urban and 3 rural sub-regions. The urban sub-regions are Bandundu (the provincial capital) and Kikwit, and the rural regions include Kwango, Kwilu and Mai-Ndombe. Kikwit, located in the centre of Kwilu, has a population of about 200,000 (Plate 1.1). The estimated population of the province was 3.8 million in 1985.

PLATE 1.1. Kikwit, principal economic center of Bandundu Province

The province is covered by tropical forest, woodland and scrub-savanna terrain and is fed by a number of major tributaries, including the Kwilu, Kwenge and Kasai Rivers (Plate 1.2). There is a high average rainfall subject to moderate seasonal differences. Temperatures vary from 20°C in the dry, winter months to 35°C in the wet, summer months, and humidity is high at all times. Rain falls during approximately 9 months of the year, between mid-August and the end of May. During this period there is a short, dry season, between

PLATE 1.2. Kwilu River, Bandundu Province

mid-February and April, followed by another short rainy period, from May to early June. The main dry season occurs between June and August. Average monthly rainfall varies from 110 to 200 mm, with the wettest months between September and February.

Patterns of livelihood vary little in the rural areas, which are mainly agricultural (Plate 1.3). Subsistence farming is the predominant activity, although palm oil production and animal herding are practised by a small proportion. Most families practise a system of traditional agriculture characterised by shifting cultivation of mixed crops, without the aid of irrigation or fertilizer. Manioc (cassava) is the dietary staple and corn, groundnuts, millet, and gourds are the other principle crops. Other crops include sorrel, okra, sweet potato, amaranthus, zucchini squash, tobacco and red pepper. Traditional agriculture is an integral part of the socio-cultural system of village life[31].

**PLATE 1.3.** Typical dwelling in a study village

Agricultural labour is provided predominantly by women, who are responsible for all agricultural operations (except clearing and preparation of fields, which is done by men). It has been estimated that women spend about 7 hours per day in agricultural work outside the home (including 5 hours in the field and 2 hours in transit to and from the field) and about 17 days per month during the 9 months of greatest agricultural activity, giving a total of about 840 hours/woman/year in non-domestic agricultural labour[31] (Plate 1.4). The study took place in the sub-region of Kwilu, in 18 village clusters ("sites") located in 6 constituencies: Imbongo, Kipuka, Kwenge, Nkara, Nko and Pay Kongila. This sub-region was chosen because all sites were within a radius of 120 km from Kikwit city, and therefore each site could be reached by road within a single day.

PLATE 1.4. Women in rural Zaire travel long distances for agricultural work outside the home

1.5. Structure of the thesis

This introductory chapter has provided a brief background to the study, its rationale, the main objectives, and a general description of the study area. In **Chapter 2**, the study design, population and methodology are described fully. **Chapter 3** describes the baseline characteristics of diarrhoeal morbidity of the study children, and the influence of mothers' reporting of diarrhoea on estimates of diarrhoeal duration and prevalence. **Chapter 4** presents results of an evaluation of the project's impact on diarrhoeal morbidity. In **Chapter 5** the evaluation of the project's impact on hygiene behaviours and the association with diarrhoeal morbidity is described. **Chapter 6** reports the impact of the intervention on child growth. Finally, in **Chapter 7** a summary of the main findings, their implications for diarrhoeal disease control, and suggestions for future hygiene educational interventions are described. In Chapters 3 to 6, reviews of the relevant literature are included in the introductory sections.

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# CHAPTER 2. STUDY METHODOLOGY

## 2.1. General study design

Between June 1, 1987 and December 30, 1988 a prospective, longitudinal study of diarrhoeal disease and associated hygiene practices was conducted in Bandundu, Zaire. The study was designed to test whether diarrhoeal morbidity among weaning age children could be reduced by a non-formal, community-based educational intervention intended to improve personal and domestic hygiene behaviours. The study had 3 main stages:

(i) a "baseline" study of diarrhoeal morbidity of 2082 children aged 3-35 months ("target" children) residing in 18 geographically separated rural "sites". The term site was designated to an identified cluster of small, closely spaced villages, each with approximately 80 to 100 target children. For 12 weeks, beginning October 1, 1987, weekly information on diarrhoeal incidence, severity and duration, based on mothers' retrospective recall, was obtained at home interviews. Concurrently, a single-day (6- to 7-hour) "baseline" observational study of hygiene practices of 300 randomly-selected families (called "sentinel" families) representing about 18% of study families in each site, was conducted. The observational study was intended to identify specific hygiene practices that were potential risk factors for diarrhoea, and which could form the basis of an educational intervention.

(ii) a randomized, controlled trial of a non-formal, community-based educational intervention intended to improve hygiene behaviours associated with diarrhoea. Following the baseline diarrhoeal study, all sites were ranked from highest to lowest according to their mean age-adjusted diarrhoeal rates. Thus ordered, the first 2 sites were grouped to form a pair, and each 2 subsequent sites were similarly grouped into pairs, and then 1 in each pair was chosen at random to receive the intervention, the other to serve as a control: thus, 9 sites were chosen to receive the intervention ("intervened sites") and 9 served as controls. The 9 control sites received an alternative ("placebo") intervention designed to prevent dehydration during a diarrhoeal episode but not to reduce diarrhoeal incidence. Intervention activities in sites in both study groups were led by trained female residents (called "community volunteers") for 6 months beginning July 1, 1988.

(iii) a second ("follow-up") diarrhoeal study and a second ("follow-up") concurrent observational study intended to evaluate the educational intervention. The follow-up studies were conducted in the same 18 sites exactly one year after the baseline studies, beginning October 1, 1988. In the follow-up diarrhoeal study, approximately one-third of the original study children who exceeded the upper end of the study age range were replaced by new children within the lower age limit. In the follow-up observational study, a new subsample of 293 sentinel families was selected.

The study design and chronology is illustrated in Figure 2.1. In addition to information on diarrhoeal morbidity and hygiene practices, supplementary nutritional, socioeconomic and demographic information was obtained. Body weights of all children were measured at the beginning and end of the baseline diarrhoeal study, at the beginning of the intervention, and at the beginning and end of the follow-up diarrhoeal study. Information on breastfeeding and weaning

**FIGURE 2.1. STUDY DESIGN**

| ACTIVITY | 1987 J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|
| PREPARATORY | x | x | x | x | | | |
| Recruit/train observers | x | x | | | | | |
| Site selection | x | x | | | | | |
| Census enumeration | | x | x | | | | |
| Recruit/train interviewers | | | x | x | | | |
| Focus groups/24-hr recalls | | | x | | | | |
| Develop/test observation form | | | x | x | x | | |
| BASELINE DIARRHOEA STUDY | | | | | x | x | x |
| child weights | | | | | x | | x |
| BASELINE OBSERVATION STUDY | | | | | | x | x |
| household survey | | | | | | | |
| RISK FACTOR ANALYSIS | | | | | | | |
| repeat census | | | | | | | |
| RANDOMIZATION | | | | | | | |
| MESSAGE SELECTION/DEVELOPMENT OF EDUCATIONAL PROGRAMME | | | | | | | |
| recruit/train trainers | | | | | | | |
| SELECT/TRAIN COMM. VOLUNTEERS | | | | | | | |
| INTERVENTION | | | | | | | |
| child weights | | | | | | | |
| revise observation form, test | | | | | | | |
| recruit interviewers/retrain | | | | | | | |
| household survey | | | | | | | |
| FOLLOW-UP DIARRHOEA STUDY | | | | | | | |
| FOLLOW-UP OBSERVATION STUDY | | | | | | | |
| EVALUATION/ANALYSIS | | | | | | | |

| 1988 J | F | M | A | M | J | J | A | S | O | N | D | 1989 J | F | ......... | 1991 J |
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| | | | | x | x | | | | | | | | | | |
| | | | | | | x | x | x | x | x | x | | | | |
| | | | | | | x | | | x | | x | | | | |
| | | | | | | | x | x | | | | | | | |
| | | | | | | | | x | | | | | | | |
| | | | | | | | | | x | x | | | | | |
| | | | | | | | | | x | x | x | | | | |
| | | | | | | | | | x | x | x | | | | |
| | | | | | | | | | | | | x | x | xxxxx | x |

practices, and socioeconomic, demographic and ethnographic characteristics, were obtained at separate home surveys during the study.

2.2. Sample size

To demonstrate a reduction in diarrhoeal incidence due to the intervention, sample size requirements were calculated on the basis of a 90% power at the 5% significance level of detecting a reduction in diarrhoeal incidence between the control and intervention communities following the educational intervention. The sample size estimates depended not only on the size of reduction that it was hoped to achieve, but also on the level of incidence of diarrhoea to be expected without intervention. Estimated sample sizes for postulated reductions of 20, 25 and 30% are shown in Table 2.1. (Stanton and

TABLE 2.1. Sample size estimates for diarrhoeal study

| Peak season incidence of diarrhoea in control areas (episodes/child/yr) | Reduction in incidence due to intervention | Sample size each group (3mth followup) | Total sample size |
|---|---|---|---|
| 3.5 | 20% | 1080 | 2160 |
| | 25% | 672 | 1344 |
| | 30% | 456 | 912 |
| 3.0 | 20% | 1260 | 2520 |
| | 25% | 784 | 1568 |
| | 30% | 528 | 1056 |
| 2.5 | 20% | 1512 | 3024 |
| | 25% | 944 | 1888 |
| | 30% | 632 | 1264 |

Clemens[1] reported a 26% reduction in diarrhoeal incidence from a water-sanitation hygiene education programme in Bangladesh.) Past data from Bandundu[2] had suggested that the annual incidence rate of diarrhoea was likely to be about 2.7 episodes/child/year in the study area. It was assumed that 35% of these episodes occur during the 3 months of peak transmission, which implied an incidence rate equivalent to 3.8 episodes/child/year (2.7x.35x4) during the peak season. As these data were very approximate and as the sample size requirements were higher the lower the baseline incidence, a conservative choice was made to carry out the calculations for incidence rates of 3.5, 3.0 and 2.5 episodes/child/year.

After reviewing Table 2.1 a total sample size of 2000 children seemed appropriate since (i) this would be adequate to demonstrate a reduction of the order of 25%, even allowing for some loss to follow-up and (ii) this would also give a fairly high power (between 75% and 88% depending on the incidence of diarrhoea in the control areas) of detecting a reduction of about 20%. The calculations were based on the formula for the comparison of two rates:

$$n=(\mu+v)^2(\mu_1+\mu_2)\div(\mu_1-\mu_2)$$

where: $\mu_1$ and $\mu_2$ are the diarrhoeal incidence rates in the control and intervened areas; $\mu$ is the two-sided % point of the normal distribution corresponding to the required significance level (in this case $\mu$=1.96); and v is the one-sided % point corresponding to the power (in this case v=1.28). "n" is the sample size of each group expressed in the same units as the rates, in this case child-years. Since the proposed follow-up period for each child was 3 months (or ¼ year) this implied that 4 times as many children needed to be studied to yield a total of n child-years of observation. This sample size was further doubled to adjust for the cluster nature of the sampling, children being selected in area clusters rather than completely at random. The computed sample size of each group was thus 8n giving a total sample size of 16n.

To determine bad hygiene practices associated with high incidence rates of diarrhoea, a sample size for the number of sentinel families in the observation study was calculated. Originally, it was planned to subdivide families into two groups, those with diarrhoeal rates in the top 25% of the distribution and those with rates in the remaining 75%. These families would be considered high and low risk families, respectively, and the aim was to identify those practices associated with the high rather than low risk families, which could then form the basis of an educational intervention.

The sample size calculation was based on two factors which would affect the impact of the intervention: (i) the relative risk R of being in the high risk group that is associated with having, rather than not having, the bad practice and (ii) the prevalence, p, of the bad practice in the community. Thus a prevalent bad practice with a relative risk of about 2 may have a larger impact than an uncommon practice with a relative risk of 4, the proportion of families in the high risk group that can be attributed to the bad practice equalling $(R-1)p/(1-p+Rp)$. Although the requirements for the sample size could be expressed in terms of R and p, the comparison was to be based on the proportion, $p_2$, of high risk families displaying the bad habit versus the corresponding proportion, $p_1$, of low risk families. It would be possible, however, to deduce the values of $p_1$ and $p_2$ that would result from a prevalence, p, of the bad practice with associated relative risk, R.

The sample size, n, required for the high risk group was calculated using the following formula:

$$n = \left[ \frac{\mu\sqrt{\{2(p_2+cp_1)(1+c-p_2-cp_1)\}\div(1+c)} + v\sqrt{\{p_2(1-p_2)+p_1(1-p_1)\div c\}}}{(p_2-p_1)} \right]^2$$

where:

c = 3 = ratio of high to low risk families; μ = % point of the normal distribution corresponding to the required significance level, taken as 5%, giving μ=1.96; and v = % point corresponding to the power, taken as 90% giving v=1.28. The total sample size required to yield n high risk families is 4n. The results are summarized in Table 2.2.

TABLE 2.2. Sample size estimates for observational study

| Proportion of families with bad practice | R = 2 | | R = 3 | | R = 4 | |
|---|---|---|---|---|---|---|
| | 4n | PAR* | 4n | PAR | 4n | PAR |
| .1 | 622 | .09 | 199 | .17 | 108 | .23 |
| .2 | 396 | .17 | 138 | .29 | 80 | .38 |
| .3 | 339 | .23 | 127 | .38 | 78 | .47 |
| .4 | 332 | .29 | 133 | .44 | 86 | .55 |
| .5 | 355 | .33 | 151 | .50 | 101 | .60 |
| .6 | 409 | .38 | 184 | .55 | 128 | .64 |
| .7 | 516 | .41 | 244 | .58 | 175 | .68 |
| .8 | 745 | .44 | 368 | .62 | 270 | .71 |
| .9 | 1450 | .47 | 746 | .64 | 560 | .73 |

*PAR = proportion of families in high risk group attributable to bad practice

Reviewing this table and bearing in mind that power could be achieved in the analysis by looking for a trend rather than just comparing two groups led to a decision to carry out the observational study on 300 families.

## 2.3. Selection of study population

### 2.3.1. Identification of sites

Several criteria were used to select study sites. First, in order to avoid the "one-to-one comparison" problem that has beset case-control studies of infectious disease in the past[3], several sites for both the control and intervened groups were required, since sites would be the critical unit of analysis in the evaluation stage. Second, in order to avoid biases that might result if control sites were to learn about messages promoted in intervened sites, all sites had to be separated by long distances. Third, to improve the study's efficiency, the numbers of target children in each site needed to be approximately equal. Fourth, agreement to participate in the study by local authorities and village leaders had to be obtained.

There were additional logistical factors limiting site selection. The most important of these were the availability of only one vehicle and a restricted supply of fuel. Data had to be transported from the sites to the central office in Kikwit on a regular, frequent basis. Moreover, a team of observers needed to be transported from site to site during the observational study. Therefore, only sites to which a return trip could be made in a single day were suitable.

There were no maps of the local area available, nor were there recent census data or birth records to identify the number and ages of children living in nearby villages. A rapid surveillance and mapping of the rural area surrounding Kikwit was therefore undertaken, beginning in June 1987. Distances and routes covered, and rough counts of target children (without regard to exact birth dates) were recorded for many villages.

Individual villages were generally very small and the numbers of target children extremely variable. Therefore, clusters of adjacent villages rather than single villages were chosen as units of study. Altogether 18 clusters (sites), each with a total of about 80-100 target children were located. The sites were all within a 120km radius of Kikwit, but generally were separated from each other by more than 20km of road. Ethnographically and socioeconomically the sites were similar, however there were many local dialects of the regional language, Kikongo (Appendix 1, note 1).

2.3.2. Census enumeration

A census enumeration was conducted in each site, beginning in July. Demographic information including the birthdate and sex of each target child, parents' names and address, and number of household members was obtained (Appendix 2).

2.3.3. Child age determination

Reliable birth records were not generally available for children, since most village women gave birth in the home (Appendix 1, note 2). Local calendars based on monthly agricultural activities, rainfall patterns, national and religious holidays, and significant local events were therefore drawn up. These were estimated to be accurate to within about 1 month, and were used to estimate the birthdates of the 2082 children (aged about 3 to 35 months in October 1987) who were recruited into the study.

2.3.4. Selection of sentinel families

Approximately 18% of families of recruited children were randomly selected in each site for the baseline observational study. A list of replacement families (also randomly selected) was drawn up in each site, for use in the event that any of the 300 sentinel families recruited for this study were absent at the time of observation.

## 2.4. Recruitment and training of study team

Between June and September 1987, a team of study workers was recruited and trained. The "PECODIZ" (Projet d'Education Communautaire sur la Diarrhée au Zaire) team consisted of 20 interviewers, 6 observers, a field supervisor, 2 data entry clerks, and a chauffeur (Plates 2.1-2.3). In May 1988, 2 additional women were recruited to develop a training programme for community volunteers prior to the intervention, and in August 1988, 2 more observers were recruited, bringing the total number of observers to 8.

PLATE 2.1. PECODIZ Observers

PLATE 2.2. PECODIZ Interviewers

PLATE 2.3. PECODIZ data processors, chauffeur, team leader

An administrator and an accountant joined the team part-time, and managed project expenditures, local official protocol, salaries, and the inventory of field supplies. The total number of project team members, including 2 directors, was thus 38.

2.4.1. <u>Observer recruitment and training</u>

Both male and female observers were recruited early in the preparatory phase of the study, for the full duration of the project. They were hired to assist with several aspects of the study, although their principal responsibility was the observational study. All observers were university graduates (equal to at least 3 years of post-secondary school education), and were literate in both French and Kikongo. Most had prior research and/or rural development work experience. Training of the observers was led by the project organizers in Kikwit. Instruction was generally formal, but active participation and discussion among the trainees was nurtured. All aspects of the study design and methodology were taught, however the main emphasis was on the design and development of the observation form (which eventually involved extensive field testing), and experimental bias: the meaning of, potential for, and strategies to avoid bias in the observations were discussed at length. The initial 2 weeks also served as a period of evaluation of each individual's aptitude: those who performed best in written tests and class participation exercises, and who had the best potential to withstand a rigorous schedule of fieldwork, were selected. After intensive training for 3 weeks, further training was ongoing with the project.

2.4.2. <u>Interviewer recruitment and training</u>

Individuals hired to collect the diarrhoeal morbidity data were recruited and trained approximately one month prior to the baseline study. All trainees had completed 6 years of primary school and at least 4 years of secondary school (Appendix 1, note 3) and were literate in French and Kikongo. As for the observers, the first 2 weeks of training served concurrently as a period of evaluation of trainees, which was based on written tests and class participation, as well as individuals' potentials to contend with the spartan conditions of village life. The 24 who performed best were identified and 20 of them were hired to work as resident interviewers in the 18 sites. (Two sites had 2 interviewers each, since they were about 50% larger than the other sites, and there were 4 reserve interviewers.)

Interviewers were hired for just 3 months and therefore were trained exclusively in baseline diarrhoeal morbidity study methods. Training methods included class instruction and participation, small working group sessions and field testing of questionnaires. Role playing was used to plan for potential difficulties in communicating with mothers and other members of the community. The interviews with mothers regarding episodes of diarrhoea were to be based on a structured questionnaire in Kikongo (Appendix 2). The importance of objectivity during the interviews and of not suggesting responses was repeatedly stressed. In the event that s/he could not speak the same dialect as the mother, the interviewer was instructed to identify a community member who could translate between urban Kikongo and the local Kikongo dialect.

Interviewers were trained to weigh children on a portable Salter scale sensitive to 100g. Variation within and between interviewers was minimized by continuing weighing instruction until all interviewers weighed ten (non-study) children to within 100g. They were also instructed to help mothers prepare a standard WHO sugar-salt oral rehydration solution (SSS) (Appendix 3) if health facilities were unavailable and a child had had diarrhoea for more than 2 days, or had signs of dehydration (decreased skin turgor, sunken fontanel, apathy). They were instructed specifically not to prescribe other medications or advise about diarrhoea or any other illnesses (Appendix 1, note 4).

Two field supervisors were trained to monitor the interviewers' performance and the quality of data collection. These supervisors made unannounced visits to each site approximately every two weeks to ensure that interviewers were collecting data properly, to help resolve technical, social or health problems, and to check the accuracy of the completed data collection forms.

## 2.5. Baseline diarrhoeal morbidity study methods

### 2.5.1. Diarrhoeal data

Weekly diarrhoeal histories of 2082 children aged 3 to 35 months old at the start of the study period were collected for 12 weeks, beginning on October 1, 1987. The period of data collection corresponded to the expected months of peak diarrhoeal incidence[2] (Appendix 1, note 5).

At the weekly home visits mothers were asked to recall the occurrence and severity of any diarrhoeal episodes on each of the previous 7 days, for each target child. The mother's own definition of diarrhoea was generally used, since there is a local word (pulu-pulu) to describe diarrhoea, but if a mother was unsure then diarrhoea was defined as 4 or more loose or watery stools per day (Appendix 1, note 6). For each day that diarrhoea occurred, the mother was asked if the child was febrile, whether there was blood in the stools, and what (if any) treatment was used. Any other illness during the week was also recorded (Plate 2.4).

PLATE 2.4. Diarrhoeal histories were recorded at weekly home visits

The names of children who had diarrhoea on the day of the interview were recorded in a notebook. Interviews were normally conducted early in the morning (Appendix 1, note 7), and if no diarrhoea had occurred by the end of the interview, the interviewer was instructed to return in the evening to ask if there had been any change. Diarrhoeal information for the interview day was actually included in the recall period one week later, at the next home visit. At that time interviewers could check the validity of mothers' reporting of diarrhoea on the previous interview day (ie. 7 days earlier) using their notebooks, and discuss and resolve any discrepancies (Appendix 1, note 8).

In the event of a mother's absence at a scheduled data collection visit, interviewers were instructed to return to the home during the subsequent week. If the mother could not be contacted, no further attempts were made to regain that week's data. Absenteeism was generally minimized by asking families (during the census) about their anticipated travel, and not recruiting those planning to be away for $\geq$3 weeks during the study period, and by giving each mother a weekly interview time which remained unchanged throughout the study.

### 2.5.2. Body weights and feeding patterns

The body weights of children in underwear were measured to the nearest 100g on a frequently calibrated portable Salter scale. Children were weighed during the first and last weeks of the morbidity study.

Information on the feeding patterns of each child was also obtained during the first and last weeks of the study. Mothers were asked if the child was currently breast-fed, if s/he had ever been given colostrum, if s/he received any other milk, porridge or family food, and (if appropriate) at what age other milk or foods had been started and at what age breast-feeding had stopped (Appendix 2).

## 2.6. Baseline observation study methods

An associated study of personal and domestic hygiene practices in a randomly selected sub-sample of 300 sentinel families was conducted during the same months as the baseline morbidity study. Using a structured form (Appendix 2), 6 observers recorded their observations during a single-day (6- to 7-hour) visit to each sentinel family. Observations were made on yard and home hygiene, water usage and storage, meal preparation, food sharing, child feeding, and disposal of child faeces. The chief purpose of this study was to identify personal or domestic hygiene behaviours that were potential risk factors for diarrhoea and to plan the practical details of the hygiene messages in the subsequent randomized intervention.

### 2.6.1. Development of observation form

An observation form which allowed observers to record, count or time predefined behaviours or events, was required. As such, several criteria governed the structure of the form and the range and categories of behaviours to be observed. First, the categories needed to be few in number and clearly defined in order to avoid observer fatigue and ambiguity. Second, since it was of interest to study not only discrete behaviours but also sequences of behaviours which might be risk factors for diarrhoea (eg. child defecates, mother cleans child's anus, mother does not wash hands, mother prepares food, etc.), either the form or the analysis needed to take account of behaviour sequences. Third, the extent to which frequencies and durations of behaviours were of interest had to be determined, since these would affect the complexity of the observations: whilst frequencies could be incorporated simply (by using checks or numbers), durations of behaviours required the use of a watch. Fourth, since some of the behaviours needed to be rated or scaled (eg. good, fair, poor; much, some, none; etc.), standards of adequacy for such behaviours needed to be defined.

A structured form for recording samples of behaviours which included about 100 predefined behavioural categories was developed. Two observation methods, referred to in the behavioural sciences as "time sampling" and "event sampling"[4-6], characterized the form and were to be used by the observer to record the behavioural events.

2.6.1.1. **Time Sampling.** Time sampling refers to recording the frequency of a predefined behaviour within a time frame. In the study, time sampling was used to record breastfeeding and child activity, such as play, bathing and snacking. Using a watch, observers noted the occurrence of these behaviours in 10-minute intervals, over a period of 1 hour.

2.6.1.2. **Event Sampling.** Event sampling involves recording each instance of a particular behaviour or event as it occurs. In contrast to time sampling, it is free of any time constraints: the unit of measure is the behaviour itself, rather than the time interval imposed on the behaviour. As Irwin and Bushnell explain, "time sampling is more concerned with the existence of an event and event sampling is more concerned with exploring its characteristics"[4]. In the baseline study, event sampling was used to study the vast majority of behaviours of interest including home and yard hygiene, water use and storage, meal preparation, child feeding, food sharing and defecation habits.

2.6.1.3. **Rating scales.** For selected observations, the use of rating scales was used. For example, the cleanliness of latrines was assessed against 4 criteria, namely: the presence of a door, the presence of a cover, the appearance of having been swept, and location more than 10 metres from the house. Similarly, the presence of animal faeces in the yard was recorded as either none, a little, or a lot. Handwashing events were recorded with a qualifying rating, i.e. not at all, with water only, or with soap and water.

2.6.1.4. **Checklist notation.** For all observations, a checklist notation was used, thus permitting observers to place a simple check on the form when a particular behaviour or event was observed. This system was preferred, for its recording simplicity, to alternative methods such as narrative description, or the use of codes. However, the forms did have to be post-coded for entry into a microcomputer later.

2.6.1.5. Observation instruction sheet. In order to minimize observational ambiguity and to develop uniform interpretations of events, an instruction sheet accompanied the observation form (Appendix 2). This sheet provided full definitions and details of the behavioural categories selected for observation. The sheet also described the order of observations, the time allowed for each, and the physical tasks (if any) required of the observer for specific observations.

All observers participated in the selection of behavioural categories, development of the observation form and finalization of the instruction sheet. Definitions of behavioural events were debated and discussed until all observers were in agreement about the definitions to be used. The form was pre-tested and inter-observer reliability measured (see Section 2.6.3) before starting the study. Throughout this developmental phase, observer objectivity was repeatedly emphasized.

2.6.2. Selection of behavioural categories: focus groups and 24-hour activity recalls

In order to select the range of behaviours of interest and to define them categorically, in-depth prior study of behavioural patterns was required[7]. Two qualitative methods - focus groups and 24-hour activity recalls - were used for this purpose.

Focus groups, or exploratory group sessions, were conducted with small groups of 8 to 12 randomly selected women with target age children from non-study villages. The purpose of these informal discussions was to obtain information about beliefs, perceptions and attitudes concerning child health and hygiene, and to learn the local vernacular used to describe them. Each focus group was led by a trained observer who introduced a theme related to child growth and development, health, feeding, or child care. A discussion guide was used to keep the sessions "focused", and participants were encouraged to express their ideas and opinions openly. Each session lasted usually an hour, and was tape-recorded.

To develop the time schedule of the observations, home interviews were conducted with random women with weaning age children from non-study villages. In these interviews, led by trained observers, each woman was asked to describe the details of her activities on the previous day, chronologically from rising til bedtime. The emphasis was placed on domestic activities, including meal preparation, child feeding, food sharing, water use, sanitation and domestic hygiene. Information about the time of events, their duration, and the involvement of any family members, was obtained: most of the relevant practices of interest occurred between 6 a.m. and 2 p.m.. These activity recalls provided the needed precision about which behaviours and events could be observed and when.

### 2.6.3. Pre-testing the observation form: reliability tests

Tests of reliability of the observations, ie. the level of consistency of observations between and within observers, were conducted prior to the study start. The purpose of the tests was to ensure inter-observer agreement over all categories of behaviours.

Ideally, observer reliability should be tested against one completely objective observer - usually the trainer - who sets "standards". However, the trainer - in this case, the author - was unable to observe families unobtrusively and establish such standards since, as a foreigner, her presence inevitably altered normal behaviour. Reliability, therefore, was measured by having pairs (or triplets) of observers simultaneously observe single families. Each observer recorded his/her observations independently of the other(s), and then their forms were compared and scored, and any discrepancies discussed and resolved. Reliability between any two observers was calculated using a formula frequently used in behavioural research, namely: (number of agreements)÷(number of agreements + number of disagreements). Although this formula cannot be used to calculate the level of agreement for each behaviour observed, it does provide an overall measure of inter-observer agreement[8,9]. Paired observations were repeated until all observers were observing at a level of consistency of 85% or more. These repetitions ensured adequate pre-testing of the form.

### 2.6.4. Operation of the observational study

In each site approximately 18% of study families had been selected for observation, therefore usually 2 or 3 days were needed to complete the observations. The order of coverage of sites was random, in principle, but in practice was governed by fuel availability, vehicle repairs, and the need to collect diarrhoeal questionnaires concurrently. Observers formed a mobile team, and completed all the observations of sentinel families in one site before beginning them in another site.

In each site observers were assigned to sentinel families randomly, by a designated team leader. They were blind to the diarrhoeal histories of the families. Observations began no later than 6 a.m., when the family's main meal was usually prepared. Prior to each family's observation, the mother was informed that a member of the study team would come for a day to make some observations of young child activities, although the true purpose of the observation was not disclosed: at the time of observation, the observer simply said that his/her purpose was related to a study of child health. Thus, mothers knew neither which particular activities and behaviours were observed, nor whose; they were asked to go about their daily activities in the usual way, and to try to ignore the observer. Observers remained outside the home, minimized their interactions with any family members, and declined to share meals until observations were complete.

At the end of each day observers reviewed their observation forms, and the team leader made sure that any errors or omissions were corrected. Any technical or operational problems which had arisen were also discussed and resolved at this time. The team leader made a written report after the observations were complete in each site, and this was reviewed by the project director.

#### 2.6.5. Socioeconomic information

At a subsequent home visit to the 300 sentinel families the age, occupation and education of each parent, the quality of their housing and home ownership status, the number and age of individuals living in the household, and the mother's pregnancy history were recorded (Appendix 2).

### 2.7 Randomization

Following the baseline diarrhoeal study, in each site the mean number of episodes (ie. the site incidence rate), the mean number of days of diarrhoea, and the mean duration of episodes were calculated and adjusted for age. All sites were ordered from lowest to highest (ie. 1 to 18) according to their age-adjusted mean number of days of diarrhoea. (A similar order of sites resulted if site incidence rates were used instead of the number of days). Thus ordered, the first 2 sites were grouped to form a pair (ie. pair number 1), and each 2 subsequent sites were similarly grouped into pairs (ie. pair numbers 2 through 9), and then 1 in each pair was chosen at random to receive the intervention, the other to serve as a control (see Table 4.2, Chapter 4). Thus, 9 sites were chosen for the intervention ("intervened sites") and 9 were chosen as to serve as controls. Only the project directors knew which sites were allocated to each of the two study groups; observers, interviewers and other project staff were kept blind to the allocation of sites to treatment group, throughout the study. (Clearly, trainers of the community volunteers became aware of the allocation during the volunteers' training, described in Section 2.9.2, below.) Residents of intervened sites were not told about activities planned in control sites, and vice versa.

## 2.8. Post-intervention diarrhoeal and observation study methods

To evaluate the impact of the intervention, both the diarrhoeal and observational studies were repeated beginning October 1, 1988, exactly 1 year after the baseline studies. The methods used were generally the same, with only some variations esteemed by the project team to improve the quality or efficiency of data collection. Most importantly, the post-intervention observation form was revised and simplified (Appendix 2), based on the results of a risk factor analysis of the baseline data. The new form was pretested and reliability fine-tuned as before. The follow-up observational study focused specifically on behaviours addressed by the intervention (described below). For the diarrhoeal study, interviewers were placed in sites where they could speak the same local dialect as the residents, unlike at baseline, when this factor was not considered. Weights of study children were again measured at the beginning and end of the 12-week study period, however this time by the observers.

Comprehensive data on child feeding practices, and socioeconomic and demographic data, were obtained for all study children at a separate home survey conducted by observers. Child feeding data included breastfeeding, the age of introduction and type of supplementary foods given, and reasons for weaning and stopping breastfeeding (Appendix 2).

Children from the baseline diarrhoeal study who exceeded 35 months at the start of the follow-up study were replaced by new children from the same sites aged 3-11 months. Just before the follow-up studies, a second census was conducted in all 18 sites to obtain demographic information on new children. A total of 1954 children were recruited for the follow-up diarrhoeal study. A new subsample of 293 sentinel families was randomly selected for the follow-up observational study.

There were renewed fieldworker training requirements in 1988. Approximately half of the interviewers had to be replaced, and 2 additional observers were added to the original team of 6. Training of new recruits followed the same procedures used 1 year earlier.

## 2.9. Description of the intervention

### 2.9.1. Message development

2.9.1.1. **Risk factor analysis.** Message development for the intervention was based on a preliminary analysis of the baseline data from both the diarrhoeal and observational studies. The purpose of this "risk factor" analysis was to link the baseline diarrhoeal rates to observed behaviours. Families with high diarrhoeal rates were expected to have bad practices and families with low diarrhoeal rates good practices. The risk factors so identified were intended to form the basis of the educational messages.

The risk factor analysis was less conclusive than hoped in identifying clear-cut behaviours that could be intervened upon and which made etiological sense. The only behaviours signficantly associated with high diarrhoeal rates were having human faeces in the yard, giving the target child a separate plate during meals, and not wiping the child with clothing after defecation. Some obviously "good" behaviours (eg. not having animal faeces in or near the home, using soap to handwash before meals, and kitchen cleanliness) were associated with diarrhoea in the expected direction but practised by so few people (ie. <10) that they could not be identified as risk factors. There was suggestive evidence that avoidance of animals in the cooking area and using disposable utensils instead of hands or durable utensils for cooking were associated with less diarrhoea. Handwashing of target children before meals was also related to less diarrhoea, but after controlling for child age this effect disappeared. For some other behaviours (eg. covering of food during cooking, using water from improved sources, reheating leftovers in a clean pan), associations were in the opposite direction than expected.

Many of these anomalies were clarified through discussions with observers and interviewers[7]. In brief, these problems were attributed largely to the failure to develop a sufficiently focused observation form for the first observational study.

With regard to weaning practices, clearer patterns emerged and stronger, more consistent statistical associations were found. Specifically, short duration of breastfeeding (ie. <12 months) was associated with longer episode duration; early introduction of supplementary foods including porridge, family foods and non-breast milk was related to more frequent diarrhoea; giving colostrum and breastfeeding in general had protective effects on diarrhoea; and bottle feeding had an adverse effect on diarrhoea.

2.9.1.2. **Choice of messages.** The choice of which observed associations to use to develop an intervention was based largely on the time available for the intervention. The behaviours selected were those which made intuitive, etiological sense, and which had some basis in previous empirical research[10-12]. In addition to the hygiene behaviours identified as possible risk factors, handwashing was also included. Although handwashing had not emerged as a significant factor in the analysis, it appeared to have reduced diarrhoeal incidence in several studies[10,13]. Washing the target child after defecation was also incorporated.

Thus, 4 behaviours were selected for the intervention, namely: **(1) disposal of animal faeces from the yard, by sweeping twice per day; (2) handwashing before meal preparation and before eating; (3) handwashing after defecation and washing the child's buttocks and hands after defecation; and (4) proper disposal of human faeces from the yard.**

Associated details of the selected behaviours were addressed. For example, proper sweeping and disposal of animal faeces emphasized having a garbage pit which was deep and not close to the house. Soap and water were encouraged for all handwashing events, and pouring water onto hands was advocated instead of washing hands in a common basin. Disposal of human (child) faeces emphasized using a durable instrument and a latrine. Posters with slogans were developed locally to illustrate the messages (Appendix 3).

2.9.2. Selection and training of community volunteers

Promotion of behavioural change was based on a philosophy of community participation and self-care, an approach which has been most effective in nutrition education programmes[14-16]. Moreover, the aim was to test the feasibility of hygiene education using locally available resources. Implementation of the intervention was, therefore, intended to involve community members to the greatest extent possible[17]. In each site 2 or 3 female residents were selected by village members and sent to Kikwit for training in message promotion in June 1988. A total of 40 women were trained. Community volunteers from sites randomized to receive the intervention were trained separately from those from control sites.

To identify appropriate community volunteers, project organizers visited each site twice to explain the goals and objectives of community volunteer selection and training. The main characteristics of suitable volunteers which were encouraged included: having a good reputation in the village; stability; enthusiasm; willingness to accept the task without monetary compensation; and having been married. Village leaders were discouraged from choosing women only because of high status[18].

Training of the volunteers was led by 2 university-educated women ("trainers") with some previous non-formal teaching experience. The procedure to recruit the trainers was similar to that for interviewers and observers: initially 4 trainees participated in 2 weeks of intensive instruction, which served simultaneously as a period of evaluation of each trainee's suitability. The trainer's instruction mainly included orientation to the project and to the intervention messages, methods of non-formal, village-based education, development of teaching plans and materials, and discussions about the roles of both the trainers and the community volunteers. At the end of this training session, 2 women were selected (and the other 2 were reserves) who, in addition to developing volunteer training materials and lesson plans, were to be responsible for monitoring the volunteers' work in the sites, assisting them in technical and social aspects of communication, liaising between village leaders and project organizers, maintaining a log book with details of volunteer and community activities in each site, and providing written reports of the training course and intervention monitoring to the project organizers.

A 1-week training course was conducted first for the 20 community volunteers from intervened sites and then, for the 20 volunteers from control sites. Training methods were non-formal: information was conveyed using open-ended questions about culturally relevant practices and experience, songs, proverbs, stories and pictures[18,19]. Songs written in Kikongo were tape-recorded during the lessons, and later translated into French. Lessons focussed on the behaviours chosen for the intervention. Trainers promoted messages using a social marketing strategy[20] which emphasized, for each behaviour theme, the social and/or personal benefits of adopting the prescribed behaviour (eg. increased social recognition and approval, a good family reputation, healthier children, fewer expenses on sickness and death, etc.). In addition, they discussed channels of message communication, such as village-wide meetings, small group discussions, home visits and so on[18], which each volunteer could adapt to her site as appropriate. Volunteers, in response to trainers' questions, told stories of their own experience, and invented new songs and proverbs. At the conclusion of training, volunteers reiterated what they had learned through drama and dances (Plates 2.5-2.12).

PLATE 2.5. Community volunteers (intervened sites)

PLATE 2.6. Community volunteers (control sites)

PLATE 2.7. Volunteer training: handwashing before food preparation

PLATE 2.8. Volunteer training: handwashing before eating meals

PLATE 2.9. Volunteer training: food sharing after handwashing

PLATE 2.10. Volunteer training: washing the child's buttocks and hands after child defecation

PLATE 2.11. Volunteer training: volunteers simulate yard sweeping using dance and song

PLATE 2.12. Volunteer training: volunteers simulate proper disposal of human faeces from the yard using dance and song

2.9.3. Control group intervention

An alternate ("placebo") intervention was planned for the control sites. It was reasoned that a control intervention was necessary, since it was possible that changes in behaviour and/or diarrhoeal rates might be due to the increased care and attention given to people in the intervened sites, rather than to the impact of the messages *per se*. Clearly, any intervention in the control areas could be considered only if it did not have an impact on diarrhoeal incidence, since this would mask the effect on diarrhoea of the hygiene intervention. Whilst a non-diarrhoeal intervention would have been preferred in order to avoid any influence on diarrhoea, this was impractical, since people in the control sites expected some type of diarrhoeal follow-up activity. Therefore, it was decided to orient the control intervention to diarrhoea management. Two messages, intended to prevent dehydration during diarrhoea, were promoted: (1) continue to breastfeed during diarrhoea; and (2) give home-made rice water solution to children during diarrhoea (Appendix 1, note 9).

The control intervention was delivered in the same way as the main intervention. Thus, community volunteers were selected, trained, and monitored using the same approach as in the main study group. Posters with slogans were designed locally to illustrate the control messages (Appendix 3). The control messages were not promoted in the sites randomized to the main intervention. It was felt that including these messages would make the main intervention unduly cumbersome.

2.9.4. <u>Monitoring of the intervention</u>

Community volunteers began intervention activities in early July 1988, and continued until the end of December. Trainers planned to visit each site on a fortnightly basis to monitor activities of the volunteers and levels of community participation. However, due to transport difficulties, such frequent visits to the sites were impossible, and most sites were visited 3 times during the 6-month intervention period. Despite these constraints, intervened and control sites were visited with equal frequency, and equivalent assistance and attention was given to volunteers in both groups.

During monitoring visits, trainers maintained a log of activities and events in each site. They noted, for each volunteer, the number of times village rallies and small group meetings had been held; the frequency of home visits; whether the volunteer had "recruited" any helper(s) from the villages; whether the volunteer implemented the messages in her own home; and whether any other village members could repeat the messages. Any initiatives related to intervention messages by community members were noted. The trainers observed general hygienic conditions in the villages and recorded their impressions of community-level changes over time. In addition to monitoring the intervention activities, trainers also assisted the volunteers. For example, in the event villagers could not repeat the messages, or repeated them incorrectly, the trainers explained the messages correctly. They reinforced volunteers' efforts to recruit and train other community members.

At the end of the intervention, the trainers compiled a written report assessing the extent and quality of volunteer's activities and community participation in each site[17]. In each site, scores for each of the indicators described above were totalled to give an overall site score. In both intervened and control groups, sites were then ranked from 1 to 9 (ie. best to worst) according to their overall score to give an intervention "activity rank". (Activity ranks were later used to differentiate the intervention's impact according to intervention "quality" in each site. See Chapters 4, 5, 6).

### 2.10. Data management

All data obtained in the field were coded by the child's number, mother's number, site number, day of study and type of information. Field supervisors transferred diarrhoeal data from the sites to a central office in Kikwit every 2 weeks. Data collection forms were checked for accuracy first at the sites by field supervisors, and again prior to data entry into a microcomputer in Kikwit. Diarrhoeal data were filed according to the week of study, site and child number. Observational data were transferred from the sites to the central office after completion of observations in each site. Observation forms were coded and then entered into the microcomputer. All the data were managed using the software programme DBASE 3+..

The data were analysed on a microcomputer using the Statistical Package for the Social Sciences (SPSS/PC+), version 3.0[21]. The Centers for Disease Control (CDC) Anthropometric Software Package, version 3.0, was used to derive anthropometric indices based on the NCHS/CDC reference population. Harvard Graphics was used for graphs and figures, and Word Perfect Executive Spreadsheet for large tables. The main data analyses were conducted in London between 1989 and 1991 (Plate 2.13).

**PLATE 2.13. Data analyses were conducted in London**

## 2.11. Evaluation of the intervention

The evaluation of the intervention was based on 3 main outcomes, namely: (1) the impact on diarrhoeal morbidity (incidence, duration and point prevalence); (2) the impact on behaviour; and (3) the impact on child growth. For each main outcome the analyses were conducted both at the child and the site levels. Comparisons focused on the differences between intervened and control groups, post-intervention, and on the changes from the pre- to the post-intervention periods between the intervened and control groups. The results of these impact evaluations are described in subsequent chapters. Details of the statistical methods for each evaluation are also included in the relevant chapters.

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CHAPTER 3. BASELINE STUDY OF DIARRHOEA MORBIDITY IN CHILDREN

## 3.1. Introduction

Despite early recognition of diarrhoea as a major health problem in Africa[1,2], there is a remarkable paucity of reliable information on the incidence, severity and duration of diarrhoeal episodes. Longitudinal, prospective studies, which provide the most accurate information, have been limited in number due to their high expense, time requirements, and logistical complexities. Studies in rural Africa, moreover, are difficult due to the scattered location of communities, low population density, incomplete mapping and census information, and inadequate communication systems. Difficulties of accessibility have particularly hampered prospective studies[3]. Most estimates of diarrhoeal morbidity have, therefore, been from cross-sectional studies.

When Snyder and Merson[4] conducted their review of the magnitude of the problem of acute diarrhoeal disease in the developing world, fairly strict selection criteria were applied to studies in order to obtain comparable, valid data. Only 3 studies in sub-Saharan Africa were identified which met the criteria of being longitudinal, prospective, community-based, and having stable populations with little migration. From such studies an estimate of 2.2 episodes of diarrhoea per child per year for children under 5 years of age was derived. More recently, Kirkwood[5] has reviewed a broad range of diarrhoeal studies from Africa dating from 1970, including data from community-based longitudinal and cross-sectional studies, routine health facility statistics, and cross-sectional surveys conducted by the Diarrhoeal Diseases Control Programme (CDD) of the World Health

Organization (WHO). Out of a total of 109 studies identified, 35 were published and 9 of these were community-based, longitudinal studies of diarrhoeal incidence or prevalence; only 5 longitudinal studies were from rural areas. From these data, it is estimated that children are ill with diarrhoea approximately 10% of the time and, depending on age, may experience from 1.6 to 9.9 episodes per child per year, the median being 4.9 for children under 5 years.

Annual estimates of diarrhoea have largely been inferred from studies of shorter follow-up. The most numerous of these are the estimates derived from the WHO/CDD cross-sectional surveys, which are based on 2-week diarrhoeal incidence data, extrapolated to yearly rates. In the Bandundu region of Zaire, a WHO/CDD cross-sectional survey[6] reported a 2-week diarrhoeal incidence rate in 1985 of 10.7% (ie. 10.7 episodes per 100 children), reflecting an estimated annual incidence rate of 2.7 episodes per child. Estimates of diarrhoeal incidence and prevalence from such cross-sectional studies must be interpreted with caution, as they are very dependent on the time of year the survey was conducted, and whether diarrhoea was at a high or low peak[5]. At best, they give a rough approximation of true incidence.

Diarrhoeal diseases of bacterial origin generally are known to peak during months of heavy rainfall and high temperatures[7]. Only 2 of the longitudinal studies identified in Africa have reported diarrhoeal morbidity rates over all seasons of the year[8,9]. Yearly estimates of diarrhoea derived from studies of short duration therefore often reflect adjustment for seasonal fluctuation of diarrhoeal rates. The WHO/CDD surveys, for example, use an adjustment factor linked to the proportion of annual episodes known to occur during the 2-week survey periods. The WHO estimate of 2.7 episodes per year from Bandundu was adjusted in this manner, using hospital records to estimate monthly distributions of diarrhoeal rates. In this area, approximately 30% of diarrhoeal episodes occur during a peak season of transmission from August through October, representing the first 3 months of a 5- to 6-month rainy season.

Diarrhoeal incidence rates vary widely according to child age in the first 5 years. The highest rates usually occur during the latter half of infancy[4], although peaks in the second year have also been found. In Africa, peak incidence rates have been reported in the 6-11 month range in Nigeria[10,11], Kenya[12] and the Gambia[1].

Although less common, sex differences in diarrhoeal rates have also been reported. Higher rates of diarrhoea were reported among male children aged <2 years in Nigeria[10] and in the Gambia[13], and among males aged <5 years in Sudan[14].

Only a small number of studies have reported duration of diarrhoeal episodes. Median values of between 4 and 5 days have been reported in the Gambia[8,13], in Nigeria[15] and in Ethiopia[9]. In the Gambia, Pickering et al[13] found that mean duration decreased with increasing child age among children aged <3 years; in Ethiopia, Freij and Wall[9] found a similar trend with age, with the median duration of episodes decreasing from 5.7 days among children aged <2 years, to 3.4 days among children aged 5-11 years. From the small number of studies reporting diarrhoeal severity, Kirkwood[5] notes that severe episodes with associated dehydration also tend to be concentrated in the first 2 years of life.

In this Chapter results from the baseline, 12-week prospective study of diarrhoeal morbidity in rural Zaire are reported. The data were collected between October 1 and December 30, 1987 using retrospective weekly recall (and the subsequent intervention trial occurred in 1988). The accuracy of mothers' weekly reporting of diarrhoea, and the prevalence rates inferred from this baseline study, are presented.

## 3.2. Methods

### 3.2.1. Acquisition of diarrhoeal histories

Diarrhoeal histories of 2082 children aged 3 to 35 months at the start of the study were collected at weekly home visits for 12 weeks, beginning on October 1, 1987. The period of data collection corresponded to the expected months of peak diarrhoeal incidence[16]. Full details of data collection methods are described in Chapter 2.

### 3.2.2. Statistical methods

A gap of two or more diarrhoea-free days was used to define a new episode of diarrhoea. The weekly survey data were used to calculate various indices of diarrhoea. Five outcome measures were calculated for each child: (1) the number of diarrhoeal episodes, (2) the mean duration of any episodes, (3) the total number of days with diarrhoea, (4) the number of days with blood and/or fever and (5) the number of episodes with blood and/or fever. These five outcome measures were studied according to child age, sex and site. The number of episodes was studied after adjusting for incomplete follow-up, using the formula: (number of episodes x 12)÷(number of weeks of observation). A similar procedure was used to adjust the number of days with diarrhoea. A logarithmic transformation ($\log_{10}$(days with diarrhoea+1)) was applied to study the number of days with diarrhoea, since this variable had an extremely skewed distribution. Both the number of days of diarrhoea and the mean duration of episodes were adjusted for reporting discrepancy, using a procedure described in section 3.3.1, below. Children with incomplete data, ie. ≤9 weeks of observation, were excluded from the analyses.

In order to check the accuracy of the data, the frequency distributions of the reported start and end days of diarrhoeal episodes were examined over the 84 study days (looking for trends in the extent of reporting) and over the 7 interview days. Next, the durations of all complete diarrhoeal episodes were studied in relation to the reported start and end days of the episodes. Finally, the frequency distribution of point prevalence was examined according to the 7-day interval between interview days.

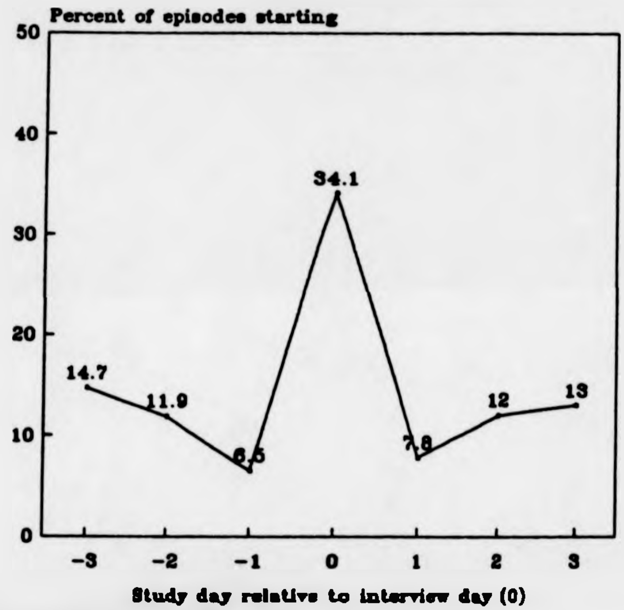
## 3.3. Results

Of the 2082 enrolled children in the study, 1914 (92%) had ≥9 complete weeks of diarrhoeal morbidity data. The remaining 168 were excluded from the analyses. In 16 children with complete data, information on age and/or sex was missing and they were therefore excluded from any analyses that involved these variables. The total number of child-days of observation was 157,290, representing a total of over 20,000 interviews. Diarrhoea was reported on 17,280 days, or 11% of all child-days observed.

### 3.3.1. Correction for disproportionate reporting of diarrhoea near interview days

When the distribution of the reported starts of diarrhoeal episodes was examined, the reported starting days were not evenly spread among the days between successive interviews but were more numerous on the actual interview days. This is shown in Figure 3.1, where the interview day has been designated day 0. In the absence of

**FIGURE 3.1. Distribution of Starts of Diarrhoeal Episodes Relative to Study Interview Days**

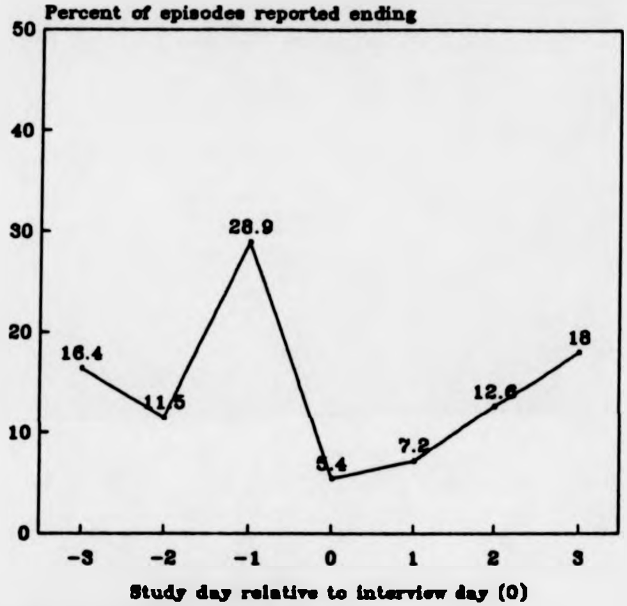



Includes 3329 episodes beginning on study day 3 or later (see text), from 1914 children with 9+ weeks data.

reporting inaccuracy, the start days of any diarrhoeal episodes should be evenly spread among the study days, and approximately 14% of all episode starts should be reported on each day. However, more than a third of the starts (34.1%) were reported on interview days, and relatively few episodes were reported to start the day before or the day after the interview (6.5% and 7.8%, respectively). On the other study days the distribution was more even and closer to the expected. The same pattern emerged when episodes were examined for each age group, each site, and for each sex. In the figure only episodes of diarrhoea that were known to have started during the study (ie. on study day r3) are represented, and 214 (ie. 6.0%) out of the total of 3543 episodes are not included, since diarrhoea reported on study days 1 and 2 may have been part of an episode that started before the study began. These findings suggest that many of the episodes that should have been reported to start on days -1 and +1 were, instead, reported on day 0 (ie. on the interview days).

Similarly, there is no reason to expect that the last day of episodes should be unevenly spread among the 7 days between interviews. Hence, the proportion of episodes ending on each of the 7 study days should be about 14%. Figure 3.2 shows, however, that approximately twice as many episodes than expected (29% vs. 14%) were reported to end 1 day before the interview, whilst an unexpectedly low number of episodes were reported to end on days 0 and +1 (5.4% and 7.2%, respectively). The other days showed approximately equal proportions of reported terminations and were close to what was expected. Again, the same was found when episodes were examined for each age group, site and sex, and when randomly chosen individual study weeks were studied. Moreover, this pattern is basically unchanged when incomplete episodes are included in the analysis. In the figure only data for complete episodes are presented, ie. those episodes which began on study day 3 or later and terminated at least 2 days before the end of the study. Thus, 445 incomplete episodes (12.6% of total) are excluded from this analysis. This distribution pattern suggests that many of the episodes that should have been

**FIGURE 3.2. Distribution of Reported End Days of Diarrhoeal Episodes Relative to Study Interview Days**

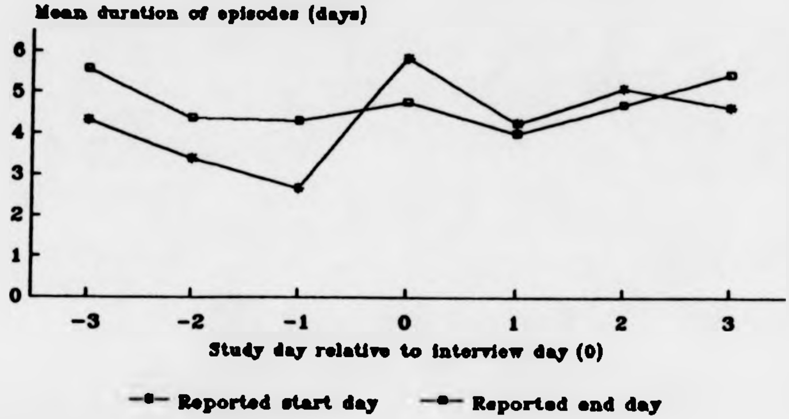



Includes 3098 complete episodes (see text) from 1814 children with 9+ weeks data. Mean percent among days 14.3%.

reported to end on days 0 or +1 were, instead, reported to end on day -1.

Figures 3.1 and 3.2 imply that even if mothers have not omitted episodes, they have certainly misplaced their start and end dates. The estimates of incidence may well be correct (so no adjustment is needed). On the other hand, since both starts and terminations are reported unevenly among the 7 days, the estimated duration of episodes is questionable. This is illustrated in Figure 3.3 which shows that

**FIGURE 3.3. Mean Duration of Diarrhoeal Episodes According to Reported Start and End Days, and Study Interview Day**




Includes 3098 complete episodes (see text), of 1814 children w/8+ weeks data.
Overall mean duration 4.77 days (sd 3.8)

the mean episode duration is 5.8 days for episodes reported to start on day 0 but is only 2.7 days for episodes reported to start on day -1. A disparate pattern is also seen when episode duration is examined according to the day the episode was reported to end: the mean duration ranges from 5.6 days for episodes reported to end on day -3 to 4.0 days for episodes reported to end on day +1. With accurate reporting, both lines should be superimposed and approximately horizontal.

To correct for these disparities, each episode duration has been adjusted by an increment, the size of which is linked to the reported duration of the episode and the percent difference between the mean reported duration for a given study day and the overall reported mean duration (4.77 days). That is, for each episode, an adjustment has been made using the formula:

$$\text{Duration}_{adj} = \text{Dur}_{rep} + (4.77 - \text{Dur}_i) \times \text{Dur}_{rep} / \text{Dur}_i$$

where: $\text{Dur}_{rep}$=reported duration of episode

$\text{Dur}_i$=mean reported duration of episode start day i

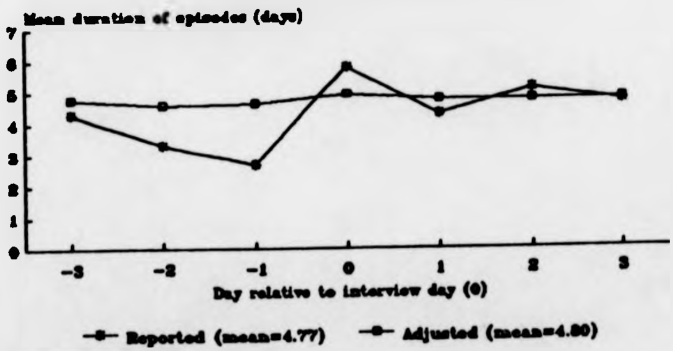
4.77=overall reported mean duration

i=episode start day (-3 to +3) relative to interview day (0)

(Since the adjustment is made for each child, the effect of child age on duration is reflected in the reported duration and need not be considered in the adjustment.) (See Appendix 1, note 1, for a summary of the baseline numbers of episodes and their mean durations, before and after adjustments for reporting discrepancy were made.)

The effect of the adjustment on mean reported duration relative to study day is shown in Figure 3.4. Whilst the effect on overall

**FIGURE 3.4. Mean Duration of Diarrhoeal Episodes, Reported and Adjusted, According to Reported Start Day**




Includes app. 3100 complete episodes (see text), from 1914 children with 9+ weeks data.

mean duration was negligible (ie. from 4.77 to 4.80 days), substantial changes resulted for individual study days, especially for episodes starting on days -1 and -2, where mean durations increased by 43% and 26%, respectively. The total number of days with diarrhoea for each child was calculated following adjustment of episode durations by totalling the adjusted number of days of any reported episodes.

Mothers' reporting inaccuracy also affects estimates of point prevalence of diarrhoea. Figure 3.5 shows the distribution of point

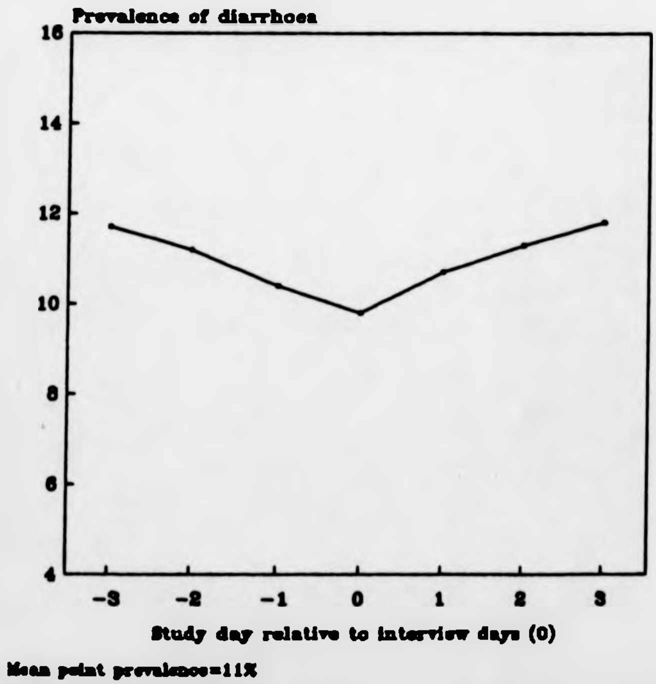



**FIGURE 3.5. Point Prevalence of Diarrhoea with Respect to Study Interview Days**

prevalence according to study day. On interview days point prevalence is nearly 20% lower than it is 3 days before or 3 days after interviews and is, in fact, lower than on any other day. This is again quite contrary to expectations if mothers were reporting diarrhoea accurately. Peaking of point prevalence mid-way between interview days is not surprising, however, in light of the fact that most diarrhoeal episodes were reported to begin on interview days and most lasted 3 to 4 days (see section 3.3.3 below). These findings notwithstanding, point prevalence was not adjusted for reporting discrepancy, since the overall estimate of point prevalence was little affected by the reporting discrepancies on individual study days.

### 3.3.2 Diarrhoeal incidence

A total of 3543 episodes of diarrhoea (unadjusted for incomplete follow-up) were recorded. Table 3.1 shows the distribution of episodes according to the number of episodes per child, and the total

TABLE 3.1. Distribution of diarrhoeal episodes during 12 weeks of study (October-December, 1987) in children 3-35 months at study start

| Number of Episodes Per Child* | Number (Percent) of Children | Number (Percent) of Episodes* |
|---|---|---|
| 0 | 554 (28.9) | 0 (0.0) |
| 1 | 410 (21.4) | 410 (11.4) |
| 2 | 345 (18.0) | 690 (19.3) |
| 3 | 240 (12.5) | 720 (20.1) |
| 4+ | 365 (19.1) | 1764 (49.2) |
| Total | 1914 (100.0) | 3584 (100.0) |

*Episodes adjusted for incomplete follow-up number of episodes (3584), after adjustment for incomplete weeks of follow-up (see Section 3.2.2). The recorded number of episodes of diarrhoea per child ranged from 0 to 9, with 29% of children having none and 50% having two or more episodes. A small proportion (19%) of children accounted for approximately half of all reported episodes. Blood in the stools was reported in 10% of all episodes.

Age- and sex-specific incidence rates for the twelve weeks of study are shown in Table 3.2. Overall, the mean number of episodes

TABLE 3.2. Mean number of diarrhoeal episodes according to child age and sex during 12 weeks of study (October-December, 1987)

| Age (months) | No. of Males | Mean no. of episodes | No. of Females | Mean no. of episodes |
|---|---|---|---|---|
| 3-5 | 82 | 2.28 + | 98 | 1.96* + |
| 6-11 | 180 | 2.34 + | 206 | 2.02* + |
| 12-17 | 162 | 2.05 | 164 | 2.08 |
| 18-23 | 150 | 1.77 | 212 | 1.83 |
| 24-29 | 170 | 1.60 | 165 | 1.71 |
| 30-35 | 160 | 1.65 | 149 | 1.55 |
| Total | 904 | 1.93 | 994 | 1.85 |

* Significantly lower than male value ($p<0.05$ in each separate age group, $p=0.04$ in the combined 3-11 month age group)

\+ Significantly higher at 3-11 months than value among children 12-35 months ($p<0.0001$, sexes combined)

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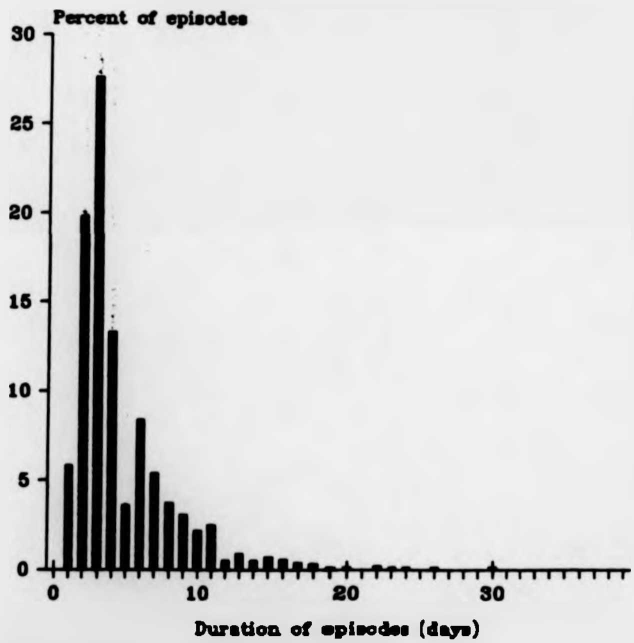
during the study period was 1.93 for males and 1.85 for females. The highest incidence rate was among males aged 6-11 months, with a mean of 2.3 episodes per child. Infants had significantly more episodes of diarrhoea than older children (anova, $p<0.0001$) and, below 12 months of age, male infants had slightly more episodes than female infants (anova, $p=0.04$).

3.3.3. <u>Duration of diarrhoeal episodes</u>

Most of the episodes (61%) lasted 2 to 4 days and the mean duration adjusted for incomplete follow-up and reporting discrepancy was 4.8 days (s.d.=3.8, Figure 3.6). The distribution of durations,

**FIGURE 3.6. Distribution of Durations of Diarrhoeal Episodes**

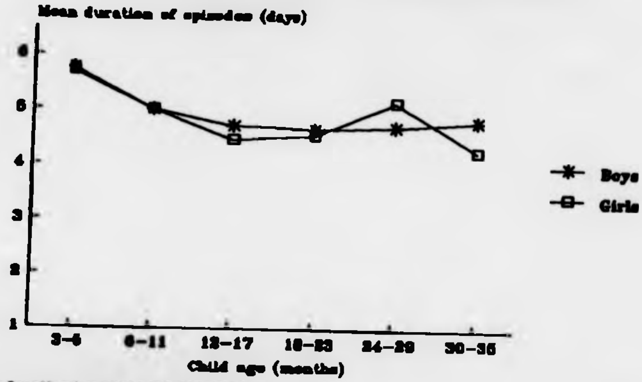



Includes 3100 complete episodes (see text). Mean duration=4.8 days, sd 3.8. 67% of episodes 2-4 days, 3% >= 15 days.

however, was very skewed, and 3% of episodes lasted more than 14 days. There were no significant differences between males and females (Figure 3.7), but infants aged 3 to 5 months had longer episodes than infants aged 6 to 11 months (mean 5.7 v. 5.0 days; anova, p<0.05) and, overall, had longer episodes than children of all other ages (mean 5.7

days v. 4.8 days; anova, $p<0.0005$).

**FIGURE 3.7. Mean Duration of Diarrhoeal Episodes According to Child Age and Sex**




Mean duration boys=4.9, girls=4.8 (ns). overall=4.8 days. Based on 3137 episodes of 1367 children with diarrhoea.

3.3.4. <u>Total days with diarrhoea</u>

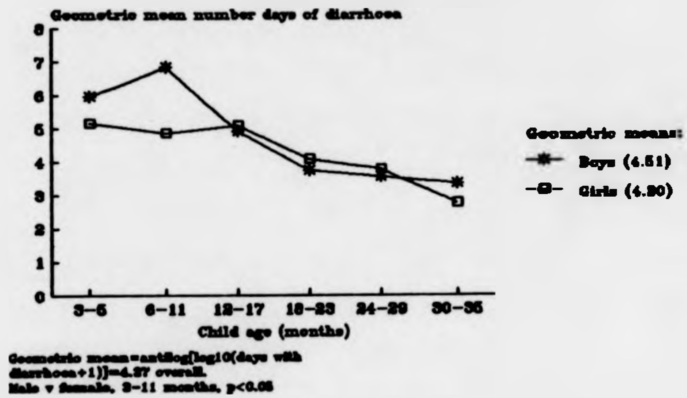
The mean total number of days with diarrhoea, adjusted for incomplete follow-up and reporting discrepancy, was 9.2 per child during the 12-week period of study (geometric mean=4.4 days). Figure 3.8 illustrates the inverse relationship between the geometric mean number of days with diarrhoea and child age (anova, $p<0.0001$). Male infants experienced more days with diarrhoea than female infants (anova, $p<0.05$), reflecting the significant sex differences in the frequency of episodes between 3 and 11 months.

## 3.4. <u>Discussion</u>

### 3.4.1. <u>Diarrhoeal morbidity results in the sub-Saharan context</u>

A longitudinal study of diarrhoeal incidence, severity and duration among 2082 children 3-35 months old in 18 rural sites in Zaire was conducted. Due to poor road conditions, severe transport and fuel constraints, and unavailability of women except at scheduled

**FIGURE 3.8. Geometric Mean Number of Days of Diarrhoea According to Child Age and Sex**




home interviews, it was not possible to perform random repeat interviews on study mothers to validate the data. The pattern of reporting of diarrhoeal episodes, however, was similar when sites were analysed separately, ie. across all interviewers, which suggests that interviewers were recording the data honestly, and that there was no differential interviewer bias between study sites [17]. Overall, the validity of the data is believed to be high.

The mean incidence of 1.9 episodes of diarrhoea per child during the 12-week study period is slightly higher than a rate of 1.4 episodes reported in a 3-month study of children aged 6 to 32 months in rural Nigeria[18]. In urban Gambia, however, children of the same age were found to have a mean incidence of 2.9 episodes of diarrhoea during a 15-week period of the rainy season (or 2.3 episodes when adjusted roughly to 12 weeks)[13].

Using information from previous studies of diarrhoeal diseases in this area of Zaire, approximately 30% of children's diarrhoeal episodes occur during October to December[16]. Thus an average annual incidence rate of 6.3 episodes (1.9÷0.3) of diarrhoea per child can be estimated, with the comparable figure for infants being 7.1. Although these incidence rates are only approximations of the true annual rates that a continuous surveillance study would provide, they are considerably higher than a previous WHO estimate of 2.7 episodes per child per year[6]. The estimated annual incidence for infants is similar to a rate of 7.3 episodes per child in a study of urban Gambian infants aged 0-11 months[8] but more than twice that reported in a study of urban Nigerian infants[15]. In contrast, it is much lower than that reported from rural Nigeria, where infants 6 to 11 months old had an estimated annual incidence of 14 episodes per child[10].

Diarrhoeal rates varied according to children's age and sex. Incidence was highest in the first year of life and declined with increasing age ($p<0.0001$). This age-specific pattern is common, and undoubtedly reflects the early adverse impact of the weaning period. Males had slightly more diarrhoea than females during infancy ($p=0.04$), but not thereafter. It is possible that mothers over-reported diarrhoea for boys, or that there are differences in breast-feeding or weaning patterns between boys and girls. The higher energy requirement of boys, for example, may have resulted in their being supplemented earlier, with consequent higher morbidity.

Overall, children in the study had diarrhoea 11% of the time, similar to rates reported for children of the same age in Nigeria[18] and the Gambia[13]. Whilst higher than the overall prevalence rate of 9.7% estimated by Kirkwood[5] for young children in sub-Saharan Africa, this difference is not surprising since children in this study were younger.

Reported mean duration of episodes in this study was 4.6 days, not unlike the durations reported in the Gambia[8,13], in Nigeria[15], and in Ethiopia[9]. Infants below 6 months had significantly longer episodes than older infants, and duration was shorter in the second and third years of life than during infancy. The longer durations in infants may reflect increased severity of episodes due to their smaller body size[19].

Only 3% of episodes lasted longer than 2 weeks, falling in the lower part of the range of reported rates of persistent diarrhoea in Africa[5]. The development of persistent episodes may have been kept low because interviewers were trained to help mothers prepare SSS when diarrhoeal episodes became severe and treatment facilities were unavailable.

3.4.2. Possible explanations for weekly reporting patterns

It was found that the reported durations of episodes were inaccurate due to misreporting of the correct start and termination dates of diarrhoeal episodes, and that this was related to the periodicity of the home interviews. More than one-third of all episodes were reported to begin on interview days, while few starts were reported on days -1 and +1. This pattern emerged when the same analyses were done separately for sites, for sexes, for age groups, and for individual study weeks. There is no reason to suspect that mothers deliberately under- or overreported diarrhoeal events, since there was good overall understanding among villagers about the long-term benefits of collecting the diarrhoeal data. There are, however, other possible explanations for these findings.

With more precise recall on interview days, "true" starts on day 0 may not have been misplaced to days -1 and +1. If, for example, in the absence of any special reminders, it is assumed that mothers usually remember the start of episodes only with an accuracy of +/- 1 day, then the chance of an episode being reported on the "true" start day will be about 33%. If the special focus of the interview day prevents the aberrant 67% from being wrongly placed on days -1 and +1, one would anticipate a heaping of starts on day 0, and a reduction on days -1 and +1, as observed in Figure 3.1.

Another potential reason for the low number of starts on the day following the interview is that mothers' memory of these starts may be the least precise of all. Episodes beginning on this day were not ascertained until 6 days later. It is possible that mothers forgot the exact start dates of these episodes, but remembered they were close to the previous interview day and thus misplaced rather more of them as starting on day 0. Memory loss was reported in a study of fortnightly morbidity recall in Guatemala[20], in which point prevalence of diarrhoea was found to decrease as the number of days away from the interview increased.

The low number of starts on the day before the interview may also be related to the mothers' perception of diarrhoea. It is possible that mothers in this study may not perceive diarrhoea that has only lasted 1 day as being particularly noteworthy. There have been very few (if any) studies of mothers' perceptions of what constitutes diarrhoeal illness and the associated reporting of diarrhoea. Whether this is culture-specific or more widespread is worthy of further research.

The analyses indicate that the interview day marks a focal point for mothers which influenced their recall on that day with a consequent heaping of start days. This is not surprising for several reasons. First, the presence of the interviewer at the home was an atypical event, and thus more memorable. Second, interviewers kept note of children who had diarrhoea on interview days, thereby providing a reminder for mothers at the subsequent interview. Third, it is likely that mothers may have been more aware of diarrhoea on interview days, since they were always at home with their children on these days. On other days children were often left with young child minders, who may not have reported diarrhoea to the mother. Fourth, the questionnaire itself may have prompted the mother and the interviewer to check the child immediately, thus increasing the chance of noticing new episodes.

Reported terminations of diarrhoeal episodes also varied according to the study day, and 29% of all episodes were reported to end the day before the interview day. The distribution pattern of episode stops (Figure 3.2) suggests that many of the stops that one would expect to be reported on days 0 and +1 were instead apparently reported on day -1. It is possible that a number of episodes that were actually ongoing on the interview day were reported as having stopped the day before due to the early hour of the interview. At the time of the interview, the child may not have yet passed stools, thus an ongoing episode might have been reported as stopped. Although interviewers were instructed to return to the home later in the day if no diarrhoea was reported at the time of the interview, due to the long distances between homes in most sites this may have been impractical and may not have occurred regularly. This would explain the high proportions of episode stops on day -1 and the low proportions on day 0. The low proportion of stops on day +1, on the other hand, might possibly be due to the mother's loss of memory of that day at the next home visit. Just as the chance of the mother correctly remembering the start day of an episode 6 days earlier is small, it is similarly likely that she would misplace the end of an episode that occurred 6 days earlier.

### 3.4.3. Summary and implications

The purpose of the present study was to provide baseline data and undertake a controlled trial of a hygiene education intervention to reduce diarrhoeal disease in a rural area of Zaire. Because the impact of the intervention on diarrhoeal morbidity would be evaluated ultimately, it was essential to obtain the most accurate estimates possible of diarrhoeal incidence, duration and prevalence. However, even when using a recall period of one week, mothers tended to report the starts of diarrhoeal episodes on interview days and the ends of episodes on the day preceding interview days, and that these reporting disparities led to inaccurate estimates of episode duration, the number of days of diarrhoea per child, and point prevalence on certain study days. The largest differences between the overall mean duration of episodes and the reported mean duration for each of the 6 days between interviews occurred on the 2 days immediately preceding the interview days. Applying a correction factor to adjust for reporting disparities led to substantial changes in mean duration on these days (+26% and +43% on days -2 and -1, respectively), and to small changes on other days (Figure 3.4). Adjusting for reporting disparity did not, however, lead to important overall changes in mean duration, the number of days of diarrhoea or point prevalence.

Diarrhoeal episodes that are reported on interview days or on the days immediately preceding an interview day are sometimes assumed to have minimum recall bias. In a weekly diarrhoeal recall survey in Bangladesh, Alam et al[21] estimated a reporting error of 42%-44% for non-severe cases of diarrhoea, based on the differences between the number of episodes reported for the two days immediately prior to home interviews, and the number reported 5-6 days prior to interviews. Moreover, in a fortnightly recall morbidity survey in Guatemala, Martorell et al[20] reported an estimate of 21.9% underreporting of diarrhoea, representing the average percentage difference of diarrhoeal prevalence between 15 retrospective days and the interview day or the day before, whichever was higher in prevalence: an assumption, therefore, of mininum recall bias on the day of highest reported prevalence. The present study's finding that mothers tended to report diarrhoea unevenly within the recall interval, and particularly on the interview day and the day preceding it, suggests that these days are not at all bias-free: in fact, they may be the most inaccurate days, and therefore would not be appropriate to assess the amount of reporting error on the other days.

In the study from Guatemala, Martorell et al[20] suggest that an inverse relationship between the reporting of diarrhoeal episodes and their duration exists. One possible reason, according to these investigators, is that as the duration of a diarrhoeal episode becomes longer, the probability of symptoms starting on or near the interview day to serve as a memory aid increases. Although this may occur in surveys using fortnightly recall or longer, it is much less plausible in diarrhoeal studies using shorter recall periods. There was little evidence in the present study to suggest that the probability of reporting diarrhoeal episodes was associated with the length of episodes. Conversely, the results imply that any episodes that start on or near the interview day are more likely to be reported, irrespective of their durations.

In a related context, it has been suggested that mothers tend to remember longer episodes better than short ones due to their severity[4]. If this is true then, when looking at the distributions of episode durations according to reported start days in the present study (not shown), one would expect to find more long episodes relative to short ones reported for each of the 7 days. However, on none of the 7 days was a predominance of long episodes found. Instead, the reporting of long episodes was as closely linked to the occurrence of the home visit as were episodes of all other durations. It is unlikely, therefore, that the perceived severity of episodes of long duration was as memorable as the interview day itself. In general, reports to date about the relationship between memory (reporting) and episode duration have been based on studies in which reported duration apparently was not examined according to reported start and end days, and one could, therefore, question the accuracy of these durations.

In addition to questioning the nature of the possible association between mothers' memory and episode duration, reporting inaccuracy associated with a 1-week diarrhoeal recall period has other public health implications. In particular, episode duration and diarrhoeal prevalence are frequently used as indicators of health in cross-sectional studies, and in studies of intervention impact or other longitudinal studies. There has been extensive debate about the association between nutritional status and diarrhoea, with some investigators suggesting specifically that malnutrition influences diarrhoeal duration, but not incidence, in young children[22]. Few would argue that large differences in these diarrhoeal indicators are not of public health importance: the suggestion by Alam et al[21], that reporting errors of the order of about 20% are substantial enough to mislead health planners, seems well-founded.

This study illustrates that even with a 1-week recall and despite careful training of interviewers, there are methodological problems associated with retrospective reporting of diarrhoea, and that these appear to be related to the presence of an interviewer, the hour of the interview and the length of the recall period. To reduce the measurement error associated with 1-week recall, the recommendation of Blum and Feachem[23] that shorter recall periods be used in diarrhoeal studies, is well-founded. This is not often possible, however, due to the increase in cost that more frequent surveillance incurs, in which case investigators using 1-week recall or longer should examine reported episode start and end dates with respect to interview days, in order to check the quality of their data and make adjustments if necessary. In addition, the mean duration of episodes and point prevalence should be examined in relation to interview days. Further research seems warranted into the effect of the home interview on diarrhoeal reporting and into mothers' perceptions of diarrhoea as a reportable event.

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# CHAPTER 4. IMPACT OF THE INTERVENTION ON DIARRHOEAL MORBIDITY

## 4.1. Introduction

Despite remarkable improvements in diarrhoeal mortality due to improved case management and the use of ORT, diarrhoea still accounts for about half of all deaths among children under 5, and for much morbidity. Widely practicable, inexpensive methods to reduce diarrhoeal morbidity are still crucially needed in poor countries. Simple improvements in personal and domestic hygiene might be a very effective approach to reducing diarrhoeal morbidity [1,2].

There have been very few appropriate studies of the impact of hygiene education on diarrhoeal morbidity. Only a small number of interventions to improve personal and domestic hygiene specifically have been planned. In 1984 Feachem[3] identified three of these, which led him to conclude that the potential reduction of diarrhoeal incidence possible from similar interventions could be as high as 48%. Since then, two recent community-based randomized trials have been reported, namely a handwashing study in Burma[4], and a hygiene education programme in Bangladesh[5]. These studies provide a valuable, but insufficient amount of information with wide general applicability about the effectiveness and feasibility of such interventions (for reasons discussed in Section 1.1), and therefore many gaps in our knowledge remain. Potentially, educational interventions to improve food hygiene may also reduce diarrhoea, but there is little epidemiological experience of such programmes to date[6]. Many studies associated with water supply and sanitation programmes incorporating hygiene education have reported substantial reductions in diarrhoeal morbidity, however the extent of the educational components of these projects varies considerably. Esrey et al[7] reviewed 67 water supply and sanitation studies from 28 countries, from which a median reduction of diarrhoeal morbidity of 22% (or 27% from a subset of better designed studies) was derived, but the specific impact of the educational components is not clear. This notwithstanding, since the launching of the international drinking water supply and sanitation decade (1981-1990), integrated environmental interventions have gained much increased attention, and the reports of some have begun to fill in the gaps in our understanding. The major community-based studies of personal and domestic hygiene education, and those of integrated environmental programmes, are discussed below.

*Educational and environmental interventions in Guatemala*. Two associated studies of educational and environmental interventions to reduce diarrhoea in Guatemala have been reported. The earlier study (1978)[8] reported the health impact of a programme providing a piped water supply to a test village with a population of about 1000. An educational programme to increase the use of piped water supplies was also promoted, using an approach designed to maximize villager involvement. Adult disease morbidity (including diarrhoeal and respiratory diseases, which accounted for 70% of all reported illnesses) was monitored through 2-week recall surveys performed monthly for 3 years, following installation of the water system, and domestic hygiene behaviours were monitored through periodic home visits using questionnaires and direct observation. Disease morbidity and behaviours were monitored similarly in a control village with about the same population size, located 30 km away. In the intervention village, improvements in observed practices related to removal of faeces from the home environment, protection of stored water, yard cleanliness, latrine installation, and exclusion of domestic animals from the living quarters, were reported. No behavioural changes occurred in the control village. There were no differences in total morbidity or in morbidity divided into 4 groups (ie. diarrhoeal diseases, respiratory diseases, skin infections, and other diseases), nor were any associations between any sanitary variables and morbidity rates found. Diarrhoeal rates were highest in both villages during the 6-month rainy season. A possible explanation for the failure of this intervention to reduce diarrhoea is that the high rate of diarrhoeal diseases among adults was due more to water collection and storage practices, than to many of the other behaviours addressed by the education. In the intervention village, for example, bacterial coliform counts were quite low in samples collected from the water distribution system, higher in samples collected from yard faucets, and still higher in samples from water containers in the home. The education appeared to focus on behaviours known to be risk factors for diarrhoea in young children: it is conceivable that diarrhoeal rates of children may have improved, but no results for children were reported. It is possible that the targeted behaviours were not risk factors for adult diarrhoea, or other infectious diseases. The study suggests that community-based hygiene education may induce favourable changes in hygiene behaviours and environmental sanitation, but may have little perceptable effect on infectious diseases if the educational messages are not correctly focused on the behaviours of greatest risk.

In the second study from Guatemala, Torun[9] reported the impact of a domestic hygiene education programme, unaccompanied by improvements in water supply or sanitation, on childhood diarrhoea and domiciliary behaviours in a village. Families with children under 6 years of age participated, with 153 receiving the education ("target" families) and 32 serving as controls. Diarrhoeal morbidity was monitored at home visits biweekly for 14 months, and behaviour was evaluated by home observations, 6 times at 2-month intervals. Substantial behavioural change relative to baseline was observed in both target and control families, however target families showed significantly greater improvements in a majority of the 27 items evaluated. The greatest improvements occurred in correct rubbish disposal practices, kitchen hygiene, latrine cleanliness, protection of children from faeces, cleanliness of children, and food and water storage. In addition, the proportion of total positive (ie. protective) behaviours observed was greater in target families. Improvements in control families were attributed to probable message leakage from target families. Despite the lack of geographical separation between study families, the results lead one to believe that the hygiene education programme was effective in modifying behaviours. Although the difference in the full-year diarrhoeal incidence rates between target and control families was modest (14%), during the 4 months of heaviest rainfall the incidence rate was 32% lower in intervened than in control families; during the non-rainy months the difference was very slight. Differences in diarrhoeal rates were most marked in children aged 0-2 years and accounted for most of the overall difference. It is possible that the lack of any significant impact during the non-rainy months is because the behaviours addressed by the intervention may not have been risk factors for diarrhoea during these months. However, no associations between diarrhoea and targeted behaviours, for any season, were reported. Overall, the intervention appears to have buffered children against the seasonal increase in diarrhoea, probably through improvements in behaviours that may be risk factors for diarrhoea during these wet months. Like the previous study, this study suggests that the effectiveness of a hygiene education programme may be very dependent on the relationship between the behaviours targeted by the intervention, and diarrhoea. Furthermore, similar hygiene educational interventions are likely to have their strongest impact on children of weaning age.

*The Rangoon handwashing study.* A community-based randomized handwashing intervention to reduce diarrhoeal incidence and dysentery in children was conducted in a poor community of Rangoon, Burma[4]. Following one month of baseline monitoring of diarrhoea and dysentery, 350 households with 494 children less than 4 years of age were randomly allocated to either the treatment or control group. Treatment group households were given soap, and mothers and children were asked to wash hands after defecation and before food preparation and eating. Soap was replenished biweekly, and compliance monitored at unannounced home visits. Control households received no intervention. Daily surveillance for diarrhoea and dysentery was made by community health workers using 24-hour recalls in the home, for the next 3 months. A 30% reduction in the 3-month diarrhoeal incidence rate was observed in intervened households relative to controls ($p<.01$). There were no significant differences in dysentery rates overall and, although children less than 2 years of age from intervened households had about 40% less dysentery than control children of the same age, this difference was not significant. Investigators attributed the lack of significance of dysentery differences to the small numbers with dysentery, and to the possibility that handwashing before meals did not effectively prevent children from environmental contamination. This study suggests that substantial reductions of diarrhoea among young children are possible when handwashing is promoted in the community, however handwashing may only be protective against dysentery among children of approximately weaning age.

*Hygiene education, Bangladesh.* A randomized, controlled trial of a hygiene educational intervention to reduce diarrhoea through improved personal and domestic behaviours was conducted in 51 communities in urban Bangladesh[5]. For 3 months baseline information on diarrhoeal morbidity of approximately 2000 children less than 6 years of age was obtained at biweekly home visits, and observations of behaviours of a randomly selected subset of 300 "sentinel" families were made. Intervention messages addressed behaviours identified as risk factors by comparing behaviours of sentinel families with high diarrhoeal rates with those of families with low diarrhoeal rates, namely lack of handwashing before food preparation, defecation by children in open areas, and poor disposal of garbage and faeces. Communities were ranked in order of diarrhoeal incidence, grouped into pairs, and then 1 in each pair was randomly assigned to receive the intervention, the other to serve as control. Trained community volunteers disseminated educational messages in intervened communities for 6 months. Following the intervention, a second diarrhoeal morbidity study and a second observational study were conducted. Overall, diarrhoeal incidence of intervened communities was reported to be 26% lower than that of controls ($p<.0001$), and a particularly strong reduction was noted among children 2 and 3 years old (46% and

32%, respectively). This study is exemplary in that it was a properly controlled trial, and avoided many of the pitfalls of similarly-focused water-sanitation studies[10]. Geographical separation of communities minimized the possibility of message leakage from intervened to control communities, and stratified randomization minimized confounding. However, as mentioned in Section 1.1, two of the behaviours addressed by the intervention (handwashing before food preparation and defecation of children in open areas) declined relative to baseline in both study groups (albeit to a greater extent in control communities). Seasonal incongruity during the follow-up study may be related to these declines. The study provides evidence that hygiene educational interventions may achieve substantial reductions in diarrhoea, particularly among children 2 and 3 years of age. However, neither the extent to which such interventions may lead to improvements in behavioural risk factors, nor the effect of these improvements on diarrhoeal reductions, can be inferred.

*Water supply, sanitation and hygiene education, Mirzapur, Bangladesh*. Aziz et al[11] reported the impact of an integrated environmental project on diarrhoeal morbidity of young children in Mirzapur, Bangladesh. The project provided handpumps, improved latrines, and hygiene education to about 5000 people in 2 villages of Mirzapur sub-district, whilst 3 villages of the same sub-district (population 4600) received no such inputs and served as controls. Hygiene education was conducted for 2 years and emphasized exclusive use of handpump water for all major domestic activities and the use of latrines by everyone. Information on diarrhoeal morbidity of all children under 5 years of age was obtained at weekly home visits for nearly 4 years. Cross-sectional surveys were conducted periodically in both study areas to record usage of water and sanitation facilities. During the last 3 years of evaluation, diarrhoeal incidence declined in both study groups (ie. by as much as 43% in intervened, and 20% in control, areas), but 25% (significantly) more in the intervened areas in each year. There appeared to be little impact on infants aged 0-5 months, but an increasing impact with age among children aged 6-59 months was observed. Within the intervened areas, lower diarrhoeal rates were associated with shorter distance to handpumps, use of latrines by children or for disposal of child faeces, and exclusive use of handpump water. Whilst an early increase in the use of handpump water by intervened households was thought to be the result of the convenience of handpumps, rather than the hygiene education, the proportion of households using handpump water for all domestic activities increased over the 3 years of evaluation, suggesting that the education did have an effect. There were also progressive changes in defecation hygiene practices: Latrines in the intervened area were more likely to be kept clean, and proportionately more mothers in the intervened area used ash or soap to clean children after defecation. Drinking water storage practices were also significantly better in intervened than control areas. Whilst a larger number of control and test villages would have provided a stronger test of the impact of this intervention, these results lead one to believe that water and sanitation education was a key determinant of observed behaviour changes, and contributed to the reduction in diarrhoeal incidence by enhancing the use of improved facilities. Water and sanitation education, therefore, is likely to improve the diarrhoea-lowering potential of water-sanitation interventions. The study does not allow one to assess the effect of the educational component on diarrhoea independently.

*Water supply, sanitation and hygiene education, Teknaf, Bangladesh*. A project similar to the one in Mirzapur was reported by Alam et al[12] and Rahaman et al[13] from Teknaf, Bangladesh. Handpumps, improved latrines and hygiene education were provided to 3 sub-units of a village (population 2173), and 2 sub-units served as controls. Hygiene education was designed to promote exclusive use of improved water supplies, better water handling and storage practices, rapid disposal of child's faeces, and handwashing before handling food and after defecation. Diarrhoeal histories of children aged 0-4 years were obtained at weekly home visits over 3 years, from 1980-1983; hygiene education was disseminated for 2 years (1981-1983); and information on maternal personal and domestic hygiene was collected using household surveys during the dry seasons (February-March) of 1981-1983. Educational impact was assessed by linking information on hygiene practices to diarrhoeal incidences in children aged 6-23 months in the corresponding year (July-June). Reported trimestral diarrhoeal incidence rates declined by large amounts in both study areas (ie. by 33%-49% in intervened, and 22%-57% in controls), however intervened areas had, on average, a 17% greater reduction than control areas. A possible explanation for the overall reduction was that both study areas acquired increased numbers of tubewells. In the intervened areas, exclusive tubewell users had significantly lower diarrhoeal rates than mixed users. On average, children 6-23 months of age in intervened areas had 3.4 episodes of diarrhoea per year, compared to 4.1 episodes among similarly aged control children. In both study areas, diarrhoeal incidence was lower among children whose mother's personal hygiene practices and household environment were relatively good. In addition, the total number of good (ie. prescribed) hygiene practices was a more important determinant of diarrhoeal rates than individual hygiene behaviours *per se*, in both groups: diarrhoeal incidence rates were 45% lower in households where 4 good practices were observed compared to those where none or only 1 was observed. Although in the intervened area good hygiene practices were observed more often than in the control area, similar improvements in hygiene practices were observed in both groups over time, and therefore the extent of the intervention's impact on behaviour is questionnable. It is possible that educational messages spilled over from intervened to control areas, which would explain the improvement in behaviours in control areas, however this was not reported. The results of this study suggest that in association with programmes to improve water supply and sanitation facilities, domestic and sanitary hygiene education may reduce the risk of diarrhoea, either by enhancing the diarrhoea-lowering potential of improved services, or by inducing changes in personal and domestic hygiene behaviours.

*Water supply, sanitation and hygiene education in Nigeria.* The impact of an integrated environmental project providing boreholes, handpumps, improved latrines and hygiene education, on diarrhoeal incidence in Imo State, Nigeria, was reported by Huttly et al[14]. Three villages received the intervention, and 2 served as controls. Information on diarrhoeal morbidity of about 1400 children under 6 years of age, monitored as 8-day period prevalence rates, and knowledge, attitudes and practices related to water, sanitation and hygiene, was obtained for 18 months prior to the installation of services and training of village-based workers (VBW), and for the following 3 years, using twice yearly cross-sectional surveys. In addition, in a subset of intervention and control villages, a longitudinal study of diarrhoeal morbidity of children less than 6 years of age, using daily diaries coupled with fortnightly home visits, was conducted. VBW's disseminated education messages related to child feeding, nutrition, water use, personal hygiene, environmental sanitation and ORT, through periodic home visits in the first year and thereafter via monthly village rallies[15]. No consistent differences in diarrhoeal incidence rates between intervention and control villages over time were reported. Within the intervened areas, diarrhoeal incidence among children 0-4 years was higher in households with water collection times of >2 hours, and where the distances to boreholes exceeded 250m, suggesting a greater association of diarrhoea with water availability than quality; no other associations between diarrhoea and water, sanitation or behavioural variables were found. The intervention appeared to have limited success in altering hygiene behaviours: handwashing before eating, handling food, and after defecation was unchanged; the presence of rubbish in yards decreased, but by the same amounts in both study areas; the presence of animal faeces varied over time, but in consistently similar ways in both areas; and the presence of domestic animals decreased, but by the same amount in both areas. Moreover, in the intervened areas latrine use by young children was low, borehole water appeared to become contaminated during collection and storage, and there was no change in water consumption per person[15]. The reported "patchy" performance of VBW's appeared to be responsible for the poor impact of the education on hygiene practices. This, together with the fact that within the intervened areas the use of improved facilities varied widely, probably accounts for the failure of this study to detect differences in diarrhoeal impact between intervention and control areas. An additional finding suggests that hygiene education, if effectively delivered, can improve domestic sanitation behaviours: in areas where project evaluation staff conducted the education, rather than VBW's, positive changes in targeted behaviours occurred. The number of health topics included in VBW's training in this study was very large - perhaps excessive, and this may have prevented better performance. This would suggest that in similar interventions the number and range of educational topics should be limited to the extent that community workers are able to effectively learn and disseminate messages.

The major implications of the studies discussed above are summarized in Table 4.1. A number of conclusions can be derived from these: Firstly, there is good evidence that hygiene educational interventions can lead to substantial reductions in diarrhoea; in 5 out of 7 of the studies, reductions were reported. The extent of diarrhoeal reductions, however, appears to depend on the accuracy with which messages address behavioural risk factors, and the strength of the relationships between these behaviours and diarrhoea. Secondly, there is also good evidence that such interventions can lead to behavioural modifications, however the extent of this seems to depend on the complexity of the educational programme: the smaller the number and range of educational topics, the greater the likelihood of favourable changes. The extent of behavioural modification is also likely to depend greatly on the performance of community workers; their effectiveness may be hindered by a training programme which is too complex. Thirdly, behavioural changes induced by such

TABLE 4.1. Summary of major community-based studies of hygiene educational interventions, and integrated environmental interventions incorporating hygiene education, to reduce childhood diarrhoea

| Study | Findings | Implications | Reference |
|---|---|---|---|
| 1. Guatemala. Hygiene education promoted with programme of piped water supplies to a test village. Adult disease morbidity and domestic hygiene behaviours monitored in test and a control village. | Improvements in targeted hygiene behaviours in test, but not control, village. No differences between study villages in adult diarrhoeal rates. No improvements in other infectious diseases. No results for children reported. | Hygiene education can lead to improvements in hygiene/sanitation practices, but may have little effect on adult diarrhoea. Diarrhoeal reductions are likely to depend on extent to which educational messages appropriately target behaviours of high diarrhoeal risk for study population. | 8 |
| 2. Guatemala. Domestic hygiene educational intervention promoted in 153 target families. Diarrhoeal morbidity of children 0-71 months old and domiciliary behaviours monitored in target and 32 control families. | Substantial behavioural improvements in both target and control families, but significantly greater in targets. Reduction of diarrhoeal incidence of 14%-32%, with largest reductions in peak season, and in children 0-23 months. No diarrhoeal improvements in off peak season. No associations between diarrhoea and behavioural changes reported. | Hygiene education can lead to improvements in domestic hygiene behaviours, and to substantial reductions of childhood diarrhoea. Largest reductions expected among weaning age children, and in rainy seasons, when target behaviours are strong risk factors. Similar messages may not reduce diarrhoea in dry months, when behavioural risk factors are likely to differ. | 9 |
| 3. Rangoon, Bangladesh. Randomized handwashing intervention in poor community. Diarrhoea and dysentery of children aged 0-4 years monitored in 350 test and control households. | 30% reduction of diarrhoea in test households. Reduction of dysentery of 40% among children 0-2 years only. | Increased handwashing can lead to substantial reductions of childhood diarrhoea in community settings. Handwashing, however, may protect against dysentery only during weaning years. | 4 |
| 4. Dhaka, Bangladesh. Randomized trial, personal and domestic hygiene educational intervention. Diarrhoea of 2000 children aged 0-6 years and hygiene practices of 300 families monitored in 51 urban intervened and control communities. | Diarrhoeal reduction of 26% in intervened communities, with largest reductions in children 12-35 months. No clear evidence of behaviour changes. No post-intervention association between diarrhoea and targeted behaviours reported. | Hygiene education can lead to substantial reductions of childhood diarrhoea. Largest reductions expected in 12-35 month group. Impact on high risk behaviours, and effect of behavioural changes on reductions, are uncertain. | 5 |

TABLE 4.1. (Continued)

| Study | Findings | Implications | Reference |
|---|---|---|---|
| 5. Mirzapur, Bangladesh. Integrated environmental project providing handpumps, latrines and hygiene education to 5000 people in 2 test villages. Diarrhoeal morbidity of children aged <5 years, and domestic water and sanitation behaviours, monitored in test and 3 control villages. | Diarrhoeal reductions in intervened and control areas, but 25% greater reduction in intervened, primarily among children 6-59 months old. Progressive improvements of target water/sanitation behaviours in intervened areas. Lower diarrhoeal rates associated with greater use of handpumps, but no other behavioural associations. | Water, sanitation and hygiene education in integrated environmental programmes can induce changes in diarrhoea-related behaviours which may contribute to diarrhoeal reductions resulting from inputs of water and sanitation services. | 11 |
| 6. Teknaf, Bangladesh. Integrated environmental project similar to 5, above. Diarrhoea of children 0-4 years and water, sanitation and domestic hygiene practices monitored. | Large diarrhoeal reductions in both intervened and control areas, but greater by 17% in intervened. Similar improvements in behaviours in both study areas. Lower diarrhoeal rates associated with improved personal and domestic hygiene practices, and with total number of good practices in both areas. | Domestic/sanitary hygiene education in association with integrated environmental projects may reduce diarrhoeal incidence, either by enhancing diarrhoeal reductions resulting from improved services, or through improvements in personal and domestic hygiene. | 12, 13 |
| 7. Nigeria. Integrated environmental programme providing boreholes, handpumps, latrines and hygiene education to 3 test villages. Diarrhoeal morbidity of 1400 children aged 0-6 years, and water/sanitation/domestic hygiene behaviours monitored in test and 2 control villages. | No consistent differences in diarrhoeal rates between study areas. No clear behavioural changes, except where project leaders conducted education. No association between diarrhoea and behavioural variables (except high diarrhoeal rates with low water availability). Poor performance of community workers, and variable use of improved services in intervened areas. | Effectiveness of hygiene education on behavioural changes and diarrhoeal reductions may depend greatly on quality of performance of community workers. Performance of community workers may be impeded by an overly-complex educational plan. | 14, 15 |

interventions are almost certain to lead to improvements in diarrhoeal rates and, in integrated environmental programmes, may enhance improvements in diarrhoea resulting from inputs of water supply and sanitation services. Fourthly, interventions that lead to diarrhoeal reductions as well as reductions in diarrhoea-associated behaviours, provide the most useful information to improve project design and operation; where disease reductions occur but behaviours seem not to have changed, many uncertainties about the intervention's impact remain. Finally, the studies to date are few in number, and their most important findings should be supplanted by further research.

In Chapter 3 the baseline characteristics of diarrhoeal morbidity in the study population were presented. This chapter describes the impact of the randomized educational intervention on diarrhoeal morbidity. The intervention was based on messages intended to influence personal and domestic hygiene practices, including: (1) disposal of animal faeces from the yard, by sweeping twice per day; (2) handwashing before meal preparation and before eating, (3) handwashing after defecation and washing both the child's buttocks and hands after child defecation; and (4) proper disposal of human faeces.

## 4.2. Methods

Evaluation of the intervention's impact on diarrhoea was based on a post-intervention community study of diarrhoeal morbidity, in the same 18 sites, using weekly home interviews for 3 months. Children aged 3-35 months at the start of the follow-up study (October 1, 1988) were recruited: out of the total number of children recruited (1954), about 2/3 had been included in the baseline study and the rest were new recruits. The follow-up study occurred at the same time of the year as the baseline study, that is, during 3 months of heavy rainfall, high temperatures, and peak diarrhoeal incidence in previous years. Full details of the study population and general methods are included in Chapter 2.

4.2.1. <u>Statistical methods</u>

To evaluate the impact of the intervention on diarrhoeal morbidity, data analysis was conducted separately for sites and for children. Since sites were the unit of randomization rather than individual children *per se*, the correct unit of analysis, strictly speaking, is the site. For the site-level analyses, the mean number of episodes in each site (ie. the site incidence rate) was calculated and adjusted for age, and statistical tests were based on the variation between sites[16]. Both post-intervention differences in diarrhoea and pre- to post-intervention changes in diarrhoea between intervened and control sites were studied. These analyses were conducted taking into account, separately, both the order in which pairs of sites were randomized, using randomization pair numbers (see Section 2.7), and the quality of intervention activities in each site, using intervention activity ranks (see Section 2.9). Non-parametric tests were used throughout these analyses (since assumptions of normality were not valid). Specific tests are described with their corresponding results in Section 4.3, below.

Standard statistical tests were used in the child-level analyses[17]. During the pre- and post-intervention periods the number of episodes of diarrhoea, the total number of days with diarrhoea and the mean duration of diarrhoeal episodes were studied according to the child's age, sex and study group, using either standard normal deviate

(SND) tests or simple analyses of variance. The numbers of episodes and of days of diarrhoea were adjusted for incomplete follow-up as before (see Section 3.2.2), and a logarithmic transformation was used to study the number of days with diarrhoea (see Section 3.2.2). Both the number of days with diarrhoea and the mean duration of episodes were adjusted for reporting discrepancy, using methods described in Section 3.3.1. (See Appendix 1, note 1, for summary of effects of adjustments on numbers of episodes and mean durations.) Chi² tests or chi² tests for trends (1 df) were employed, where appropriate, to compare distributions of the diarrhoea variables grouped into 2 or more categories[18].

4.3. Results

Of the 1954 children enrolled in the follow-up study, 1764 (90.3%) had ≥9 complete weeks of diarrhoeal morbidity data. The remaining 190 were excluded from the analyses. In 4 children with ≥9 weeks of data, information on age was missing and they were therefore excluded from analyses involving this variable.

Below, results of analyses of diarrhoea in the study groups at baseline (Section 4.3.1) are followed by analyses conducted at the child level (Sections 4.3.2, 4.3.3), and then analyses conducted at the site level (Sections 4.3.4, 4.3.5).

4.3.1. Characteristics of study groups at baseline

Following the baseline study all sites had been ordered from lowest to highest according to the mean number of days with diarrhoea, adjusted for age, and then adjacent sites were grouped into pairs and one in each pair randomized to the intervention group, the other to the control group. This matching of sites equalized diarrhoeal rates between the two study groups within pairs to a large extent, although there was still considerable inequality in incidence rates within pairs, particularly in pairs 6 through 9, as shown in Table 4.2.

TABLE 4.2. Baseline age-adjusted diarrhoeal rates in matched pairs of sites *

| Pair Number | Geometric Mean Number of Days | | Number of Episodes | | Duration of Episodes | |
|---|---|---|---|---|---|---|
| | Intervened | Control | Intervened | Control | Intervened | Control |
| 1 | 0.82 | 0.58 | 0.49 | 0.35 | 3.72 | 3.20 |
| 2 | 0.90 | 0.95 | 0.48 | 0.56 | 3.52 | 3.94 |
| 3 | 1.88 | 2.02 | 0.97 | 1.16 | 5.30 | 3.60 |
| 4 | 2.16 | 2.24 | 1.43 | 1.34 | 3.71 | 3.10 |
| 5 | 2.55 | 2.24 | 1.30 | 1.24 | 3.43 | 3.93 |
| 6 | 3.47 | 6.08 | 1.20 | 2.69 | 6.84 | 3.34 |
| 7 | 10.48 | 9.00 | 3.28 | 2.66 | 3.93 | 4.89 |
| 8 | 15.22 | 13.79 | 3.19 | 2.40 | 5.50 | 7.99 |
| 9 | 18.50 | 18.50 | 4.55 | 3.36 | 4.73 | 6.94 |
| All | 4.21 | 4.50 | 1.93 | 1.82 | 4.63 | 5.09 ** |

* Mean number of days used to order sites and group into pairs for randomization (see Section 2.7)
** Significantly different from intervened group, p=.008 (anova, after adjustment for age)

Overall, the variations in site incidence rates and the number of days with diarrhoea were wide, but the duration of episodes varied only slightly. Diarrhoeal incidence and the number of days with diarrhoea increased almost exactly in parallel, as one would expect, however duration had no apparent correlation with incidence or total days.

Table 4.3 shows the mean number of episodes, the geometric mean number of days of diarrhoea per child, and the mean duration of episodes, by child age, for all children with $\geq$9 complete weeks of data. In both study groups, approximately 2 episodes of diarrhoea per child were reported, with a mean reported duration of about 5 days each. Children had, therefore, about 9.2 total days of diarrhoea (arithmetic mean), representing an average (geometric mean) of about 4

TABLE 4.3. Baseline diarrhoeal morbidity rates according to child age and study group

Mean number of episodes

| Age (m) | Intervened | Control | p value |
|---|---|---|---|
| 3-5 | 2.13 | 0.50 | |
| 6-11 | 2.20 | 2.11 | |
| 12-17 | 2.06 | 2.02 | |
| 18-23 | 1.84 | 1.74 | |
| 24-29 | 1.63 | 1.64 | |
| 30-35 | 1.78 | 1.39 | .05 * |
| All | 1.93 | 1.82 | |

Geometric mean number of days

| Age (m) | Intervened | Control | p value |
|---|---|---|---|
| 3-5 | 5.49 | 5.54 | |
| 6-11 | 5.95 | 5.52 | |
| 12-17 | 4.68 | 5.26 | |
| 18-23 | 3.77 | 4.07 | |
| 24-29 | 3.14 | 4.05 | |
| 30-35 | 3.21 | 2.91 | |
| All | 4.21 | 4.50 | |

Mean duration of episodes (days)

| Age (m) | Intervened | Control | p value |
|---|---|---|---|
| 3-5 | 5.56 | 5.86 | |
| 6-11 | 4.92 | 5.09 | |
| 12-17 | 4.61 | 4.59 | |
| 18-23 | 4.45 | 4.71 | |
| 24-29 | 4.05 | 5.52 | <.0001 * |
| 30-35 | 4.40 | 4.74 | |
| All | 4.63 | 5.03 | .008 ** |

* Significance of group differences in age category (SND test)

** Significance of group differences (anova, after adjustment for age) days. Both the number of episodes and the number of days of diarrhoea declined with increasing age (anova, $p<0.0001$ in each case). Diarrhoeal incidence and the geometric mean number of days of diarrhoea were nearly identical in both study groups, except for control children 30-35 months old who had fewer reported episodes than intervened children of the same age (SND, $p<0.05$). Duration of episodes differed somewhat between the groups, with intervened children having a mean of 4.6 days compared to 5.1 days in the controls (anova, $p<.01$). This difference in duration between the study groups appears to be due to a substantial difference between children aged 24-29 months (SND, $p<0.0001$). Elsewhere (Chapter 5) it is reported that the difference in duration between the study groups was not related to the observed differences in baseline nutritional status (discussed in Chapter 6). As communities were randomized, such differences are in all probability due to chance rather than to selection bias, or due to etiological differences which by chance have led to differences between the groups. Trend and distributional characteristics of baseline diarrhoeal incidence, duration and prevalence data have been described in Chapter 3.

#### 4.3.2. Comparison of post-intervention diarrhoeal rates between intervened and control children

One year after baseline, proportionately fewer children in intervened sites were reported to have diarrhoea than children in control sites (Table 4.4). The relative risk of reporting one or more episodes of diarrhoea in intervened sites was 89% of that in controls (95% c.i. .84, .98), representing an 11% reduction in diarrhoeal risk ($p<0.025$). Nevertheless, a $chi^2$ test for a trend towards fewer episodes in intervened sites was not significant.

TABLE 4.4. Distributions of children between study groups according to number of episodes of diarrhoea, post-intervention

| Number of Episodes | Number of Intervened Children (%) | Number of Control Children (%) | p value |
|---|---|---|---|
| 0 | 450 (54.9) | 464 (49.2) | |
| 1+ | 370 (45.1) | 480 (50.8) | <.025 * |
| 1 | 192 (51.9) | 266 (55.4) | |
| 2 | 98 (26.5) | 129 (26.9) | |
| 3+ | 80 (21.6) | 85 (17.7) | 0.23 ** |

* Significance of chi² test, 0 v 1+ episodes, chi²=5.53
** Significance of chi² test for trend (1 df), 0-3+ episodes chi²=1.52

The intervention appeared to reduce the total time children spent with diarrhoea. Table 4.5 shows the distributions of children according to the total number of days with diarrhoea (a measure which combines possible impacts on incidence and duration of episodes).

TABLE 4.5. Distribution of children between study groups according to total number of days with diarrhoea, post-intervention

| Number of Days | Number of Intervened Children (%) | Number of Control Children (%) | p value * |
|---|---|---|---|
| 0 | 450 (54.9) | 464 (49.2) | |
| 1- <4 | 134 (16.5) | 168 (17.8) | |
| 4- <8 | 113 (13.8) | 150 (15.9) | |
| 8+ | 122 (14.9) | 162 (17.2) | <0.025 |

* Significance of chi² test for trend (1 df), chi²=5.06

Children from intervened sites displayed a significant trend towards fewer days of diarrhoea than those from controls (chi$^2$ trend, p<.025). These results (ie. a significant trend towards fewer days with diarrhoea in the intervened group but no evidence of a trend towards fewer episodes) suggest that in the intervened sites, diarrhoeal episodes were shorter.

The reduction in the total time with diarrhoea was, indeed, reflected in shorter mean durations of episodes (Table 4.6). Children with diarrhoea from intervened sites showed a significant trend

TABLE 4.6. Distributions of children between study groups according to mean duration of episodes, post-intervention

| Mean duration of Episodes (days) | Number of Intervened Children (%) | Number of Control Children (%) | p value |
|---|---|---|---|
| 1- <2 | 58 (15.7) | 62 (16.8) | |
| 2- <3 | 99 (26.8) | 100 (27.0) | |
| 3- <4 | 82 (22.2) | 120 (32.4) | |
| 5- <6 | 76 (20.5) | 121 (32.7) | |
| 6+ | 55 (14.9) | 77 (20.8) | .04 * |
| Number of Episodes | 696 | 837 | |

* Significance of chi$^2$ test for trend (1 df), chi$^2$=4.20

towards shorter durations of episodes than those with diarrhoea from control sites (chi$^2$ trend, p=.04); this trend was most evident in the proportions of children with durations longer than 3 days.

Differences in post-intervention incidence rates according to child age are shown in Table 4.7. Overall, children in intervened sites had a reported mean of 0.85 episodes of diarrhoea, while

TABLE 4.7. Post-intervention diarrhoeal morbidity rates in intervened and control children, according to child age

Mean number of episodes

| Age (m) | Intervened | Control | p value |
|---|---|---|---|
| 3-5 | 1.05 | 0.89 | |
| 6-11 | 1.05 | 1.16 | |
| 12-17 | 1.04 | 0.90 | |
| 18-23 | 0.86 | 0.93 | |
| 24-29 | 0.70 | 0.84 | 0.10 * 0.09 ** |
| 30-35 | 0.49 | 0.63 | |
| All | 0.85 | 0.90 | |

Geometric mean number of days

| Age (m) | Intervened | Control | p value |
|---|---|---|---|
| 3-5 | 1.96 | 1.90 | |
| 6-11 | 2.04 | 2.62 | |
| 12-17 | 1.89 | 1.76 | |
| 18-23 | 1.47 | 1.93 | |
| 24-29 | 0.96 | 1.45 | 0.03 * 0.01 ** |
| 30-35 | 0.59 | 0.81 | |
| All | 1.37 | 1.66 | 0.02 *** |

Mean duration of episodes

| Age (m) | Intervened | Control | p value |
|---|---|---|---|
| 3-5 | 4.91 | 4.75 | |
| 6-11 | 4.29 | 4.85 | |
| 12-17 | 4.59 | 4.41 | |
| 18-23 | 4.78 | 4.32 | |
| 24-29 | 3.17 | 3.71 | 0.08 * 0.09 ** |
| 30-35 | 3.23 | 3.40 | |
| All | 4.19 | 4.30 | |

Only differences significant at or below 10% level reported:

* Significance of difference in 24-29m age category (SND test)

** Significance of difference in combined 24-35m category (SND test)

*** Significance of difference, all ages combined (anova, after adjustment for age) children in control sites had 0.90 episodes (anova, after adjustment for age, p=.41). Although the overall difference between the groups was small, differences in the number of episodes varied considerably according to child age. Diarrhoeal incidence was uniformly lower among intervened children 18 months and older, compared with control children, and in the age group 24-35 months, this difference approached statistical significance (SND, p=.09). (In Table 4.7, only differences significant at the 10% level or less are pointed out.)

The trend toward fewer total days of diarrhoea among intervened children, seen in Table 4.5, was apparent for all age categories except infants aged 3-5 months. Table 4.7 shows that intervened children had, overall, a geometric mean of 1.4 days of diarrhoea, compared to 1.7 days in the control group (anova, after adjustment for age, p=.04). The largest differences were among children aged 24-29 months (0.96 v. 1.45 days, p=.03), and in the combined 24-35 month category (0.78 v. 1.14, p=.01).

Mean duration of episodes for all ages combined was similar in both study groups, being about 4.2 days per episode. Intervened children aged 24-29 months had, however, significantly shorter episodes than control children of the same age (3.17 v. 3.71 days, p=.08).

4.3.3. Reductions in diarrhoeal rates from the pre- to post-intervention periods in intervened and control children

During the post-intervention period, diarrhoeal morbidity was greatly reduced relative to the previous year among all children in both study groups (Figures 4.1, 4.2). Diarrhoeal incidence rates declined by approximately 50% in each group, and the total number of days with diarrhoea declined by over 60% in each. The reductions in incidence and total days were highly signficant within each age

**FIGURE 4.1. Mean number of episodes of diarrhoea pre– and post–intervention, according to child age and study group**

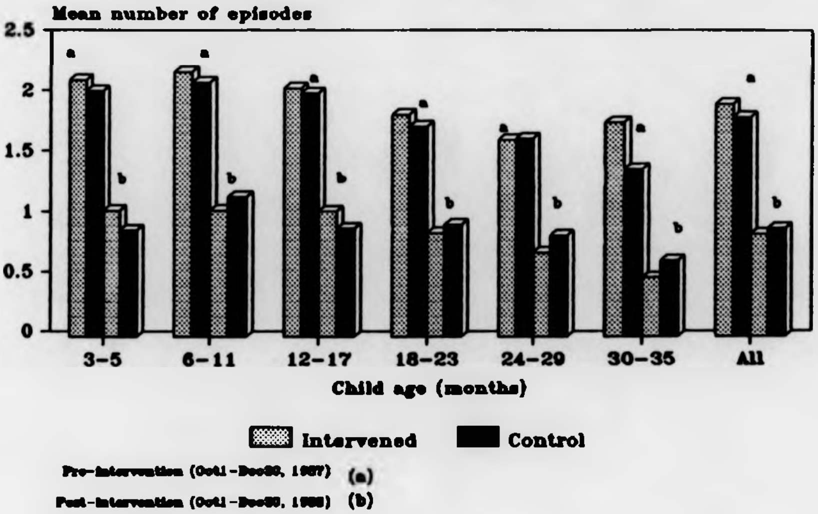
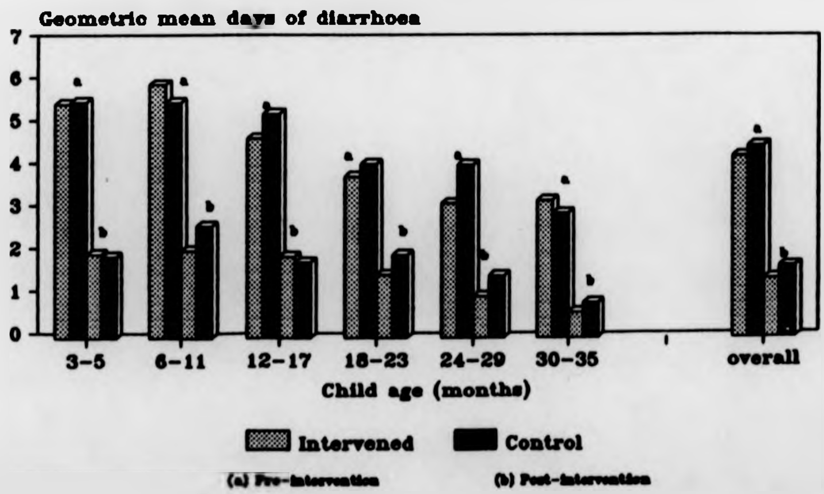
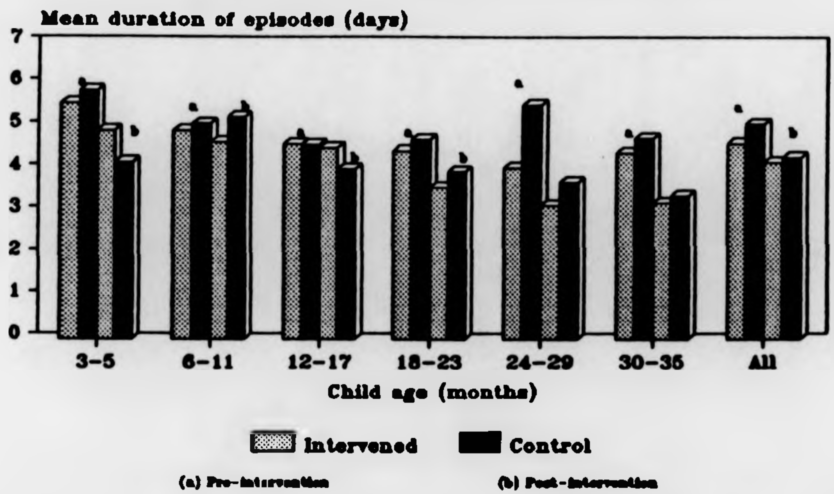



**FIGURE 4.2. Geometric mean number of days of diarrhoea according to child age, pre– and post–intervention**



category in both groups (SND tests, p<.0001 in every case). The mean durations of episodes declined from the pre- to post-intervention periods in both study groups also, but mainly among children aged 24 months and older (Figure 4.3). In the intervened group, the decline

**FIGURE 4.3. Mean duration of diarrhoeal episodes, pre- and post-intervention, according to child age and study group**




in mean duration overall, from 4.63 to 4.23 days, was not significant, but mean durations for intervened children aged 24-29 months (4.05 v. 3.17 days) and for those aged 30-35 months (4.40 v. 3.23 days) were significantly different (p=.05 and p<.001, respectively). Among control children, mean duration was significantly lower in the post- than in the pre-intervention year, overall (4.52 v. 5.03 days, p<.0001). For the 24-29 month and 30-35 month categories the pre- v. post- durations were 5.52 v. 3.71 days (p<.0001) and 4.74 v. 3.40 days (p<.001), respectively.

4.3.4. Comparison of post-intervention diarrhoeal incidence rates in intervened and control sites

As mentioned above, since sites were the unit of randomization in this study, they were, ideally, the appropriate units of analysis. Therefore, the impact of the intervention was evaluated further by analysing age-adjusted site incidence rates. Site incidence rates calculated from the mean number of episodes of children of all ages combined, as well as those from children stratified by age, were explored.

Post-intervention differences between sites were studied, first, taking account of the randomization pair numbers (Table 4.8). Randomization pair numbers had been assigned to sites prior to randomization, by match-pairing sites according to their ordered baseline mean number of days of diarrhoea (see Section 2.7). (In the table, pair numbers increase with increasing baseline rates). The Wilcoxon signed rank test was used to assess the significance of differences between sites with equal randomization pair numbers. (This test, a non-parametric equivalent of the paired t-test, uses the signs and relative magnitudes of the data but not their actual values [17, 19]). This test was highly insignificant (p=.81), as were similar tests considering site incidence rates stratified by child age.

The proportionate reduction of diarrhoea associated with the intervention was studied next, using incidence rate ratios (IRR) [20, 21], or the ratios of diarrhoeal incidence in intervened sites to diarrhoeal incidence in control sites with equal randomization pair numbers (ie. $Incidence_I/Incidence_C$), (Table 4.8). (An IRR of 1 corresponds to no association; values <1 correspond to reduction of diarrhoea in the intervened sites; and values >1 denote an excess of

TABLE 4.8. Post-intervention diarrhoeal incidence rates in intervened and control sites according to randomization pair number *

| Pair | Intervened Sites | Control Sites | IRR ** Adjusted | (Crude) | Intervened-Control Difference |
|---|---|---|---|---|---|
| 1 | 0.44 | 0.74 | 0.57 | (0.68 ) | -0.30 |
| 2 | 0.59 | 1.33 | 0.44 | (0.62 ) | -0.74 |
| 3 | 1.11 | 0.58 | 1.91 | (1.43 ) | 0.53 |
| 4 | 0.25 | 2.13 | 0.12 | (0.23 ) | -1.88 |
| 5 | 1.34 | 0.50 | 2.68 | (1.80 ) | 0.84 |
| 6 | 0.70 | 0.77 | 0.91 | (1.00 ) | -0.07 |
| 7 | 1.57 | 1.50 | 1.05 | (0.79 ) | 0.07 |
| 8 | 0.15 | 0.71 | 0.21 | (0.30 ) | -0.56 |
| 9 | 1.31 | 0.22 | 5.95 | (2.93 ) | 1.09 |
| All | 0.85 | 0.90 | 0.94 | (0.89 ) | -0.05 |
| | | | | p=.03 # | p=.81 ## |

* Site incidence rates adjusted for child age. Randomization pair number based on ordering of sites matched according to baseline diarrhoeal rates (see Section 2.7).

** Incidence Rate Ratio. «Adjusted» column represents ratio of age-adjusted site incidence rates within pairs. «Crude» column represents ratio of relative risk within pair stratum (unadjusted for age).

# Significance of stratified Mantel-Haenszel summary estimate of IRR (0.89). Mantel-Haenszel summary estimate and associated test based on crude relative risks within each stratum, thereby controlling for effect of site. Estimate not controlled for age.

## Significance of Wilcoxon signed rank test.

diarrhoea in the intervened sites. The value [1-IRR] denotes the proportionate reduction of diarrhoea in the intervened group attributable to the intervention). In 5 of the 9 pairs, the IRR was less than 1, indicating that the intervened site experienced a lower rate of diarrhoea than the control. The Mantel-Haenszel summary IRR (.89, p=.03) for this stratified analysis reflected an 11% reduction in diarrhoea (see Appendix 1, note 2).

To explore whether the impact of the intervention differed according to the quality of volunteers' activities and community participation, the site incidence rates were compared according to the intervention activity ranks. Qualitative information obtained during the trainers' monitoring visits had been scored in each site for several indicators of volunteer efficacy and village participation, and totalled to give an overall score. Sites in both study groups were then ranked from 1 to 9 (best to worst), according to their overall scores. Post-intervention differences in incidence rates between equally ranked sites were studied, again using the Wilcoxon signed rank test. This test was not significant (p=.77), and further analyses (ie. differential analyses by child age) were not pursued.

4.3.5. Pre- to post-intervention changes in diarrhoeal incidence in intervened and control sites

To differentiate the impact of the intervention from the overall observed reduction of diarrhoea in 1988, the changes in site incidence rates from the pre- to post-intervention periods in both intervened and control sites were compared. First, the differences between pre- and post-intervention site incidence rates, considering all 18 sites together, were studied using the Wilcoxon signed rank test. This test was significant (p=.02), indicating, not surprisingly, that the large overall decline in diarrhoeal incidence from the pre- to post-intervention years in all sites was significantly different from zero. When the same analysis was repeated considering the 9 intervened sites only, the Wilcoxon test approached statistical significance (p=.08), suggesting that the overall decline among intervened sites was also truly different from zero. In the 9 control sites, the Wilcoxon test was not significant (p=.21), suggesting that among these sites, overall, there were no differences between pre- and post-intervention incidence rates.

Substantial declines in incidence rates from the pre- to post-intervention periods were observed in 6 out of 9 sites in each study group. In the 3 control sites where incidence rates were actually worse (pair numbers 1, 2 and 4), the increases were larger than in the 3 intervened sites where incidence rates were worse (pair numbers 2, 3 and 5). These differences were investigated by comparing the percentage reductions of diarrhoea from the pre- to post-intervention periods in each site, using the formula:

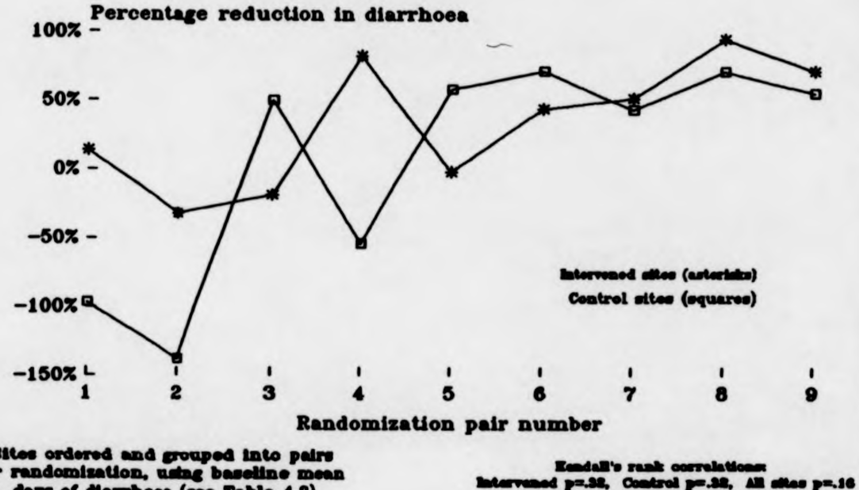
$$\frac{\text{(Pre-intervention incidence rate - Post-intervention incidence rate)}}{\text{Pre-intervention incidence rate}} \times 100\%$$

The overall difference in the percentage reduction of diarrhoea between the 9 intervened and the 9 control sites was tested using the Mann-Whitney U test (ie. the non-parametric equivalent of a two sample t-test). This test was not significant (p=.69).

In order to control for the possibility that the percentage reduction of diarrhoea (in any given site) might be related to the magnitude of the baseline site incidence rate, differences in percentage reductions between pairs of intervened and control sites were studied, taking into account randomization pair numbers (as in Section 4.3.4) (Figure 4.4). When the Wilcoxon signed rank test was applied to compare the difference between sites with equal pair numbers, this was not significant (p=.51). When the same test was applied to compare differences between intervened and control site incidence rates stratified by child age, there were, once again, no significant differences between the study groups.

Lastly, percentage reductions were compared taking into account the qualitative activity ranking of sites (Figure 4.5). Visual inspection of Figure 4.5 suggested that percentage reductions were

FIGURE 4.4. Percentage reduction in diarrhoea according to baseline matched pairing of sites *



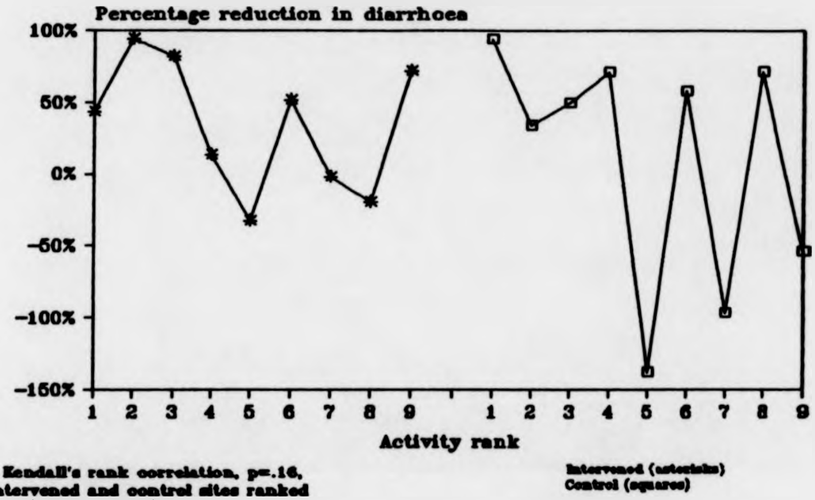

* Sites ordered and grouped into pairs for randomization, using baseline mean no. days of diarrhoea (see Table 4.2)

greater in intervened compared to control sites. The Wilcoxon signed rank test indicated that the differences in percentage reductions between equally ranked sites were not significant (p=.44). There were, furthermore, no differences between intervened and control sites when site incidence rates were stratified by child age (Wilcoxon Z, p=.95, p=.51, and p=.51, for infants, children aged 12-23 months, and children aged 24-35 months, respectively).

#### 4.3.6. Correlates of pre- to post-intervention reduction in diarrhoea

Whilst there were no apparent differences between the study groups in the pre- to post-intervention percentage reductions of diarrhoea, either according to randomization pair number or to intervention activity rank, visual inspections of Figures 4.4 and 4.5 suggested that diarrhoeal reductions may have been associated with

**FIGURE 4.5. Percentage Reduction in Diarrhoea by Site Activity Rank ***




* Kendall's rank correlation, p=.16, Intervened and control sites ranked 1-9 (best to worst)

pair number or activity rank. In Figure 4.4, percentage reductions appear to increase with increasing pair number (ie. with increasing baseline incidence rates). When the closeness of this association for all sites considered together was tested using Kendall's rank correlation coefficient (W) (ie. a non-parametric equivalent of the correlation coefficient), a possible correlation emerged (p=.16). When site incidence rates were stratified by child age, the correlations between pair number and incidence rates of infants, and of children aged 12-23 months, both approached significance (p=.06 in each case). The correlation with respect to children aged 24-35 months was less strong (p=.16). When the intervened and control sites were analysed separately, the correlations were not significant (p=.32 in each case).

Similarly, an association between the percentage reduction of diarrhoea and intervention quality is suggested by Figure 4.5. Percentage reductions appear to be larger in both intervened and control sites with high activity ranks, particularly those ranked 1-4. Kendall's W was again used to test the correlation, and yielded $p=.16$, suggesting a possible positive correlation between the two variables. When this analysis was repeated considering separate age categories, the correlations were stronger: Considering site incidence rates for infants and children aged 12-23 months, the correlations approached statistical signficance (Kendall's W, $p=.06$, in each case). When intervened and control sites were considered separately, the correlations between percentage reduction and activity rank were not significant (Kendall's W, $p=.32$ in each case).

## 4.4. Discussion

The results suggest that diarrhoeal morbidity in children may be lowered by an educational intervention to improve personal and domestic hygiene. Children in intervened communities experienced an 11% reduction in the risk of diarrhoea during the peak diarrhoeal season, compared to controls ($p<.025$). Children from intervened communities also had significantly fewer days of diarrhoea than children from control communities with comparable baseline diarrhoeal rates, and relatively fewer intervened than control children had episode durations longer than 3 days. The largest differences were observed among children aged 24-35 months, with those from intervened sites reporting significantly fewer episodes, fewer days of diarrhoea, and shorter mean durations of episodes.

There was little overall difference in the mean number of episodes, post-intervention, between intervened and control children

(0.85 v. 0.90, respectively, age-adjusted IRR=0.94), but there were fewer episodes among intervened children aged 18 months upwards, and significantly fewer between the ages of 24-35 months. The results therefore highlight the age group 24-35 months as benefiting most from the intervention. In a similarly focused study of a hygiene educational intervention in Bangladesh[5] the impact was greatest in the 12-35 month age group. This suggests that personal and domestic hygiene practices may be more important etiological factors for diarrhoea in these older children, than for infants. Children beyond 12 months are breast-fed less frequently, play farther away from the home and may be cared for by siblings only slightly older than themselves. Greater mobility and less direct maternal supervision would undoubtedly increase their risk of exposure to environmental contamination relative to younger children. In contrast, among infants, factors other than personal and domestic hygiene behaviours may be of relatively greater importance in determining diarrhoeal rates, eg. the use of colostrum, the age of introduction of weaning foods, the use of non-human milk, etc.

Beause the intervention was addressed to communities, and not to individual households, there was a strong possibility that families were influenced not only by volunteers' messages, but also by each other. Therefore, the evaluation also focused on the differences in diarrhoeal rates between the intervened and control sites. In contrast to the child-level analyses, these analyses revealed few significant differences between the two study groups, either in the comparisons of post-intervention site incidence rates or the comparisons of pre- to post-intervention percentage reduction in incidence rates. None of the comparisons of intervened v. control sites, using the Wilcoxon signed rank test (ie. the only strictly appropriate site-level test available) resulted in significant differences: when post-intervention incidence rates between intervened and control sites were compared, first according to randomization pair number and then according to intervention activity rank, the differences between the study groups were insignificant in each case. Similarly, when the Wilcoxon test was used to study the percentage reductions in diarrrhoea, separately according to randomization pair number and to activity rank, no differences between the study groups were significant in either case. These results do not signify that the intervention had no effect. The most likely explanation for the lack of differences at the site level is, rather, that the number of sites was very small and comparisons were dependent on the variation among 9 pairs of sites. In all probability, any differences between the study groups due to the intervention would need to have been quite large to be detected by the site-level analyses; these tests had little power to discern the moderate differences which the child-level analyses suggest are due to the intervention. In fact, when the Wilcoxon test was used to assess the differences between pre- and post-intervention site incidence rates, separately in intervened and in control sites, the differences among the intervened sites did approach signficance (p=.08), whereas among the controls they did not (p=.21), suggesting that the aggregate decline in the intervened sites was indeed *very* large (ie. 56%). Moreover, a Mantel-Haenszel summary estimate of the relative risk of diarrhoea in matched pairs of intervened and control sites (IRR=.89, p=.03), revealed that children in intervened sites experienced an 11% lower risk of diarrhoea than those in control sites with similar baseline rates.

Analyses of the correlations of percentage reductions of diarrhoea with randomization pair number and with intervention activity rank suggested that the intervention had differential effects. First, there was mild evidence (p=.16) that percentage reductions increased with increasing randomization pair number among both intervened and control sites, ie. that larger reductions occurred in sites with high baseline incidence rates. It is possible that in sites with the worst initial rates, proportionately more bad behaviours were practised, and therefore the *opportunities* for correcting these behaviours were more numerous. When this analysis was repeated, stratifying for child age, stronger correlations emerged in the sites with respect to infants and children aged 12-23 months (p=.06 in each case). The stronger correlations in these cases suggest that in the youngest children, who have the highest diarrhoeal rates, a given amount of behavioural change (relevant to their diarrhoeal risk) may have a proportionately larger impact on young child diarrhoeal rates than the same amount of behavioural change would have on diarrhoea in older children. Moreover, the worse the initial site incidence rate, the larger this effect is likely to be.

Similar results emerged from the study of the correlations between percentage reduction and intervention activity rank: when all sites were considered together, a possible correlation was suggested (p=.16). The association was particularly evident in the 3 intervened sites and 3 control sites having the highest scores, suggesting that greatest reductions occurred in sites where community volunteers and/or residents were more enterprising. Differences in behavioural changes and in growth rates according to activity ranks (discussed in Chapters

5 and 6, respectively), reinforce this view. When the sites were stratified by child age, the correlations were strongest for the age groups 3-11 months and 12-23 months (p=.06 in each case). This implies that the quality of the intervention made a relatively greater difference in the percentage reduction in diarrhoea among children 3-23 months of age than among older children in the same sites. This is not contradictory to the finding (from the child-level analyses) that post-intervention differences between intervened and control children were greatest in the age group 24-35 months. In contrast, it may indicate that only in sites with very effective volunteers were the intervention messages protective against diarrhoea in the youngest children. On balance, the results presented in Sections 4.3.2 and 4.3.3 suggest that intervention messages targeted behaviours of relatively greater relevance for diarrhoea in the older, more mobile children, compared to younger children. In the youngest children certain adverse weaning practices may hav been more important causes of diarrhoea than the targeted behaviours.

Whilst the comparison of the differences in diarrhoea reductions between intervened and control sites provides a measure of the intervention's impact, the fact that incidence rates decreased greatly in both groups relative to baseline deserves attention. The most likely explanations for the large declines in both groups are either (i) annual fluctuations in diarrhoeal rates, or (ii) both control and intervention education messages had a diarrhoea lowering effect, or (iii) a "Hawthorne" effect occurred, ie. an effect due not to message content *per se* , but to the continuous presence of community volunteers and interviewers. Large annual fluctuations in diarrhoea rates have been documented in this area of Zaire previously[22, 23].

Health facility data from the Diarrhoeal Diseases Control Programme in Bandundu indicate that from 1985-1989 annual hospital admissions for diarrhoea among children ≤5 years of age fluctuated widely, with the highest percentage (11%) reported in 1987, and the lowest (4%) in 1988 (see Appendix 1, note 2). This suggests that the large declines observed in the present study reflect, at least in part, the general regional decline between 1987-1988. As regards the "Hawthorne effect", the presence of the research team may have stimulated villager's general awareness of diarrhoea and its causes (as well as other illnesses and their causes). In control areas, furthermore, volunteers (as free agents) may have promoted other health and diarrhoea messages based on their own previous knowledge, in addition to the control messages. These possibilities are discussed in more detail in the context of the intervention's behavioural impact, in Section 6.4. It is unlikely that message leakage from intervened to control sites could account for these reductions, since all sites were separated by long road distances, and field monitors, being on the alert for message leakage, reported only one instance which was of minor importance.

The study incorporated certain features which may be considered strengths. First, the design permitted the establishment of age-adjusted diarrhoeal rates for each site and matching of sites with similar rates, hence stratified randomization of sites to study groups ensured that the baseline diarrhoeal rates of the two groups were comparable. Second, the study safeguarded against many of the weaknesses of similarly-focused interventions, including the lack of an adequate number of sites, lack of adequate controls, poor diarrhoeal definition, failure to analyze by age, and failure to account for the influence of season on diarrhoea. These problems were highlighted in the studies reviewed in the introduction to this chapter, and in studies reviewed by Blum and Feachem[10].

4.4.1. Difficulties encountered

The sustained involvement and activity of community volunteers was pivotal to the success of the intervention, since the volunteers were the principal community resource used. Several of the volunteers were, however, inadequately selected by their communities or poorly motivated. Although project leaders visited each site twice prior to the training period to explain the goals of community volunteer selection to village leaders, this was not sufficient. Several volunteers did not have the strong qualities of leadership, village credibility, enthusiasm, goodwill and community motivation, which had been encouraged: two volunteers were chosen simply because they were spouses of village chiefs, one volunteer was feeble-minded, and yet another two or three demanded salaries, which were not possible to pay. Expectedly, those volunteers who performed poorly during training or exhibited poor motivation were less effective in their communities. Some lost motivation after a short time because they were not paid. Perhaps the most important problem was the inability of trainers to visit volunteers frequently to provide technical, managerial and moral support, due to poor roads, insufficient and expensive transport, inadequate vehicle repair, and unsure supplies of fuel (Plates 4.1-4.3). For similar reasons, it was impossible to regroup volunteers in Kikwit at any point during the intervention for refresher training and an exchange of volunteer experiences.

A second difficulty was that the time frame planned for the study was too short in a number of ways. Between message development

PLATE 4.1. Poor road conditions make rural access difficult

PLATE 4.2. River crossings in remote areas retard the best laid research plans

PLATE 4.3. Fieldworkers' good humour alleviates transport difficulties

and implementation of the intervention there were only 2 months, allowing little time for re-selection of inappropriate volunteers. Although the educational posters were pretested, there was also insufficient time to pilot message dissemination in the field using the methods promoted during training (ie. home visits, village reunions, small-group discussions, etc.). Perhaps most pertinently, the time frame of the intervention was in all probability inadequate to achieve the full potential of behaviour change at the community level. Adoption of the prescribed behaviours in even the most active sites was only gradual.

### 4.4.2. Implications of the findings

The results of this study should be considered in tandem with the impact evaluations on behaviour and child growth, discussed in

Chapters 5 and 6, respectively. Taken alone, this chapter provides - on balance - mainly suggestive evidence that the observed reductions in diarrhoeal rates were attributable to the intervention. However, evaluations of the project's impacts on behaviour and nutritional status reinforce the conclusion that the changes in diarrhoeal rates, albeit modest, were due to the intervention. Improvements in hygiene behaviours and growth followed similar patterns to the reductions in diarrhoea with respect to baseline measurements and intervention quality: those improvements were, in fact, statistically stronger and more convincing than the reductions in diarrhoea. Moreover, the analyses of diarrhoeal reduction suggest that the intervention had the strongest impact on children 24-35 months of age, probably reflecting the greater influence of hygiene practices on pathogenic transmission among the more mobile children and those no longer benefitting from the protection of breast milk. Analyses of the growth data similarly suggest a stronger impact on children in the third year of life. These combined findings suggest that educational interventions to promote personal and domestic hygiene may be most effective against diarrhoea in children aged about 24-35 months.

The combined evidence leads one to believe that community-based hygiene education may be a feasible and potentially effective approach for controlling diarrhoea in Zaire. Whilst an overall reduction of 11% may seem small, there have been few appropriate community studies of personal and domestic hygiene education to suggest a reliable range of reductions which can be expected from similar interventions. It is likely that more appreciable reductions could occur. It is important to bear in mind that personal and domestic hygiene education, as a diarrhoeal diseases control strategy, is still in an experimental phase; there are many issues of design, operation and evaluation that still need to be improved, through further research. In this study, operational constraints limited the extent to which project staff could visit communities, train volunteers, and monitor their performance in the sites, thereby preventing greater diarrhoeal impact. To assess the potential benefit of personal and domestic hygiene education fairly, similar approaches should be studied in settings where these constraints are not a major problem. Using a similar approach, but putting greater emphasis on community volunteer selection, training in message dissemination methods, and frequent feedback and refresher training of volunteers would be of considerable practical value. The comparative effect of focusing a similar approach (with these improvements) on children 24-35 months of age, would also merit further study.

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# CHAPTER 5. IMPACT OF THE INTERVENTION ON HYGIENE BEHAVIOUR

## 5.1. Introduction

Inadequate personal and domestic hygiene practices in poor countries cause needlessly high rates of diarrhoeal morbidity in children. These practices, notably the lack of handwashing, insufficient disposal of animal and human faeces, and poor food and water storage and handling, increase the transmission of pathogenic bacteria, primarily through the faecal-oral route in children. Educational interventions to improve hygiene behaviours may substantially reduce the risks of pathogenic transmission in the home. To date, several studies suggest that community-based hygiene education - alone as an intervention or integrated in programmes to improve water supply and sanitation facilities - can lead to sizeable reductions in diarrhoeal morbidity (see Table 4.1, Chapter 4). However, for several reasons related to study design, evaluation methodologies, and the inherent difficulties of measuring human behaviours (discussed in Section 4.1), these studies have not illuminated the behavioural impact of such interventions. In fact, behavioural effectiveness has been ambiguous and inconsistent. The need for further research in these areas in order to advance our appreciation of the potential effectiveness of hygiene education, has been emphasized[1].

In Chapter 4, the results of the impact of the educational intervention on childhood diarrhoea were presented. In this Chapter, the impact of the intervention on families' personal and domestic hygiene behaviours is described. In addition, the associations between behavioural patterns and diarrhoeal reductions are described. First, however, in order to set the framework for these results, the major pathways of environmental and domestic hygiene transmission of diarrhoeal pathogens are discussed. The major related studies of community-based hygiene educational interventions and integrated water and sanitation interventions which include hygiene education have been reviewed in the previous Chapter (see Section 4.1).

#### 5.1.1. Environmental transmission: water supplies, sanitation and domestic hygiene

Diarrhoeal pathogens are transmitted and ingested through pathways established largely by the interactions between host and environment. The level of socioeconomic development determines these interactions at a fundamental level. Adverse socioeconomic and sociological "host" factors may include poor housing, low income, crowding, inadequate resources, poor communications, low educational attainment, and potentially adverse cultural beliefs. Levels of nonspecific resistance and specific immunity are important biological host factors[2]. Antagonistic "environmental" factors typically include inadequate quality or quantity of water, poor sanitation, and harsh climate and ecologic conditions.

The most common pathogenic organisms of diarrhoea in developing country children are enterotoxigenic and enteropathogenic *Escherichia coli* (ETEC, EPEC), *Shigella*, *Vibrio cholerae*, *Giardia lamblia*, *Entamoeba histolytica*, rotavirus, *Campylobacter jejuni* and *Yersinia enterocolitica*. These organisms may be transmitted through contaminated food, water or person-to-person contact, although the relative importance of routes for most bacterial organisms remains uncertain[3]. In young children, the most common mode of transmission is via hands, feeding utensils, or ingestion of dirt[1].

Almost all the major pathogenic organisms, including *E. coli, Entamoeba histolytica, Shigella, Campylobacter, Giardia lamblia, Salmonella typhi, Vibrio cholerae, Aeromonas hydrophila* and rotavirus, have been demonstrated to be transmitted through contaminated water[4-7]. Contaminated water has been responsible for the outbreak water-borne diseases, so-called because water acts as the vehicle of transmission, most significantly cholera, typhoid and giardiasis. Water-borne diseases are believed to result mainly from drinking water contaminated with faeces, although transmission through food and hands is also possible. Other pathogens, including *Shigella, Campylobacter jejuni, E. coli* and rotavirus, have been implicated in "water-washed" diseases, so-called because transmission is usually facilitated by unclean domestic conditions associated with insufficient water, such as unwashed food, utensils and hands. In the Gambia, Lloyd-Evans et al[8] found that 3 times as many samples of stored water taken from a group of children with high diarrhoea prevalence were contamined by *E. coli* compared to a group of children with no diarrhoea. Whilst improved water quality has been shown to prevent water-borne transmission, it is believed that water in sufficient quantity may control water-washed transmission[9].

Interventions to improve water quality have been the object of in-depth study. Improved water sources (i.e. source or well water surrounded by protective parapet and apron) have been shown to have greatly reduced levels of faecal contamination relative to unprotected sources and surface water from rivers, irrigation channels and open reservoirs[5,9,10]. The superior quality of handpump water has been reported recently also. Mertens et al[11], reported from Sri Lanka, that the percentages of water samples with faecal coliforms were lowest from handpumps (48%), followed by pipes (82%) and then wells (95%). Similarly, Aziz et al[12] reported much lower contamination of water from handpumps than surface sources in Mirzapur, Bangladesh. Environments characterized by poor water supplies frequently also lack adequate sanitation, leading to high faecal contamination of homes, yards and gardens. Use of toilets and proper disposal of human faeces is of the utmost importance, as all the major diarrhoeal infectious agents are shed by infected persons via faeces[4]. Poor sanitation and faeces disposal practices increase the risk of diarrhoea[4,12-15], and have been implicated especially in *Shigella* and EPEC infections[3,7]. The installation of improved latrines has been shown to reduce diarrhoea incidence in many studies[16-20].

Whilst it would seem axiomatic that individuals' personal and domestic behavioural patterns greatly regulate the effects of adverse environmental conditions, the evidence to support this is mainly anecdotal. Most studies have focused on handwashing behaviours, although transmission through food and water handling has gained increasing attention. Almost all handwashing studies have been reported from hospital, clinic or nursery settings, with the exception of a recent community-based study in Rangoon[21]. Reviews of these studies by Feachem[1] and Black[3] indicate that inadequate handwashing, both in frequency and thoroughness, increase the spread of *Shigella, Klebsiella, E. coli, Salmonella* and rotavirus. Indeed, proper handwashing has been shown to reduce the secondary infection rate due to *Shigella* [2] and the incidence of diarrhoea and dysentery[21]. Handwashing with soap is more effective than handwashing with water alone, however water alone is better than no handwashing.

Domestic hygiene behaviours have important effects on the quality of water, including water from handpumps or improved sources, which may degenerate subsequent to long collection distances, or poor water storage in the home[12,22-23]. A number of studies provide information about indicators of faecal contamination in stored water, however there are few reports of levels of enteropathogen contamination. In Sri Lanka[11] several practices were reported to affect stored water quality: boiling water was a strong, protective modifier of stored water quality; levels of contamination were lower when water was stored in a different container from that in which it was collected; water stored inside rather than outside the house was less contaminated; use of non-earthenware containers (metal, plastic) was associated with less contamination; and storage of unboiled water for longer periods reduced contamination. Storage of water in the home does appear to have a reductive effect on the numbers of coliforms, however the type of container which is most protective is ambiguous. Both Tomkins et al[10] and Rowland[24] reported that storage in earthenware pots reduced the level of faecal organisms. The benefit of boiling or purifying water, on the other hand, is more conclusive. Huttly et al[13] reported an elevated relative risk of diarrhoea of 1.3 in children of Nigerian families who did not purify their water (through boiling, filtration or addition of alum), although coliform counts were not measured in water samples. Covering of stored water has been encouraged in some educational programmes[12,18], however the protection afforded by covering is unclear. Long water collection distances have been associated with increased diarrhoeal incidence rates[16,18-19], although it is not certain whether this is due to increased contamination of water during transport or because less water is available for washing. Certainly, there is good evidence that a lower quantity of water consumption is associated with increased diarrhoeal morbidity[9,25-26]. These studies suggest that water handling and storage behaviours are important factors in environmental transmission of diarrhoeal pathogens.

Contamination of food, particularly infant foods, is another important mechanism of pathogenic infection. Faecal pathogens in infant foods have been identified in the Gambia[8,27-28], Bangladesh[29], India[30], Nigeria[31], Guatemala[32] and Peru[7]. In these studies *E. coli* contamination was most frequent, however *Salmonella, Aeromonas hydrophila, Staphylococcus aureus, Bacillus cereus, Clostridium welchii*, and *Vibrio cholerae* non-O group 1 were also found. Poor food preparation, handling and storage, and the use of unclean feeding utensils are associated with the transmission or proliferation of pathogens. Inadequate cooking of contaminated raw ingredients is believed to increase bacterial contaminations[27,32]. Storage of foods at high ambient temperatures for several hours increased bacterial counts in infant foods in the Gambia[27] and Bangladesh[29], and the frequency of contamination of foods in Peru[7]. Long periods of storage may increase the risk of secondary contamination from hands and utensils, the germination of spores, and production of enterotoxins, and inadequate reheating of leftovers may permit ingestion of high numbers of pathogens[6]. The greater survival and proliferation of pathogens in food (and water) in warmer months may contribute to the seasonality of bacterial diarrhoeas. In the Gambia Rowland et al reported that traditional infant weaning foods were as contaminated with *E. coli, Bacillus cereus, Staphylococcus aureus* and *Clostridium welchii* as commercial infant preparations after 8 hours of storage[28].

Relatively few studies have documented pathogenic transmission through domestic environmental routes other than food and water. This notwithstanding, transmission via contaminated infant bottles and feeding utensils has been reported frequently[7,28,30,33-34]. In Peru[7], infection of domestic animals with *Campylobacter jejuni*, *Plesiomonas shigelloides* and ETEC was reported, and the risk of *Campylobacter* infection in children may increase in settings where animals and people live in close proximity[7,35]. In Guatemala Torun[36] identified *Clostridium*, *Klebsiella* and *E. coli* each in drinking water, cooked tortillas and beans, in dishware and on housewives' hands.

Clearly, the pathways of environmental transmission of the pathogenic agents of diarrhoea are numerous. Whilst the most common agents have been identified, the relative importance of water, food or direct routes for the transmission of most organisms is not clear. It is certain that pathogenic transmission to children occurs through unclean hands, feeding objects, animals and ingested dirt and rubbish, although little information is available about domestic routes and behavioural patterns that increase the transmission of specific bacteria. Further research in this area is likely to improve the efficiency with which environmental and educational interventions may be planned.

## 5.2. Methods

A subset of approximately 18% of study families, called sentinel families, were randomly selected for a single 6-7 hour observational study of hygiene practices postulated to be related to diarrhoea. Observations were made concurrent with the baseline and follow-up morbidity studies, by trained observers blind to the diarrhoeal histories of the families involved. Full details of the observational methods and observer training are included in Chapter 2.

5.2.1. Statistical Methods

In order to assess the impact of the intervention on hygiene behaviours, two main comparisons were considered. These included: (1) a pre- versus post-intervention comparison of behaviours in intervened and in control families, and (2) a post-intervention comparison of behaviours between intervened and control families. Behaviours were compared using frequency distributions and behavioural "scores" reflecting aggregate hygiene behaviours (see Section 5.3, below, and Appendix 4 for details of score construction). Statistical methods included $chi^2$ tests for trends, simple analysis of variance, and SND tests.

In addition to these main comparisons, three related sets of analyses were also conducted. First, differential effects of the intervention according to child age were studied. Second, the associations between behaviours and intervention quality were explored, using site activity ranks (see Section 2.9.4). Third, to assess whether the changes in diarrhoeal rates, reported in Chapter 4, were due to changes in hygiene behaviours, the associations between behaviours and diarrhoeal morbidity in sentinel families were also investigated. Statistical methods for these analyses included multiple analyses of variance, tests of correlation coefficients, and SND tests. Finally, in order to evaluate whether a single observation of families' hygiene practices was sufficient to characterize behaviour, the *variability of behaviour* among families with multiple occurrences of behavioural events was analysed. Frequency distributions and tests of correlation coefficients were used in these analyses.

## 5.3. Results

In the pre-intervention year (1987), 300 sentinel families having study children with 9 or more complete weeks of diarrhoeal data were included in the analyses. Some 100 behavioural categories per family, representing a minimum total of 30,000 observations (and a maximum total of 150,000 observations, possible with multiple events), were analyzed. In the intervention year (1988), 293 sentinel families had children with 9 or more weeks of data and were included in the analyses. Approximately 60 behavioural categories per family, representing a total of 17,580 (minimum) to 64,5000 (maximum) observations in this year, were analyzed.

In Sections 5.3.1-5.3.6 below, all results of analyses pertain to the sentinel families only, in each year. Diarrhoeal data of non-sentinel family children are not included.

### 5.3.1. Pre- v. post-intervention hygiene behaviours in intervened and control families.

To compare the change in hygiene practices from the pre- to post-intervention periods, 12 behavioural events observed in each period were studied in intervened and control sentinel families (Table 5.1). In each study group, the proportions of protective behaviours observed before and after the intervention were compared using a chi$^2$ test or chi$^2$ test for trend[37]. The behaviours compared represent a subset of the observed events common to both the pre- and post-intervention studies and, in the post-intervention period, are behaviours related to the intervention messages.

TABLE 5.1. Distributions of Hygiene Practices Observed in Both the Pre- and Post-Intervention Periods in Intervened and Control Sentinel Families

| Behaviours Observed | Pre-Intervention (1987) Number of Families (% of Observations) Intervened | Control | Post-intervention Number of Families (% of Observations) Intervened | Control |
|---|---|---|---|---|
| **YARD HYGIENE** | | | | |
| Yard swept fully+ | 8 (5.9) | 9 (5.5) | 28 (20.9)***** | 26 (16.4)**** |
| Animal faeces not seen+ | 2 (1.5) | 2 (1.2) | 14 (10.4) | 11 (6.9) |
| Human faeces not seen+ | 92 (67.6) | 104 (63.4) | 109 (81.3) | 121 (76.1) |
| Garbage pit present | 54 (39.7) | 54 (32.9) | 81 (60.4)**** | 68 (42.8)* |
| **FOOD AND MEAL HYGIENE** | | | | |
| Hands washed before food preparation++ | 46 (41.4) | 33 (25.8) | 95 (70.9)***** | 100 (62.9)***** |
| Childs hands washed before eating++ | 59 (46.8) | 75 (49.7) | 67 (83.6)*** | 75 (88.2)** |
| Feeders hands washed before feeding++ | 58 (63.7) | 82 (73.2) | 61 (83.6)*** | 75 (88.2)** |
| Adults hands washed before eating+++ | 46 (34.8) | 62 (38.5) | 62 (57.4)***** | 87 (68.5)***** |
| **DEFECATION HYGIENE** | | | | |
| Latrine used+++ | 99 (91.7) | 124 (97.6) | 71 (93.4) | 79 (82.3)*** |
| Disposal of child faeces into latrine+++ | 34 (38.6) | 44 (40.0) | 57 (63.3)***** | 48 (44.4) |
| Disposal of faeces with hoe/shovel++ | 35 (39.8) | 56 (50.9) | 38 (42.2) | 40 (37.0)** |
| Child cleaned after defecation++ | 7 (7.9) | 16 (14.2) | 20 (22.2)*** | 23 (21.3) |
| Number of families | 135 | 165 | 135 | 158 |
| Mean % observations good | 40 | 41 | 55 | 50 |
| Mean % observations bad | 60 | 59 | 45 | 50 |
| std. dev. | 26.5 | 28.3 | 26.5 | 26.6 |
| Change from pre-intervention | | | -15 (25% red.) | -9 (15% red.) |

Symbols used in table:
+ Single event observed
++ Best observed
+++ Worst observed

Significance of difference from pre-intervention values (chi-square test 1df):
* p<0.10
** p <0.05
*** p <0.01
**** p<0.001
***** p<0.0001

In the intervened sentinel families, all 12 behaviours were more frequently practised after the intervention than before and, for 8 behaviours, the improvements were highly significant ($p<0.01$ in each case). The largest changes were in handwashing before food preparation (70% improvement, $p<0.0001$), adult handwashing before eating meals (65% improvement, $p<0.0001$), disposal of child faeces (64% improvement, $p<0.0001$) and thorough yard sweeping (100% improvement, $p<0.0001$). Only 2 behaviours - adults' latrine use and disposal of child's faeces with a durable instrument - changed negligibly, showing improvements of only 2% and 6%, respectively. In the control families, there were also improvements in all but 2 of the behaviours (latrine use and disposal of child's faeces with a durable instrument, declining by 16% and 27%, respectively), and the improvements in 7 reached statistical significance ($p<0.05$ in each case). All the improvements in the control group were, however, smaller than those in the intervened group, except handwashing before food preparation and adult handwashing before eating meals, which increased to a larger extent than in the intervened group.

The changes in behaviour in sentinel families were studied further by comparing the frequencies of adverse ("bad") behaviours observed in each of the intervened and control families, pre- and post-intervention. To do this, the proportions of protective ("good") behaviours shown in Table 5.1 were averaged, giving pre-intervention figures of 40% and 41% for the intervened and control families, respectively, and figures of 55% and 50% for the families post-intervention. These averages were then subtracted from 100, to give the average proportions of bad behaviours observed in each group. In the intervened group, bad behaviours declined from 60% pre- to 45%

post-intervention, representing a 25% reduction. In the control group, bad behaviours declined from 59% pre- to 50% post-intervention, representing a 15% reduction.

To understand further the large changes observed in many behaviours in both study groups, the *variation* of behaviour in intervened and control sentinel families, pre- and post-intervention, was studied, using an aggregate measure of *overall* behaviour. For each of the 12 behaviours, observations of good practice or bad practice were scored 0 or 1, respectively, and then for each family scored observations were summed to give an overall behaviour score (a "12-index score"). The higher the score, the more frequently were bad behaviours practised. The mean behaviour scores of intervened and control sentinel families, before and after the intervention, were then compared (Table 5.2). Whilst the mean behaviour scores were

**TABLE 5.2. Mean 12-index Behaviour Scores in Intervened and Control Sentinel Families, Pre- and Post-Intervention**

| | Pre-intervention | | | Post-intervention | | |
|---|---|---|---|---|---|---|
| | mean score | s.d. | n | mean score | s.d. | n |
| Intervened Families | 6.15 | 2.12 | 135 | 4.76 | 1.97 | 135 |
| Control Families | 6.13 | 2.18 | 165 | 5.26 | 2.14 | 158 |
| Overall | 6.14 | 2.16 | 300 | 5.00 | 2.07 | 293 |
| ANOVA F | n.s. | | | $p<0.07$ | | |

about the same before the intervention (overall mean 6.14, s.d. 2.16), following the intervention the mean score in intervened sentinel families improved, and was lower than in controls (4.76 v. 5.26, anova, p=0.07). There was also evidence suggesting a trend toward fewer bad behaviours in the intervened families compared to controls, as shown in Table 5.3 (chi² trend, p=0.08).

**TABLE 5.3. Distributions of 12-index Behaviour Scores in Intervened and Control Sentinel Families, Post-Intervention ***

| Behaviour Score | Number of Intervened Families (%) | Number of Control Families (%) |
|---|---|---|
| 0-3 | 37 (27.4) | 31 (19.6) |
| 4 | 28 (20.7) | 39 (24.7) |
| 5-6 | 46 (34.1) | 42 (26.6) |
| 7-11 | 24 (17.8) | 46 (29.1) |

* Chi-square trend p<0.08

5.3.2. Post-intervention behaviours, intervened v. control sentinel families

During the post-intervention period, additional observations of behaviours related more specifically to the intervention messages were made. (A small number of changes in the observational methods were also made during the post-intervention study in order to focus observations specifically on intervention-related behaviours. These changes are described in full in Section 2.8.) The distributions of hygiene practices observed during the post-intervention period in intervened and control sentinel families are shown in Table 5.4. In the table, differences in behaviour between intervened and control families are assessed using the chi² test or chi² test for trend (1 df). The strongest differences between the groups were in yard

TABLE 5.4. Distributions of Message-related Hygiene Behaviours Observed in Intervened and Control Sentinel Families, Post-Intervention

| Observed Behaviour | Number of Intervened Families (% row total) | Number of Control Families (% row total) | P value* |
|---|---|---|---|
| Thorough sweeping | | | |
| none | 24 (38.7) | 38 (61.3) | 0.1 |
| partial | 78 (45.3) | 94 (54.7) | |
| thorough | 32 (54.2) | 27 (45.8) | |
| Sweepings disposal | | | |
| garbage pit | 40 (54.8) | 33 (45.2) | n.s. |
| other | 70 (44.3) | 88 (55.7) | |
| Target child plays in sweepings | | | |
| never | 100 (49.8) | 101 (50.2) | 0.06 |
| sometimes | 34 (37.0) | 58 (63.0) | |
| Older children play in sweepings | | | |
| never | 91 (46.2) | 106 (53.8) | ns |
| sometimes | 43 (44.8) | 53 (55.2) | |
| Animal faeces seen | | | |
| none | 6 (50.0) | 6 (50.0) | <0.01 |
| some | 54 (56.8) | 41 (43.2) | |
| much | 74 (39.8) | 112 (60.2) | |
| Human faeces seen | | | |
| none | 102 (48.8) | 107 (51.2) | ns |
| some | 32 (38.1) | 52 (61.9) | |
| Garbage Pit Location | | | |
| none | 53 (36.8) | 91 (63.2) | <0.0001 |
| yard | 55 (46.6) | 63 (53.4) | |
| far | 26 (83.9) | 5 (16.1) | |
| Hands washed before food preparation | | | |
| never | 39 (39.8) | 59 (60.2) | <0.10 |
| sometimes | 43 (44.8) | 53 (55.2) | |
| always | 48 (52.7) | 43 (47.3) | |
| Child's hands washed before eating | | | |
| never | 57 (44.9) | 70 (55.1) | n.s. |
| sometimes | 13 (35.1) | 24 (64.9) | |
| always | 54 (50.9) | 52 (49.1) | |

(cont'd)

TABLE 5.4. (cont'd)

| | | | |
|---|---|---|---|
| Feeder's hands washed before feeding child | | | |
| never | 12 (54.5) | 10 (45.5) | n.s. |
| sometimes | 4 (57.1) | 3 (42.9) | |
| always | 57 (44.2) | 72 (55.8) | |
| Sharers' hands washed before sharing w/child | | | |
| never | 13 (43.3) | 17 (56.7) | n.s. |
| sometimes | 9 (52.9) | 8 (47.1) | |
| always | 68 (48.9) | 71 (51.1) | |
| Adults' hands washed before eating | | | |
| never | 27 (57.4) | 20 (42.6) | <0.10 |
| sometimes | 19 (48.7) | 20 (51.3) | |
| always | 62 (41.6) | 87 (58.4) | |
| Disposal of faeces into latrine | | | |
| never | 26 (38.2) | 42 (61.8) | 0.02 |
| sometimes | 8 (32.0) | 17 (68.0) | |
| always | 58 (53.7) | 50 (46.3) | |
| Faeces disposal (a) | | | |
| none | 33 (47.8) | 36 (52.2) | n.s. |
| leaf | 20 (37.0) | 34 (63.0) | |
| hoe/shovel | 39 (50.0) | 39 (50.0) | |
| Child washed after | | | |
| never | 72 (45.3) | 87 (54.7) | |
| sometimes | 7 (38.9) | 11 (61.1) | |
| always | 13 (54.2) | 11 (45.8) | |
| Caretakers hands washed after child defecation | | | |
| never | 66 (47.1) | 74 (52.9) | n.s. |
| sometimes | 6 (24.0) | 19 (76.0) | |
| always | 20 (55.6) | 16 (44.4) | |
| Others' latrine use | | | |
| never/sometimes | 6 (26.1) | 17 (73.9) | 0.1 |
| always | 72 (47.1) | 81 (52.9) | |
| Latrine location | | | |
| none | 50 (49.0) | 52 (51.0) | n.s. |
| <15m from home | 46 (44.2) | 58 (55.8) | |
| >15m from home | 43 (49.4) | 44 (50.6) | |
| Others wash hands after defecation | | | |
| never | 52 (40.6) | 76 (59.4) | 0.09 |
| sometimes | 8 (44.4) | 10 (55.6) | |
| always | 18 (60.0) | 12 (40.0) | |

* Significance of chi-square test (1 df) or chi-square test for trend (1 df). Lines indicate division of groups for chi-square test.

hygiene practices, particularly with regard to garbage pits, with intervened families having garbage pits and placing them at a safe distance (≥15 metres away) significantly more often than controls ($chi^2$ trend, $p<0.0001$). There were also significant trends among intervened families to have less animal faeces in the yard ($p<0.01$), and to dispose of child faeces into latrines more often than controls ($p=0.02$). There was evidence bordering on statistical significance that intervened families also swept more thoroughly, prevented young children playing in sweepings, handwashed before food preparation, handwashed after defecation and used latrines more often than controls ($p<=0.10$ in each case). Handwashing of children, feeders and sharers before meals did not differ substantially between the groups, and handwashing of other family members before eating may have been better among controls ($p<0.10$).

The behaviours listed in Table 5.4 were used to construct a second behaviour score (a "20-index score"), with observations of each behaviour assigned a value of 0, 1 or 2, reflecting increasing levels of poor behaviour for each event (eg. hands washed always (0), sometimes (1), or never (2); yard swept thoroughly (0), partially (1), or not at all (2)). (Whereas the 12-index score could vary from 0-12, the second behavioural score could vary from 0 to 30. See Appendix 4 for details.) The mean 20-index scores differed significantly between intervened and control sentinel families, intervened having a mean of 17.5 (s.d. 4.5) and controls a mean of 19.1 (s.d. 4.1) (anova, $p<0.005$). The distribution of these scores in the two groups (Table 5.5) shows a significant trend toward lower scores in the intervened group ($chi^2$ trend, $p<0.02$). The trend in the 20-index score, being stronger than that in the 12-index score, provides further evidence that intervened families were practising better hygiene.

TABLE 5.5. Distributions of 20-index Behaviour Scores in Intervened and Control Sentinel Families, Post-Intervention *

| Behaviour Score | Number of Intervened Families (%) | Number of Control Families (%) |
|---|---|---|
| 5-15 | 43 (31.9) | 31 (19.6) |
| 16-18 | 31 (23.0) | 40 (25.3) |
| 19-21 | 33 (24.4) | 45 (28.5) |
| 22-30 | 28 (20.7) | 42 (26.6) |

* Chi-square trend $p<0.05$

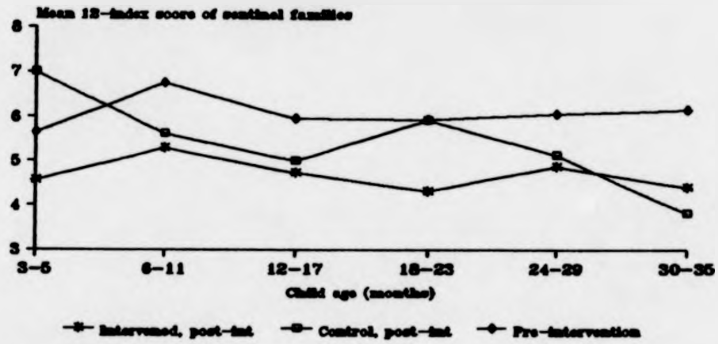
5.3.3. Associations between intervention, behaviour and child age

To assess whether the intervention had a differential impact on children of different ages, and to address the possibility that the differences in post-intervention behaviours between the study groups may have been due to a confounding influence of child age, the 12- and 20-index scores were studied further, controlling for child age. Three main analyses were used, the results of which are presented below.

Multiple analyses of variance were used, first, to study the variation of post-intervention behaviour scores against child age and study group. A regression approach was used, with no assumption of linearity between age and behaviour. For the 12-index score, both age and study group were significant factors ($p=0.02$ in each case), and study group was significant after inclusion of age (p=.05), suggesting an independent effect. There was a mild interaction between age and study group, significant only at the 10% level. For the 20-index score, study group was again very significant (p=.002), age was marginally so (p=.08) and study group remained significant after inclusion of child age (p<.01). There was little evidence of an interaction between age and study group (p=0.12) influencing the 20-index score. These results indicate that the intervention had an independent effect on both the 12- and 20-index scores, apart from any influence of age. (Interestingly, there was no association between child age and behaviour scores in 1987 (anova, p=n.s.).)

Given that age appeared to be a significant determinant of the variation of behaviour scores, the next analysis examined whether there were differential effects of the intervention according to child age. Pre- to post-intervention changes in behaviour in intervened and control sentinel families were studied according to child age, using both the 12- and 20-index scores (Figure 5.1). In the figure, both intervened and control families are represented in a single "pre-intervention" line, since there were no differences in behaviours between the groups at this time (see Table 5.2). Compared to pre-intervention, the post-intervention 12-index behaviour scores were lower (i.e. better) in both study groups, across all age categories. The only exceptions were control families with infants aged 3-5 months, whose scores were worse relative to baseline. The improvements were greater in the intervened families than in the controls in all age groups except the eldest (30-35 months), and the largest relative improvement occurred in the 18-23 month age group (mean scores: intervened 4.3 vs. control 5.9, t-test, p=0.02).

**FIGURE 5.1. Changes in sentinel family behaviour scores from pre- to post-intervention, according to child age**

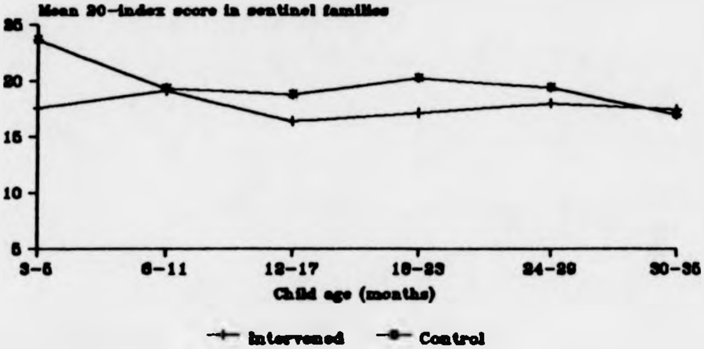



Pre-intervention, r=-.05, ns
Post-intervention, (I) r=-.10, p=.23
Post-intervention, (C) r=-.20, p=.01

Relative to the pre-intervention year, behavioural improvements among intervened families occurred more or less evenly within age groups (note the parallelism of pre- and post-intervention lines), suggesting that behaviour change was independent of child age. In fact, when the closeness of the association between child age and the 12-index score was tested using Pearson's correlation coefficient (r), the correlation in intervened families was not significant ($r=-.10$, $p=.23$), whereas in control families, it was significant ($r=-.20$, $p=.01$). These results imply that observations of behaviours in control families were affected by child age, whereas in intervened families they were not.

A similar comparison of post-intervention behavioural differences between intervened and control families according to child age was made using the 20-index behaviour score (Figure 5.2). The 20-

**FIGURE 5.2. Post-intervention sentinel family behaviour scores, according to child age**




Overall r=-.09, p=.13
Intervened r=-.06, p=.46
Control r=-.13, p=.12

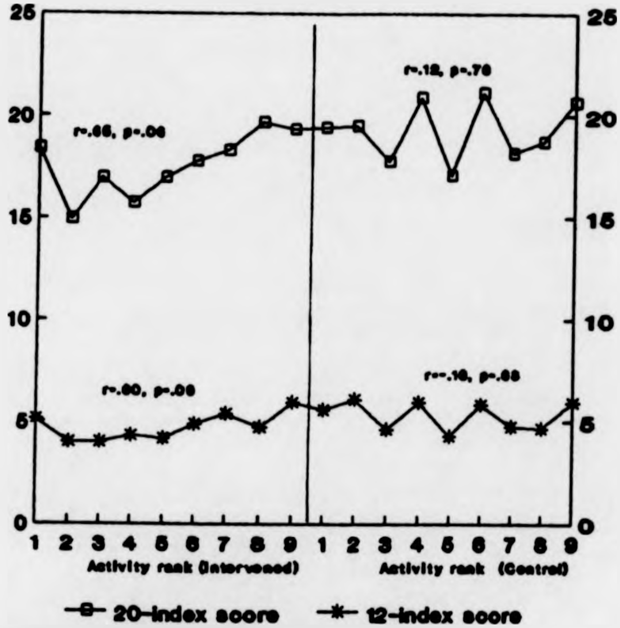
index mean scores showed a pattern with respect to age corresponding quite closely with that of the 12-index score (Figure 5.1) in both study groups. The largest post-intervention difference between the study groups was observed in sentinel families with infants aged 3-5 months (mean scores: intervened 17.6 vs. control 23.7), followed by 18-23 months (mean scores: intervened 17.1 vs. control 20.2). Like the 12-index score, mean behaviour scores were lower in intervened families in every age category except the eldest (30-35 months). After controlling for child age, the difference in the mean 20-index scores between groups was highly significant (mean scores: intervened 17.5 vs. control 19.1, anova p=.002). The correlation between child age and the 20-index score in intervened families was not significant (r=-.06, p=.46), but in control families there was some suggestion of a possible correlation (r=-.13, p=.12).

5.3.4. <u>Association between behaviour scores and intervention quality in sites</u>

In assessing post-intervention diarrhoea rates (Chapter 4), it was noted that some of the intervened sites improved more than others, and these differential improvements corresponded roughly to differences in the quality of the intervention among the sites. Since the quality of the intervention, measured as an activity rank from 1 to 9 (ie. best to worst), should be reflected in differences in behaviours - particularly in the intervened sites -, this reasoning was tested. In each study group, first, multiple analyses of variance were employed to study the variation in behaviour scores of sentinel families according to site activity rank and child age. In the intervened families, after accounting for child age (which was not significant for either score), activity rank approached significance for the 12-index score ($p<.10$), and was significant for the 20-index score ($p<.05$). In the control families, after inclusion of child age (which was significant for both scores), activity rank was highly significant for both the 12- and 20-index scores ($p=.025$ and $p<.005$, resepctively). These results imply that intervention quality (ie. volunteers' performance and effectiveness) was an important determinant of behaviour in both intervened and control families, independent of child age.

The closeness of association between behaviour scores and activity ranks was examined next, using Pearson's correlation coefficient, in the 9 intervened and 9 control sites (Figure 5.3). Since sites were, ideally, the most appropriate units of study, in this analysis the mean behaviour scores in each site (ie. site

**FIGURE 5.3. Post-intervention site behaviour scores according to qualitative activity rank ***




* Mean site behaviour score adjusted for child age
r=correlation between site behaviour score and activity rank

behaviour scores) were calculated, adjusted for age, and comparisons between sites were subsequently based on the variation between sites. In the intervened sites both the 12- and 20-index behaviour scores increased with increasing activity rank, suggesting (as in the previous analysis), that as volunteers' performance in the intervened sites diminished, fewer good behaviours were practised. In these sites, correlation coefficients for both scores were positive and approached statistical significance (12-index: r=.60, p=.09; 20-index: r=.65, p=.06). In the control sites, in contrast, no clear associations between either score with activity rank emerged, and correlations were not significant (12-index: r=-.16, p=.68; 20-index: r=.12, p=.76). When this analysis was repeated at the family level, ie. using family behaviour scores instead of site behaviour scores, very similar findings emerged. The correlations between activity rank and the 12- and 20-index scores among intervened families were highly significant (p=.03 and p=.02, respectively), whereas the correlations among control families were not significant (12-index, p=.85; 20-index, p=.42). These results imply that site activity rank is a good proxy for behaviour in the intervened families, but not in the controls. Furthermore, even though the analyses of variance indicate that volunteers' performance influenced behaviours in both intervened and control families, these results suggest that the nature of the association between behaviour and volunteer activity apparently is not the same in the two groups. It is possible that the (roughly) linear, positive relationship in the intervened sites results from the fact that the behaviours scored were directly related to the educational messages promoted in the intervened sites, whereas in control sites other messages were promoted.

To confirm the indications that behaviour was better in sites where community volunteers were more active, the last analysis compared behaviour scores of sentinel families in the best-ranked sites with those in the worst-ranked sites (Table 5.6). Since volunteer activity appeared to affect behaviour of all sentinel families, intervened and control sentinel families from sites with equal activity ranks were studied together. Mean 12- and 20-index behaviour scores in intervened and control sites ranked 1-5 were compared to mean 12- and 20-index scores in intervened and control sites ranked 6-9. For both the 12-and the 20-index scores, families in the better-ranked sites had significantly lower mean scores than those in poorer-ranked sites (anova, 12-index: p=.04; 20-index:

p=.006), reinforcing that behaviour indeed improved in sites with more effective volunteers.

TABLE 5.6. Mean behaviour scores of sentinel families in intervened and control sites according to site activity rank *

| Activity Rank (AR) Group | Number of Families | Mean 12-index Behaviour Score (s.d.) | Mean 20-index Behaviour Score (s.d.) |
|---|---|---|---|
| Best sites (AR 1-5) | 175 | 4.80 (2.06) | 17.82 (4.15) |
| Worst sites (AR 6-9) | 118 | 5.30 (2.06) | 19.24 (4.52) |
| ANOVA, p value | | <.04 | 0.006 |

* Qualitative site activity rank based on assessment of community volunteer/intervention effectiveness (see Section 2.9).

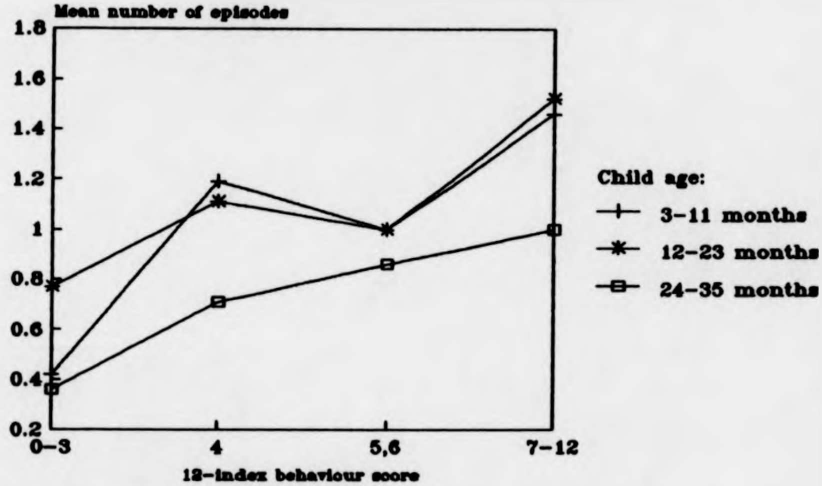
### 5.3.5. Associations between behaviour and diarrhoea.

The main hypothesis of the study was that hygiene education may be an effective means of reducing diarrhoeal diseases in children by improving specific behaviours associated with diarrhoea. If hygiene education is operative through behaviour change, then one would expect improvements in diarrhoeal morbidity to be accompanied by improvements in behaviours. The next analyses, therefore, examined the associations between diarrrhoeal morbidity and behaviour during the post-intervention period.

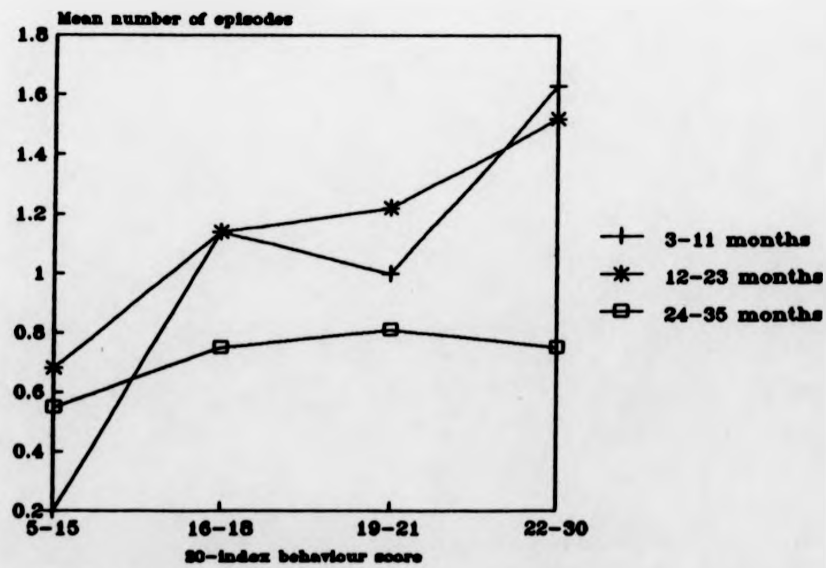
First, multiple analyses of variance were used to test the number of post-intervention diarrhoeal episodes, days of diarrhoea, and mean durations of episodes in children of sentinel families, against the 12- and 20-index behaviour scores. These analyses controlled for both child age and initial (ie. October, 1988) nutritional status, since these variables were found to influence diarrhoea in the larger sample of children (see Chapters 4 and 6, for discussions of relationships between diarrhoea and child age, and diarrhoea and nutritional status, respectively). After child age, initial nutritional status was a highly significant determinant of the numbers of days and episodes of diarrhoea, but not of diarrhoeal duration. The subsequent analyses of diarrhoea in sentinel children according to the numbers of days and episodes of diarrhoea, therefore, controlled for initial nutritional status.

Analyses of variance indicated that both the 12- and the 20-index behaviour scores were highly significant factors for each of the three diarrhoeal variables. Figures 5.4 - 5.6 illustrate the associations between diarrhoeal morbidity in sentinel children and behaviour scores, controlling for child age. (In Figures 5.4 - 5.6, very underweight children (ie. those <-3 s.d. weight-for-age), representing approximately 13% of the sample, are included, despite their higher diarrhoeal rates, since the directions of associations between diarrhoea and behaviour were similar in all children, regardless of their nutritional status.) The figures show, quite clearly, that as behaviour scores increase (ie. become worse), diarrhoeal rates increase as well. All diarrhoeal variables were strongly and positively correlated with behaviour scores. The associations were quite consistent across age groups, with the exceptions of mean episode duration in infants, and the number of episodes in older children. These results suggest that hygiene practices were explict determinants of diarrhoeal rates in the sentinel children. For each diarrhoeal variable, interestingly, there

**FIGURE 5.4. Mean number of diarrhoeal episodes according to sentinel family behaviour scores, post-intervention**

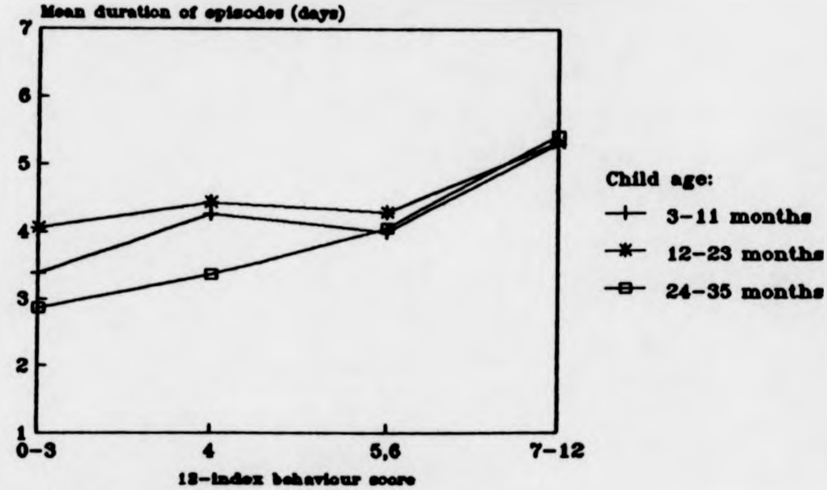



Correlation, all ages combined, r=.19, p<.0001

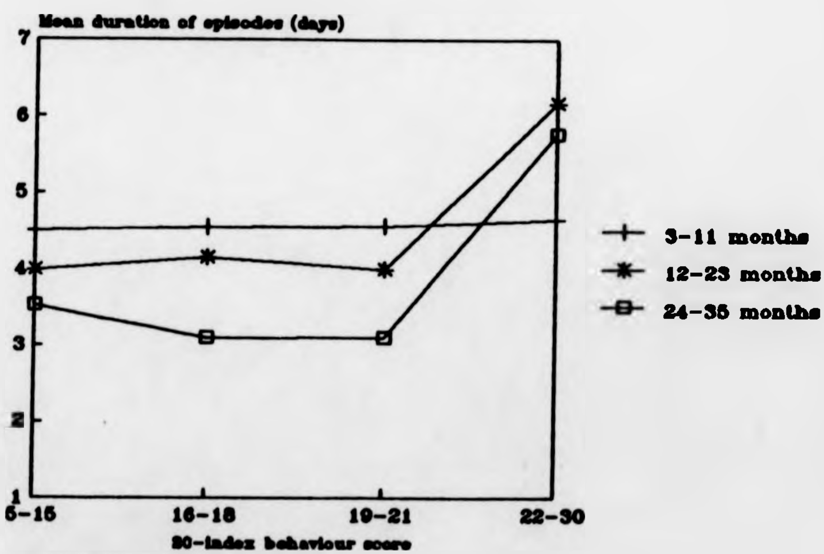



Correlation, all ages combined, r=.18, p=.001

**FIGURE 5.5. Mean duration of diarrhoeal episodes according to sentinel family behaviour scores, post-intervention**

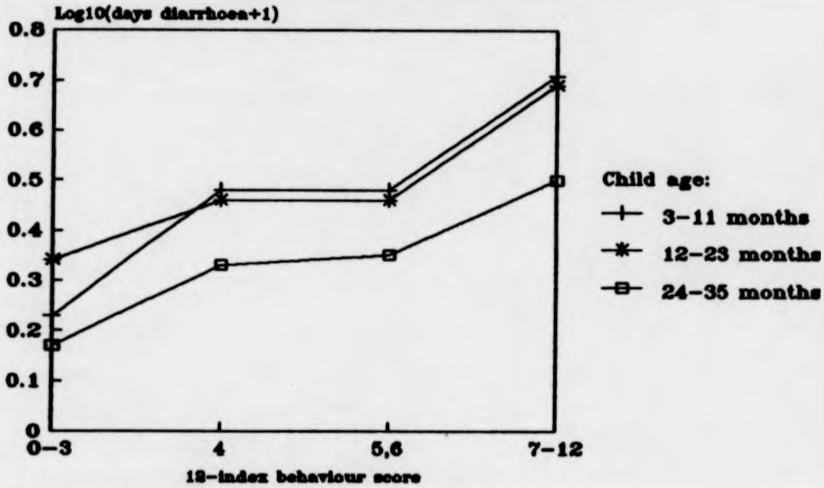



Correlation, all ages combined, r=.2[illegible], p=.00[illegible]

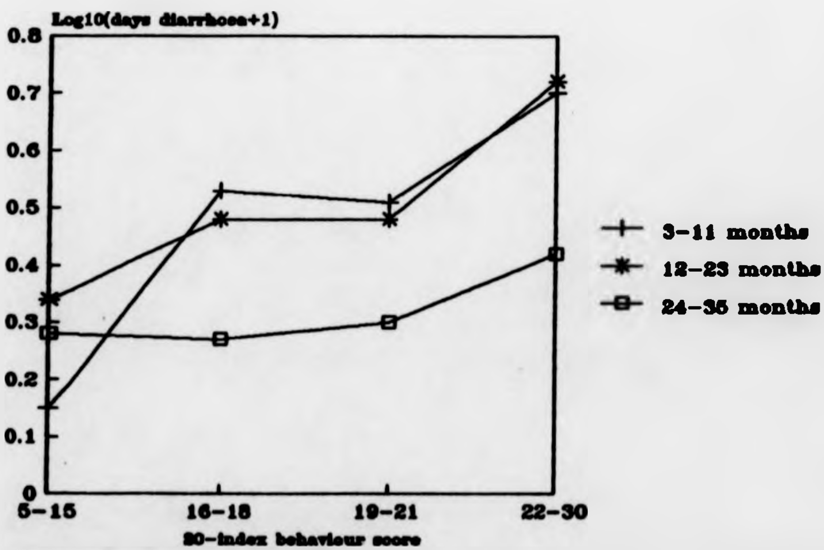



Correlation, all ages combined, r=.[illegible], p=.001

**FIGURE 5.6. Mean number of days with diarrhoea according to sentinel family behaviour scores, post-intervention**




Correlation, all ages combined, r=.24, p<.0001




Correlation, all ages combined, r=.22, p<.0001 was little difference in the "middle" range of behaviour scores, suggesting that the extremes of behaviour were the essential discriminators of disease rates.

5.3.6. Validity of observing families once: Variability of behaviour

In order to assess whether a single observation of each family's behaviours was sufficient to characterize behaviour correctly, the variability of behaviour in sentinel families where certain events were observed more than once were studied (Table 5.7). This analysis focused on the consistency of post-intervention handwashing behaviours among families in which 5 handwashing opportunities (ie. events) associated with food preparation or eating were observed ≥2 times. Handwashing behaviour among these families was remarkably consistent for the 3 events related to child feeding, namely child handwashing before eating, feeder's handwashing before feeding children, and sharers' handwashing before sharing food with target children; that is, in 95%, 96% and 100% of these events, respectively, hands were <always> washed. In only a few cases were hands <sometimes> washed (implying inconsistency of behaviour in these cases). Handwashing before food preparation and adult's handwashing before eating were somewhat less consistent, ie. in only 69% and 78% of these observations, respectively, were hands <always> washed. Families with multiple events were much more likely to wash hands always, for all handwashing behaviours, than all families studied together. The correlations between the number of events and the number of times hands were washed were positive and highly significant (p<0.0001) for each handwashing behaviour in Table 5.7.

Examining the consistency of behaviour also permitted study of

TABLE 5.7. Distributions of Handwashing Behaviours among Sentinel Families with Multiple Handwashing Events, Post-Intervention

| Handwashing Behaviours | All families n (% of total) | Number of Families (%) with 2+ Observations of Events: Hands washed before food preparation | Child's hands washed before eating | Feeder's hands washed before feeding child | Sharers' hands washed before sharing w/child | Adults' hands washed before eating |
|---|---|---|---|---|---|---|
| FOOD AND MEAL HYGIENE | | | | | | |
| Hands washed before food preparation | | | | | | |
| never | 98 (34.4) | 0 | 8 (21.1) | 5 (19.2) | 6 (21.4) | 8 (13.3) |
| sometimes | 96 (33.6) | 37 (31.1) | 9 (23.7) | 14 (53.8) | 11 (39.3) | 25 (41.7) |
| always | 91 (31.9) | 82 (68.9) | 21 (55.3) | 7 (26.9) | 11 (39.3) | 27 (45.0) |
| Child's hands washed before eating | | | | | | |
| never | 127 (47.0) | 41 (36.3) | 0 | 9 (34.6) | 4 (14.3) | 25 (47.2) |
| sometimes | 37 (13.7) | 14 (12.4) | 2 (5.3) | 9 (34.6) | 6 (21.4) | 4 (7.5) |
| always | 106 (39.3) | 58 (51.3) | 36 (94.7) | 8 (30.8) | 18 (64.3) | 24 (45.3) |
| Feeder's hands washed before feeding child | | | | | | |
| never | 22 (13.9) | 3 (4.5) | 0 | 0 | 0 | 4 (11.4) |
| sometimes | 7 (4.4) | 1 (1.5) | 0 | 1 (3.8) | 0 | 0 |
| always | 129 (81.7) | 62 (93.9) | 13 (100) | 25 (96.2) | 13 (100) | 31 (88.6) |
| Sharers' hands washed before sharing w/child | | | | | | |
| never | 30 (16.1) | 8 (9.8) | 0 | 1 (5.9) | 0 | 3 (8.8) |
| sometimes | 17 (9.1) | 3 (3.7) | 3 (8.6) | 2 (11.8) | 0 | 2 (5.9) |
| always | 139 (74.7) | 71 (86.6) | 32 (91.4) | 14 (82.4) | 28 (100) | 29 (85.3) |
| Adults' hands washed before eating | | | | | | |
| never/sometimes | 86 (36.6) | 24 (23.3) | 13 (43.3) | 9 (39.1) | 5 (25.0) | 13 (22.0) |
| always | 149 (63.4) | 79 (76.7) | 17 (56.7) | 14 (60.9) | 15 (75.0) | 46 (78.0) |
| DEFECATION HYGIENE | | | | | | |
| Child washed after | | | | | | |
| never | 159 (78.7) | 55 (71.4) | 19 (79.2) | 12 (60.0) | 17 (89.5) | 26 (61.9) |
| sometimes | 19 (9.4) | 7 (9.1) | 2 (20.8) | 4 (20.0) | 1 (5.3) | 8 (19.0) |
| always | 24 (11.9) | 15 (19.5) | 3 (12.5) | 4 (20.0) | 1 (5.3) | 8 (19.0) |
| Caretakers hands washed after child defecation | | | | | | |
| never | 36 (17.8) | 41 (53.2) | 15 (62.5) | 9 (45.0) | 13 (68.4) | 21 (50.0) |
| sometimes | 26 (12.9) | 11 (14.3) | 5 (20.8) | 6 (30.0) | 3 (15.8) | 8 (19.0) |
| always | 140 (69.3) | 25 (32.5) | 4 (16.7) | 5 (25.0) | 3 (15.8) | 13 (31.0) |
| Adults wash hands after defecation | | | | | | |
| never | 128 (72.7) | 48 (57.8) | 13 (56.5) | 11 (64.7) | 12 (80.0) | 26 (59.1) |
| sometimes | 18 (10.2) | 13 (15.7) | 3 (13.0) | 2 (11.8) | 1 (6.7) | 7 (15.9) |
| always | 30 (17.0) | 22 (26.5) | 7 (30.4) | 4 (23.5) | 2 (13.3) | 11 (25.0) |

whether some families who practised at least one good behaviour tended to have better behaviours overall. In general, the distributions of handwashing behaviours among families with multiple events indicated that these families tended to practise better hygiene, overall, than all families considered together.

### 5.4. Discussion

The results presented in this chapter suggest that hygiene education alone as an intervention can improve personal and domestic hygiene practices, and these improvements in behaviour are associated with reduced risk of diarrhoea. Following six months of intervention, domiciliary behaviours improved to a greater extent in intervened families receiving messages about handwashing, defecation hygiene and faeces removal, compared to control families receiving messages about prevention of dehydration during diarrhoea.

The fact that observed behaviours improved in both intervened and control families may indicate that a "Hawthorne effect" occurred, ie. an effect on families' behaviours due not to message contents *per se*, but due to the attention given to families at the home visits and interviews. This effect may have stimulated people's general awareness of and attentiveness to diarrhoea and other illnesses in children. This seems likely, since behavioural observations were made in the same trimester that weekly home visits were conducted, and for almost two-thirds of the mothers, diarrhoea interviews continued for 2 years. Among intervened families, although such an effect probably contributed to changes in behaviours, this is not a likely explanation for the full extent of the behavioural changes, since every behaviour (except two) improved to a greater extent than in control families, and the possibility of this happening by chance alone seems small. In control sites, however, a Hawthorne effect may have led to families implementing better overall hygiene practices, including those specifically promoted in the intervened sites. (These improvements might also explain the large reductions in diarrhoea in control children, as suggested in Section 4.4.)

A further consideration in control sites is that delivery of *diarrhoea-related* messages, ie. those about dehydration, may have stimulated control mothers' previous or related knowledge about the causes of diarrhoea associated with poor hygiene. Previous "good" knowledge may, under normal circumstances, be too difficult to put into practice either due to resource constraints or sociocultural influences. It is well-known that in poor environments people's knowledge regarding good health practices is often not reflected in their behaviour. This has been documented in several studies of child feeding[38], and is probably equally true for behaviour related to personal and domestic hygiene. Rahaman et al[16] reported discordance between mothers' reported handwashing practices and observed behaviour. Aziz et al[12] reported that many people claiming to bathe principally in handpump water actually continued to bathe at surface water sites. Many variables can intervene between what people know and what they do, as Hornick[39] observed in an overview of health education campaigns. Infrequent handwashing, for example, may be due to unavailability of water; or lack of handwashing before eating may be related to a belief that handwashing alters the taste of food.

It is unlikely that the changes in control sites were due to significant message leakage from intervened sites, since all sites were separated by about 30 km of road or more. Message leakage can be a problem in educational intervention trials, if intervened and control groups have easy geographical access to each other, as investigators in Guatemala[36] learned. It is also improbable that the observed differences were due to observer bias, since observers were blind to the diarrhoeal histories of the sentinel families and treatment group allocation.

Because nearly all observed behaviours improved in both study groups, it is speculative to rank the success of specific behavioural messages. This may reflect that overall awareness of illness-causing behaviours was stimulated, albeit to a stronger extent in intervened sites. Nevertheless, post-intervention observations of practices associated with yard cleanliness, i.e. the digging and correct placement of garbage pits, disposal of animal and child faeces, and sweeping - appeared to be implemented with greater rigour than other behaviours. Yard cleaning practices may have improved more because they were extensions of activities practised daily already in most families, and therefore did not require implementation of relatively new behaviours, or more resources. More consistent improvements of handwashing behaviours may have been limited by the availability of water, or may be because messages were directed more to mothers than other family members.

Tests were made to control for the potential confounding effect of child age on post-intervention behavioural differences between intervened and control families. Significant differences in behaviour remained after controlling for age, with the largest differences among families with children aged 3-5 and 18-23 months. The analyses explored further whether the intervention's impact on behaviour may have differed according to child age. Pre- to post-intervention changes in behaviour were studied according to child age, in both intervened and control families (Figure 5.1). Among intervened families, behaviour improved by about the same amount across all age categories, suggesting there were not differential effects related to age. (In control families, changes in behaviour did not show a similar consistency across age categories, however no inferences about the intervention's impact can be made from these results.).

Although it is not surprising that behavioural changes in intervened families did not depend on children's ages, there were differential effects of the intervention on diarrhoeal rates according to child age, with children aged 24-35 months showing the largest reductions in diarrhoea (see Sections 4.3.2 and 4.3.3). The behavioural analyses, nevertheless, did not reveal a relatively stronger influence of behaviour on the diarrhoeal rates of older compared to younger children; the effect of behaviour scores on diarrhoeal rates was similar in all age groups (Figures 5.4 - 5.6). Children of different ages have different risk factors for diarrhoea, and the same behaviours may have unequal effects on diarrhoea depending on child age. It is possible that the behavioural scores did not vary sufficiently to reflect the impact of specific behaviours on diarrhoea in children of different ages. Furthermore, the 6- to 7-hour period of observation may not have been long enough to record repetitions of certain good behaviours (eg. adults', children's and sharers' handwashing before eating) which could have contributed to greater diarrhoeal reductions in older children.

The difference in the reductions in bad behaviours between the two groups suggests the intervention may be responsible for a reduction in bad behaviour of abouat 10%. This is only an approximation to a truer estimate of reduction that might be obtained by counting every behavioural event rather than categorising observations into levels such as 'worst' or 'best' recorded, as was done in this study (see score construction details, Appendix 4). However, given the large number of potential behavioural events in the study (about 283,000 total), this was an impractical alternative. It is possible that the reduction of bad behaviours due to the intervention may be slightly less - perhaps about 8% (ie. (mean post-intervention level in intervened sites - mean post-intervention level in control sites)÷(mean pre-intervention level) ), if the bad behaviours observed in each group were independent of their pre-intervention levels. It seems unlikely, however, that families' post-intervention behaviours were totally independent of their pre-intervention behaviours, since the analyses of behaviour variability among families with multiple events suggested that behaviours were fairly consistent within families. On balance, the data suggest that the reduction of bad behaviour is of the order of 5% to 15%.

Whilst the magnitude of bad behaviour reduction may seem small, the main concern of the study was to test the feasibility and process of hygiene education as a diarrhoeal diseases control strategy. Therefore, the foremost question is whether the reduction observed was due to the intervention. If the evidence suggests that it was, then a series of ancillary issues arises, namely the reasons for the size of the reduction; the potential for improving behaviour under more controlled or favourable circumstances; and the potential for improved behaviour to lead to greater reduction of diarrhoea. These additional questions are addressed in Chapters 4 and 7. Several of the findings corroborate the view that the reductions observed were due to the intervention. First, improvements in behaviour were greater among intervened families compared to controls whether or not pre-intervention behaviours were considered. That is to say, post-intervention behaviours were better among intervened than control families, and the changes in behaviours from the pre- to post-intervention periods were larger in intervened families. Second, behaviour did not regress from 1987 to 1988, and the improvements in intervened families were therefore not due to smaller deteriorations of behaviour relative to controls, as had occurred in Bangladesh[40], wherein two of the behaviours addressed by the intervention deteriorated in each study group, making interpretation of that study's behavioural findings problematic. Third, bad behaviours considered together (i.e. as behaviour scores) were significantly and positively correlated with diarrhoeal rates, even after controlling for child age and nutritional status. Fourth, and perhaps most importantly, behaviour scores improved as the quality of the intervention in intervened sites improved, suggesting that changes in hygiene behaviour were a direct result of community volunteer, and hence intervention, activities.

Although specific behaviours may vary in their importance in pathogenic transmission, ultimately it is a labyrinth of associated hygiene behaviours that is likely to determine diarrhoeal rates in children. Whilst in water and sanitation projects it may be possible to differentiate associations between diarrhoea and specific behaviours related to the use of improved facilities[16,18-19], detecting associations between individual domestic hygiene behaviours and diarrhoea is more complicated because there are many more of these that may vary. Pickering[41], reporting from the Gambia, studied childhood diarrhoea against approximately 35 social and environmental variables but was unable to identify any statistically significant associations, except for mother's opinion of whether or not diarrhoea was dangerous. In the present study two composite behaviour scores were related to diarrhoeal morbidity as well as to intervention quality. The consistency between the two behaviour scores across age groups in the control and intervened families implies that these scores were reliable indicators of behaviour. Behaviour scores were positively correlated with diarrhoeal rates and the risk of diarrhoea. Moreover, when site intervention quality was high, behaviour scores were concomitantly low. Although individual behaviours were assessed against diarrhoea (results not presented), interpretation of these analyses were problematic due to the high correlations among some of the behavioural variables, and the possibility that specific behaviours within families may be confounded by socioeconomic or demographic characteristics[18-19]. The use of behaviour scores, or other aggregate measures of behaviour, such as the number of good practices[15] or ranked categories of sanitary behaviour[16], may, therefore, be advantageous in studies of diarrhoea and personal and domestic hygiene. In the present study, activity ranks also appeared to serve a similar purpose.

A possible limitation in this study deserves attention. A single day's observation of hygiene practices may lead to erroneous conclusions about the relationship between hygiene and diarroea if each families' behaviours vary greatly. The analyses revealed that handwashing behaviours were remarkably consistent among families in which multiple handwashing events were observed. Moreover, there was a positive correlation between the number of times events were observed in a family, and the frequency of handwashing. At first glance, these results suggest that a single day's observation may not be sufficient to characterize typical behaviour correctly, and may overestimate the prevalence of bad behaviour. If this is true, it is unlikely to have biased the assessment of intervention impact, since good behaviour in both control and intervened families would probably be underestimated by the same amount. Alternatively, as the observations of handwashing events related to eating meals or feeding children, families with multiple occurrences of events may be families who can afford to eat more often. More frequent meals may reflect higher educational or socioeconomic levels and these, in turn, could be associated with better hygiene behaviour.

Few studies of hygiene education alone as an intervention, or hygiene education incorporated in environmental interventions to reduce diarrhoea, have documented both improvements in diarrhoeal morbidity and in behaviours which may reasonably be attributed to the intervention. The present study has shown that hygiene education, unaccompanied by water or sanitation improvements, can significantly improve personal and domestic hygiene behaviours, and such improvements may be directly responsible for reductions in diarrhoea. The estimated reduction of bad behaviour of approximately 10% corresponds with the 11% reduction in diarrhoea incidence, reported in Chapter 4. The potential impact of the programme was in all probability much greater, but severe transport and communications constraints limited the quality of selection, monitoring and support of community volunteers, and ultimately their effectiveness. Further study of methods to assess intervention quality (ie. volunteer performance and community participation) and to improve educational quality control in similar programmes seems warranted.

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# CHAPTER 6. IMPACT OF THE INTERVENTION ON CHILD GROWTH

## 6.1. Introduction

Because of the close asociation of diarrhoea with childhood malnutrition, there has been much support for the inclusion of nutritional anthropometry to complement diarrhoeal data when evaluating the health impact of anti-diarrhoeal interventions[1-4]. Diarrhoeal rates in community settings are often difficult to measure accurately because of misclassification error, underreporting and poor recall of the duration of episodes. Nutritional anthropometry may be more sensitive than diarrhoea to improvements in environmental hygiene because it is less subject to measurement error[2].

Although there is substantial interest in the potential for anit-diarrhoeal interventions to improve child growth, few studies associated with hygiene interventions have reported impacts on anthropometric status. Several reports have examined the impact of interventions to improve water supply and sanitation facilities on child growth, but have produced results that are inconclusive or conflicting[5-12]. There appears to be just one study associated with a community-based controlled trial of an educational intervention to improve personal and domestic hygiene in Bangladesh, that has previously examined anthropometric impact[13]. This study, however, documented little or no impact on the nutritional status of children 0-6 years of age, despite a reported reduction in diarhoeal incidence of 26%[14]. The percentage of children experiencing an improvement in anthropometric status (ie. gain of ≥5% weight-for-age, weight-for-height, or height-for-age) was similar among intervened and control children up to 1 year of follow-up after the intervention. In the first 3 months of follow-up, fewer intervened than control children experienced a decline (ie. loss ≥5%) in weight-for-height ($p<.05$), however after 3 months these differences between the two groups disappeared. One possible reason for this study's failure to find an association between improved diarrhoeal morbidity and growth may be that the method used to analyse changes in children's growth during the post-intervention year had too little power to detect differences between groups: only children with definite improvements (ie. gains of ≥5%) or declines (ie. losses of ≥5%) in each of the three anthropometric indicators (representing in each case only 30%-40% of children in each study group) were compared, and these analyses, moreover, contained too few children to control effectively for child age. A further consideration in this study is that whilst diarrhoeal improvements in intervened relative to control communities were significant, they were not accompanied by improvements in hygiene behaviours addressed by the intervention, and therefore the mechanism of this intervention's impact is questionnable. In general, the use of anthropometric indicators to assess the health impact of hygiene interventions has been insufficiently studied.

Chapter 4 presented results of the evaluation of the intervention's impact on diarrhoeal morbidity among children, and suggested the intervention improved diarrhoeal rates by about 11% in intervened communities. The largest reductions appeared to occur among children 24-35 months of age. In Chapter 5, the evaluation of the intervention's impact on behaviour indicated that hygiene behaviours improved significantly more in intervened than in control sentinel families, and there was a strong association between improvements in behaviours and reduced diarrhoeal incidence. It was concluded that the intervention was probably responsible for a reduction in poor behaviour of about 10%. The improvements in diarrhoea and behaviours were each positively associated with the quality of the intervention in intervened sites. In this chapter the evaluation of the intervention's impact on the ponderal growth of study children is described.

## 6.2. Methods

Information on nutritional status and growth of children was based on a total of 5 weight measurements obtained over the two study years and included weights at the beginning and end of both diarrhoeal morbidity studies (early October, late December, respectively) and at the beginning and end of the intervention (July, December, 1988) (see Figure 2.1, Chapter 2). Body weights of children lightly clothed were measured to the nearest 100g on a frequently calibrated portable Salter scale. Full details of fieldworker training in anthropometric techniques and pretesting are included in Section 2.4.2.

Children's body weights obtained at each measurement were used to derive weight-for-age (W/A) z-scores using the NCHS reference values[15]. To study the impact of the intervention on ponderal growth, several comparisons were considered. These included: (1) attained W/A, October v. December, 1987, in intervened and control children; (2) changes in W/A during the 3-month period (October-December 1987), pre-intervention, in intervened v. control children; (3) attained W/A at the beginning (July 1988), middle (October 1988) and end (December 1988) of the intervention, in intervened v. control children; (4) changes in W/A during the 3-month (October-December 1988) and 6-month periods (July-December 1988), post-intervention, in intervened v.

control children; and (5) pre- v. post-intervention differences in the 3- and 6-month changes in W/A, in intervened v. control children. In addition, mean attained W/A and 3-month changes in W/A, post-intervention, were studied according to the quality of volunteer performance in intervened and control sites.

W/A z-scores were compared with respect to child age, sex, study group and diarrhoeal morbidity. Contrasts in attained W/A and W/A changes (ie. growth) between sex, age and study group categories were explored using SND tests and simple analysis of variance. In addition, attained W/A and growth (both 3- and 6-month) were studied further with multiple analysis of variance, using a regression approach, taking into account possible explanatory variables including child age, sex, study group, diarrhoeal morbidity and initial W/A.

## 6.3. Results

### 6.3.1. Child growth during the baseline year, 1987

A total of 1914 children with ≥9 weeks of complete diarrhoeal data were considered for inclusion in the analyses and, of these, 6 were excluded because the weight measurements were considered implausible for one or more of the following reasons: 1) body weight after 3 months of study was ≤3 kg, or ≥30 kg; 2) body weight loss over the 3 months was ≥45% of weight at study start; and 3) either z-score was ≥7, or ≤-7. In a further 15 children age was missing, and these children were excluded from all analyses involving age. A total of 1865 children (97%) were included in the analysis of October 1987 z-scores; 1802 children (94%) in the analysis of December 1987 z-scores; and 1774 (93%) children had weight data for both dates and were thus included in the analysis of the changes in W/A during the baseline period (see Table 6.1).

TABLE 6.1. Mean W/A z-scores according to child age at time of measurement, sex and study group, in October and December, 1987

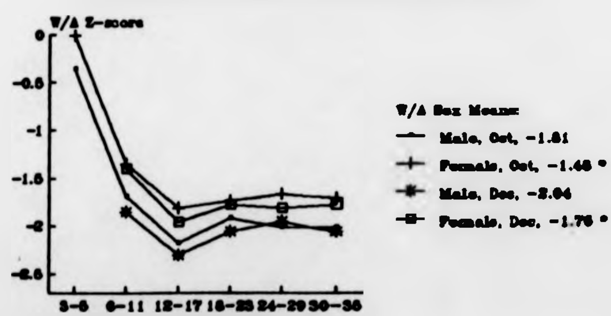
| | October 1987 | | December 1987 | |
|---|---|---|---|---|
| | Intervened (n) | Control (n) | Intervened (n) | Control (n) |
| Age (months) | | | | |
| 3-5 | -.24 (72) | -.11 (102) | -2.31 (2) | 1.15 (2) |
| 6-11 | -1.45 (166) | -1.55 (211) | -1.52 (132) | -1.61 (185) |
| 12-17 | -2.03 (144) | -1.97 (178) | -2.13 (169) | -2.12 (193) |
| 18-23 | -1.88 (158) | -1.76 (200) | -1.81 (141) | -1.99 (194) |
| 24-29 | -1.92 (133) | -1.79 (198) | -1.92 (137) | -1.85 (201) |
| 30-35 | -1.97 (149) | -1.78 (154) | -1.93 (138) | -1.91 (181) |
| All | -1.70 (822) | -1.60 (1043) | -1.88 (719) | -1.89 (956) |
| Anova, Intervened v. Control | p=.13 | | p=.77 | |
| Sex | All children (n) | | All children (n) | |
| Male | -1.81 (888) | | -2.04 (859) | |
| Female | -1.48 (977) | | -1.76 (943) | |
| Anova, Male v. female | p<.0001 | | p<.0001 | |

Table 6.1 presents W/A z-scores for intervened and control children according to their sex and age at measurement time, at the beginning and end of the baseline diarrhoeal study. In October intervened children had somewhat lower mean z-scores than control children overall (-1.70 v. -1.60, respectively, p=.13), and males had significantly lower z-scores than females (-1.81 v. -1.48, p<.0001). Not surprisingly, the highest z-scores were among infants aged 3-5 months (mean of intervened and control children, -.16) and the lowest among children 12-17 months of age (mean of intervened and control children, -1.99). In December there was an overall decline in W/A among all children to -1.89, about 13% lower than the mean z-score of -1.64 in October, largely reflecting a shift in the age distribution of children, with fewer children 3-5 months of age included, and to some extent the negative effect of diarrhoea on growth during this period. At this time there were again no differences between the two

study groups (intervened -1.88 v. control -1.90, p=.77), males continued to have lower z-scores than females (-2.04 v. -1.76, p<.0001) and the pattern of z-scores with respect to child age was similar to October.

Figure 6.1 shows W/A z-scores in October and December according to child sex and age at measurement time, with intervened and control children considered together. W/A z-scores for all children declined sharply from early infancy until 12-17 months of age, and then levelled off, reflecting the very rapid deterioration in W/A which accompanies weaning. As mentioned, z-scores among males were consistently lower than females across all age groups. In December, z-scores of children of all ages (except boys aged 24-29 months) were

**FIGURE 6.1. Weight-for-age z-scores in October and December 1987, according to child sex and age at measurement time**




Based on [illegible] children in October and [illegible] children in December
*p<.0001 significance of sex differences

slightly lower than they were in October, reflecting the negative seasonal impact of diarrhoea on the growth of children.

6.3.1.1. Change in W/A z-score. The change in relative nutritional status from the beginning to the end of the baseline period was examined further by studying the differences between October and December z-scores. Table 6.2 shows results for the 1774 children with October and December weight measurements. W/A among

TABLE 6.2. Change in W/A Z-score from October-December, 1987, according to child sex, study group and age at study start

| | Z-score change (s.d.) | n |
|---|---|---|
| Sex | | |
| Male | -.21 | 846 |
| Female | -.27 | 928 |
| Anova | p=.15 | |
| Study Group | | |
| Intervened | -.18 | 771 |
| Control | -.30 | 1003 |
| Anova | p<.001 | |
| Age (months) | | |
| 3-5 | -1.11 | 161 |
| 6-11 | -.57 | 355 |
| 12-17 | -.02 | 309 |
| 18-23 | -.08 | 343 |
| 24-29 | .02 | 319 |
| 30-35 | -.07 | 287 |
| All | -.24 | 1774 |
| Anova | p<.0001 | |

females declined slightly more than among males, but not significantly so (-.27 s.d. v. -.21 s.d., p=.15). W/A among infants aged 3-5 months declined twice as much as in older infants (-1.11 s.d. v. -.57 s.d., p<.0001), and W/A among all infants declined significantly more so than among older children aged 12-35 months (-.74 s.d. v. -.05 s.d., p<.0001). There was a substantial overall difference between children according to study group, with intervened children having a mean decline of -.18 s.d. compared to -.30 s.d. among the controls (p<0.001).

As the difference in z-score change between study groups was unexpected, this was studied further using multiple analysis of variance, taking into account child age, sex, initial (October 1987) W/A, study group and diarrhoeal morbidity during the period. The independent variables were tested using a regression approach, beginning with a small model including only child age and sex and then adding, progressively, (i) initial W/A, (ii) diarrhoeal duration, the number of episodes, or the total number of days with diarrhoea, and then (iii) study group. The effects of these variables (and their one- and two-way interactions) on the change in W/A were then assessed. No assumptions of linearity were made, and thus all independent variables were tested as main factors and not covariates. The strongest explanatory variable, in addition to child age and sex, was initial W/A (p<.001). In addition, the duration of diarrhoeal episodes, the number of days of diarrhoea and the number of episodes were each significant factors (p=.025, p=.025, p<.01, respectively), albeit each less strong than initial nutritional status. After accounting for initial W/A, diarrhoeal duration, which was reported to be lower in intervened than in control children at baseline (see Section 4.3.1), was no longer a significant factor in determining the difference in z-score change between study groups. Study group, however, was significant when it was added after initial W/A, and there was an interaction between initial W/A and study group, suggesting that the difference in W/A change between the two study groups was due to an initial difference in W/A. It is possible that intervened children, who were initially more malnourished, may have experienced catch-up growth during the period.

6.3.2. Child growth during the intervention year, 1988

From the follow-up diarrhoeal study which began October 1, 1988, 1764 children with ≥9 complete weeks of diarrhoeal data were included in the analyses of nutritional status based on weights measured in early July, early October, and late December, 1988. Of these children, 10 were excluded from the analyses based on one or more of the following criteria: 1) body weight after 3 or after 6 months of study was ≤3 kg, or ≥30 kg; 2) body weight loss over the 3 months of study was ≥45% of initial body weight; 3) body weight loss over the 6-month period of study was ≥50% of initial body weight; 4) any W/A z-score was ≥7, or ≤-7.

In July 1988, children aged 0-32 months were enrolled so that they would be 3-35 months in October for the start of the follow-up diarrhoeal study. The mean W/A z-score was -1.65 among the 1581 children aged 3-32 months with a weight measurement at this time and complete (ie. ≥9 weeks) diarrhoeal data in the follow-up study (Table 6.3). Unlike in the previous year, males had much higher W/A z-scores than females (means -1.22 v. -2.05, $p<.0001$). Z-scores for both sexes were, once again, highest in early infancy and lowest in the age group 12-17 months. Overall mean z-scores did not differ significantly between intervened and control children (-1.61 v. -1.69, $p=.28$), however within age groups there were differences. Children aged 12-35 months from intervened sites had higher z-scores than children of comparable ages in control sites ($p=.02$). In contrast, infants from

TABLE 6.3. Mean W/A z-scores according to child age at measurement time, sex and study group in July, October and December, 1988, and mean W/A z-scores in December 1988, according to study group and child age in October 1988

| Child age (months) | July 1988 Intervened (n) | July 1988 Control (n) | October 1988 Intervened (n) | October 1988 Control (n) | December 1988 Intervened (n) | December 1988 Control (n) |
|---|---|---|---|---|---|---|
| 3-5 | -.28 (69) | -.18 (82) | -.70 (63) | -.64 (65) | -.28 (10) | .83 (2) |
| 6-11 | -1.45 (173) | -1.28 (158) | -1.83 (131) | -1.45 (161) | -1.72 (140) | -1.53 (147) |
| 12-17 | -2.05 (134) | -2.12 (160) | -1.88 (137) | -2.02 (137) | -1.84 (134) | -2.08 (137) |
| 18-23 | -1.85 (131) | -1.91 (145) | -1.94 (120) | -1.87 (131) | -2.02 (117) | -2.03 (145) |
| 24-29 | -1.80 (128) | -1.99 (180) | -1.90 (131) | -2.10 (183) | -1.88 (116) | -1.98 (133) |
| 30-35 | -1.69 (101) | -1.97 (120) | -1.83 (124) | -2.00 (139) | -1.75 (122) | -1.99 (167) |
| All | -1.61 (736) | -1.69 (845) | -1.77 (706) | -1.78 (816) | -1.80 (639) | -1.89 (731) |
| Anova, Intervened v. Control | p=.28 | | p=.81 | | p=.20 | |

| Sex | July 1988 All children (n) | October 1988 All children (n) | December 1988 All children (n) |
|---|---|---|---|
| Male | -1.22 (755) | -1.38 (735) | -1.49 (728) |
| Female | -2.05 (826) | -2.14 (787) | -2.20 (798) |
| Anova, Male v. Female | p<.0001 | p<.0001 | p<.0001 |

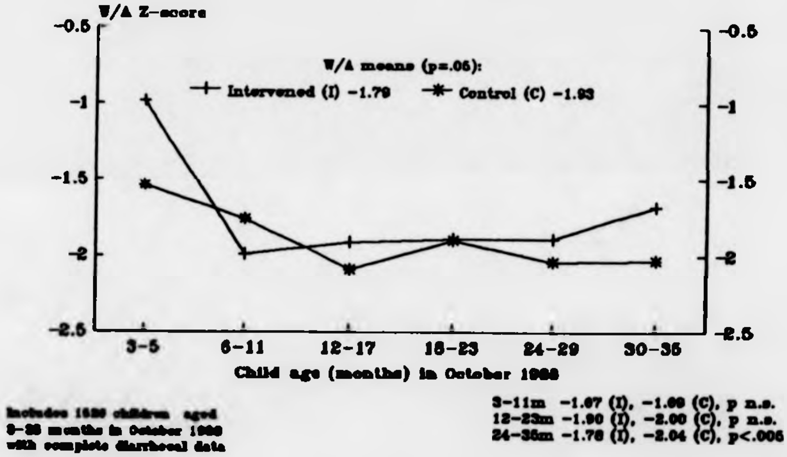
| Age (months) in October 1988 | December 1988 Intervened (n) | December 1988 Control (n) |
|---|---|---|
| 3-5 | -.98 (63) | -1.54 (70) |
| 6-11 | -1.98 (137) | -1.76 (151) |
| 12-17 | -1.91 (139) | -2.09 (144) |
| 18-23 | -1.89 (117) | -1.90 (133) |
| 24-29 | -1.89 (119) | -2.04 (177) |
| 30-35 | -1.68 (130) | -2.03 (146) |
| All | -1.79 (705) | -1.92 (821) |
| Anova, Intervened v. Control | p=.05 | |

intervened sites had somewhat lower z-scores than infants from control sites (p=.12).

In October 1988, the overall mean z-score among 1522 children aged 3-35 months with complete diarrhoeal data was -1.78, or 8% lower than October of the previous year. The pattern associated with child age was similar to that seen at other measurement times, and males continued to have higher z-scores than females (means -1.38 v. -2.14, p<.0001). Between study groups the overall mean z-scores did not differ (intervened -1.77 v. control -1.78, p=.81), nor did z-scores differ substantially within age groups, except in the 6-11 month group, where intervened children had a lower mean W/A than controls (-1.83 v. -1.45, p=.03). There was some evidence (Table 6.4) that in all age groups except 6-11 months, proportionately more control than intervened children had the lowest (ie. <-3) z-scores, however $chi^2$ tests for trends were not statistically significant. Thus, while there were probably differences in W/A between the two study groups, these were not reflected in mean z-scores *per se*, nor in consistent trends across all categories of W/A.

In December 1988, W/A declined from the previous months to an overall mean of -1.87 among the 1370 children aged 3-35 months with complete diarrhoeal data. The distributions of z-scores relative to child age were comparable to those reported for the 4 previous measurements, and males continued to have higher z-scores than females (-1.49 v. -2.20, p<.0001). Differences in W/A between intervened and control children were not significant (p=.20). This analysis, it should be noted, included a total of only 12 children 3-5 months of age, and children aged 32-35 months in October were excluded. In contrast, when the differences in December W/A between intervened and control children were studied according to child age in October, so that 1526 children (including 133 children aged 3-5 months) with a December measurement and complete diarrhoeal data were included, intervened children had a mean z-score of -1.79 compared to -1.92 among controls (p=.05, Table 6.3, Figure 6.2). The largest

FIGURE 6.2. End-of-intervention W/A z-score, according to child age in October 1988 and study group




differences were between infants aged 3-5 months (means: intervened -.98 v. control -1.54, p<.05) and between children aged 30-35 months (means: intervened -1.68 v. control -2.03, p<.01). However, when children were grouped according to their year of age, z-scores among children 3-11 and 12-35 months were not significantly different between the two study groups, but in the age group 24-35 months intervened children had significantly higher z-scores than controls (-1.78 v. -2.04, p<.005). These results suggest that, as regards growth, children aged 24-35 months benefited most from the intervention.

There was additional evidence that the observed group differences were, in fact, attributable to the intervention. First, examination of the distributions of z-scores between the study groups (Table 6.4),

TABLE 6.4. Distribution of intervened and control children according to W/A z-scores at the end of the intervention, December 1988

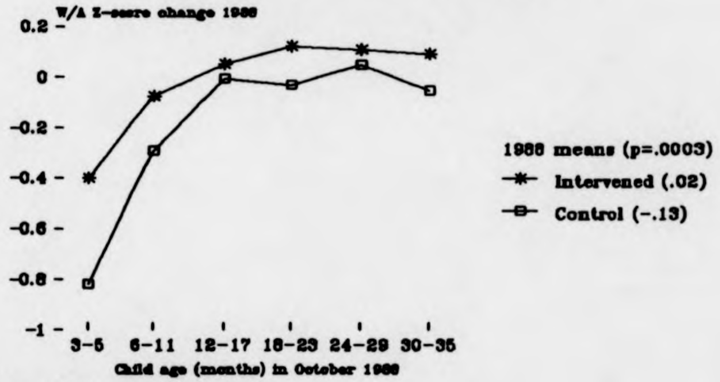
| W/A Z-Score | Number of Intervened Children (%) | Number of Control Children (%) |
|---|---|---|
| <-3 | 118 (16.7) | 162 (19.7) |
| ≥-3, <-2 | 193 (27.3) | 223 (27.1) |
| ≥-2, <-1 | 220 (31.2) | 270 (32.8) |
| ≥-1 | 175 (24.8) | 167 (20.3) |

Chi² trend=3.68, p=.06

revealed a greater proportion of control children having the lowest z-scores (chi² trend=3.68, p=0.06). Second, when the variation in December W/A was studied using analysis of variance, employing the same approach described in Section 6.3.1.1, after child age and sex, October W/A was the strongest explanatory variable ($p<.0001$), followed by study group which was significant either alone ($p<.001$), or in addition to October W/A ($p<.0001$), indicating that its effect on December W/A was independent. None of the diarrhoeal variables was significant.

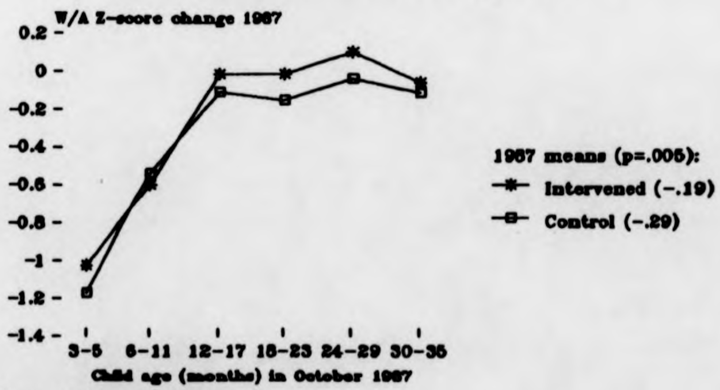
6.3.2.1. **Change in W/A z-score.** Figure 6.3a shows that between October and December 1988 the W/A z-score increased among intervened

**FIGURE 6.3a. Trimestral W/A z-score change, October–December 1988, according to child age and study group**




3-11m -.16 (I), -.45 (C), p<0.01
12-23m .08 (I), -.02 (C), p=.10
24-35m .10 (I), .00 (C), p=0.06

**FIGURE 6.3b. Trimestral W/A z-score change, October–December 1987, according to child age and study group**




3-11 m -.72 (I), -.75 (C), p n.s.
12-23 m .02 (I), -.13 (C), p<0.002
24-35 m .02 (I), -.07 (C), p n.s.

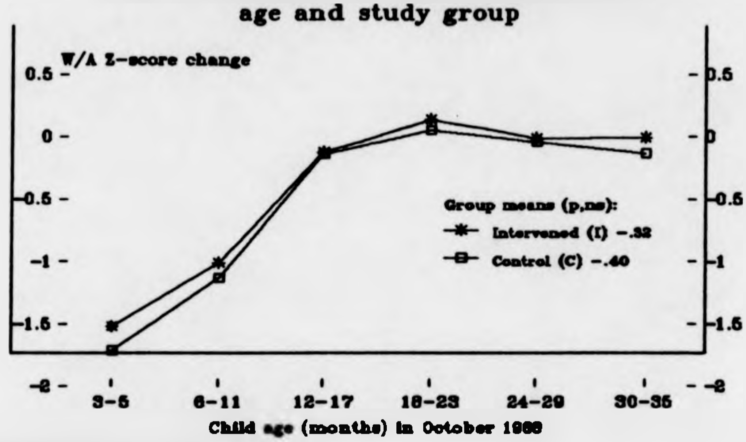
children by an overall average of +.02 s.d., compared to a significantly lower average decline of -.13 s.d. among the controls ($p<0.0003$). The largest difference was among infants aged 3-11 months, with W/A of intervened infants declining by just -.18 s.d. compared to -.45 s.d. in the controls ($p<0.01$). In the oldest year (24-35 months) intervened children improved by an average of +.10 s.d. more than controls ($p=0.05$). In the middle year (12-23 months), intervened children also fared better than controls (+.08 s.d. v. -.02 s.d.), however this difference was significant only at the 10% level.

Analysis of variance of W/A change in 1988 indicated that October W/A (after child age and sex) was the strongest explanatory variable ($p<.0001$), followed by the mean duration of diarrhoeal episodes ($p<.0001$) and then study group ($p<.005$). The number of days of diarrhoea and the number of episodes were not significant. Study group was significant either alone ($p<.005$), after accounting for October W/A ($p<.001$), or after accounting for both October W/A and the duration of episodes ($p<.01$). These results suggest that there was a favourable impact of the intervention on the short-term growth of children.

In addition to comparing the post-intervention changes in W/A between the two study groups, the differences between the pre- and post-intervention changes in W/A in both intervened and control children were compared (Figure 6.3a v. 6.3b). By contrasting the pre- to post-intervention changes in trimestral growth rates in the two groups it was possible to assess the actual impact of the intervention on trimestral growth. In both intervened and control groups there was a relative improvement in W/A change in 1988 compared with 1987. Among intervened children, the change in 1988 was +.21 s.d. larger than in 1987, whereas among control children the change from 1987 to 1988 was only +.16 s.d., representing a 31% greater improvement among intervened relative to control children. The pre- to post-intervention differences, considered by year of child age, were greatest among infants (intervened +.54 s.d. v. controls +.30 s.d.). Among children aged 12-23 months, intervened improved by +.06 s.d. compared to +.11 in the controls; and among children aged 24-35 months intervened improved by +.08 s.d. compared to +.07 in the controls. The greater improvement in growth rates from the pre- to post-intervention periods among infants may reflect a greater relative effect of reductions in diarrhoea on the growth of the youngest children, possibly due to their smaller body size.

6.3.2.2. **Semestral (6-month) change in W/A z-score.** In order to explore the possible influence of the intervention on growth of children over the 6-month intervention period, the changes in W/A from July-December 1988 in control and intervened children, according to child age at the start of the follow-up study, were studied (Figure 6.4). In both intervened and control groups W/A declined most severely (ie. by more than 1 full s.d.) among infants, reflecting the adverse effect of weaning. Although the decline in W/A was slightly less among intervened children across all age groups (suggesting an effect of the intervention on semestral growth), none of these differences significant and, overall, the difference between groups (-.32 s.d. in intervened v. -.40 s.d. in controls) was not significant. When the variation in W/A semestral change was explored further using analysis of variance, July W/A (after child age and sex) was the strongest explanatory variable ($p<0.0001$), followed by the number of days of diarrhoea ($p<0.05$). Neither study group, duration of episodes

**FIGURE 6.4. Semestral W/A z-score change July-December 1988, according to child age and study group**

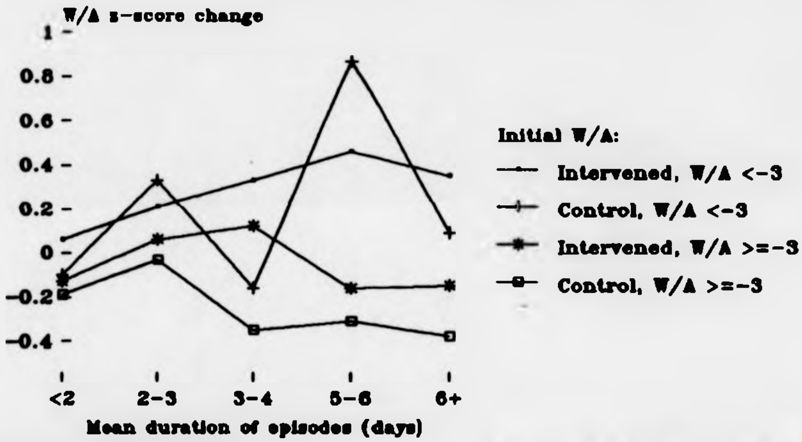



3-11 months -1.18 (I), -1.31 (C), p n.s.
12-23 months 0 (I), -.08 (C), p n.s.
24-35 months -.01 (I), -.10 (C), p n.s.

nor the number of diarrhoeal episodes were significant explanatory factors.

6.3.2.2. Association between malnutrition, diarrhoea and change in W/A in the post-intervention period. Because initial W/A and diarrhoeal morbidity were found to be significant explanatory factors in the variation of trimestral W/A change in both 1987 and 1988, and because the larger pre- to post-intervention differences in W/A change among infants suggested that diarrhoeal rates may influence growth differentially according to body size, the effect of diarrhoeal morbidity on trimestral W/A change in 1988 was studied further, controlling for initial W/A. Figures 6.5-6.7 illustrate, respectively, the effects of diarrhoeal duration, the number of days of diarrhoea and the number of episodes on post-intervention

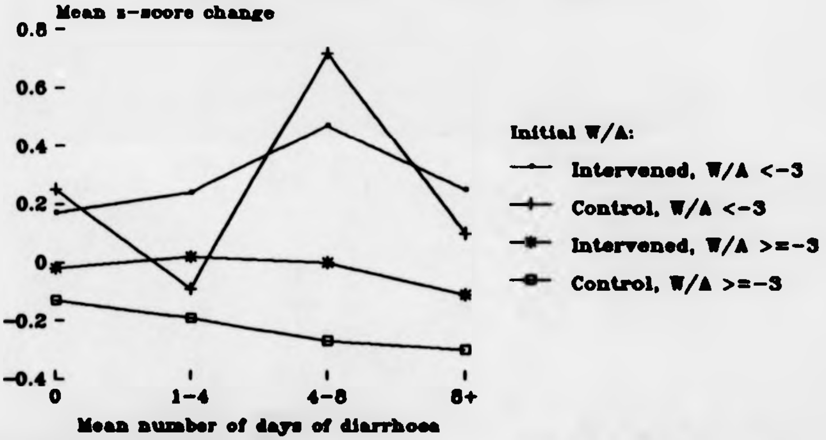
**FIGURE 6.5. Trimestral W/A z-score change, Oct–Dec 1988, according to episode duration and initial W/A**




Significance of group differences:
Initial W/A >= -3, Int v. Ctl, p=.0004
Initial W/A < -3, Int. v. Ctl, p ns

Correlations b/w initial W/A and duration:
Initial W/A <-3, r=.18, ns
Initial W/A >=-3, r=-.11, p<.01

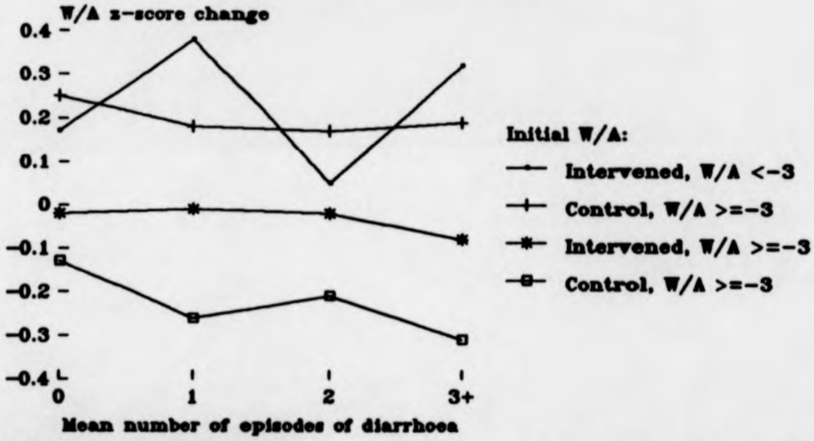
**FIGURE 6.6. Trimestral W/A Z–score change, Oct–Dec 1988, according to total days of diarrhoea and initial W/A**




Significance of group differences:
Initial W/A >=-3, Int v. Ctl, p <.0001
Initial W/A <-3, Int. v. Ctl, p ns

Correlations btw initial W/A and nbr days:
Initial W/A <-3, r=.03, ns
Initial W/A >=-3, r=-.07, p<.01

FIGURE 6.7. Trimestral W/A Z–score change Oct–Dec 1988, according to number of episodes and initial W/A




Significance of group differences:
Initial W/A <–3, Int v. Ctl p ns
Initial W/A >=–3, Int v. Ctl p<.0001

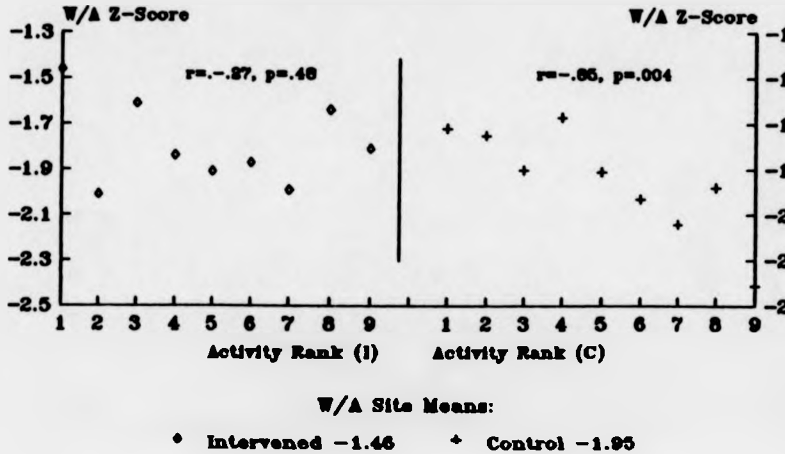
Correlations btw initial W/A and episodes:
Initial W/A <–3, r=–.009, ns
Initial W/A >=–3, r=–.05, ns

trimestral W/A changes in intervened and control children, controlling for initial W/A, with children represented in one of two categories of initial W/A, either most poorly nourished (ie. W/A z-score <-3) or better nourished (ie. W/A z-score $\geq$-3). (In Figure 6.5, only children with diarrhoea are represented, whilst in Figures 6.6 and 6.7 all children are represented.) The figures show that W/A change among the most poorly nourished children was approximately 3 times greater than among the better nourished children (poorly nourished +.22 s.d. v. better nourished -.10 s.d., all children considered; poorly nourished +2.1 s.d. v. better nourished -.12 s.d., considering only children with diarrhoea). There were no differences in trimestral W/A change between intervened and control children among the poorly nourished (intervened +.23 s.d. v. controls +.21 s.d., respectively, p n.s., all children considered; intervened +2.3 s.d. v. controls +1.9 s.d., p n.s., considering children with diarrhoea only), however among the better nourished children, intervened had growth improvements twice as large as controls (intervened -.02 s.d. v. controls -.20 s.d., p<.0001, all children considered; intervened -.03 s.d. v. controls -.26 s.d., p=.0004, only children with diarrhoea considered). The duration of episodes (Figure 6.5) was significantly, negatively correlated with W/A change among better nourished children (r=-.11, p<.01) but had no effect on the growth of poorly nourished children (r=.13, p n.s.). Similarly, the number of days of diarrhoea (Figure 6.6) had a significant, negative effect on the growth of the better nourished children (r=-0.07, p<.01), but no effect on that of the poorly nourished (r=.03, p n.s.). The number of episodes of diarrhoea (Figure 6.7) had no apparent effect on the growth of either the poorly or better nourished children (p n.s. in each case). The mean ages of children in the two W/A categories of initial of W/A were similar (mean age, poorly nourished 19.4 months v. better nourished 19.1 months, p=.62), ruling out the possibility that the differential effect of diarrhoea on growth was due to unequal ages between the two categories of children. Similar results were obtained when pre-intervention trimestral change in W/A was studied according to diarrhoeal morbidity and initial nutritional status. These results suggest that diarrhoea had a negative effect on the W/A change among relatively better nourished children, but had little effect on the W/A change among the most poorly nourished children. Moreover, the post-intervention analyses of differences between intervened and control children suggest that the intervention had a favourable impact on short-term growth among the better nourished children, but little distinguishable effect on the growth of the worst nourished.

6.3.3. Child growth relative to intervention quality

Finally, the appropriate units of analysis in this study, strictly speaking, are village clusters (sites), since randomization was performed on sites rather than individual children. Therefore, post-intervention W/A and changes in W/A were reanalysed at the site level. In Section 4.3.5, a positive association between the quality of the intervention (i.e. intervention activity ranks) and percentage reduction in diarrhoea was reported. W/A at the end of the intervention was studied similarly according to site activity rank, with the December 1988 mean z-score of children in each site treated as the site mean W/A z-score, and intervened and control sites ranked 1-9 (Figure 6.8). Kendall's correlation test was used in this analysis. There was a significant negative correlation between site mean W/A and activity rank when intervened and control sites with

**FIGURE 6.8. End-of-intervention mean site W/A, according to site activity rank, December 1988**




equal activity ranks were considered together (r= -.57, p=.01). When intervened and control sites were considered separately, the correlation among control sites was strongly significant (r= -.85, p=.004), but in intervened sites the correlation was not significant (r=-.27, p=.48). That is, W/A at the end of the intervention tended to be better in those sites where the volunteer and hence, intervention, quality was better, - an effect which was most evident in control sites. There were no significant associations between post-intervention trimestral site W/A changes (treating mean trimestral W/A changes among children in sites, post-intervention, as site W/A change) and activity ranks, nor between site mean W/A or site W/A change and site behaviour scores (see Section 5.3.4).

## 6.4. Discussion

The impact of a community-based hygiene educational intervention on the nutritional status of weaning age children in rural Zaire has been described. The analyses have highlighted the differences in attained W/A and 3- and 6-month growth, before and after the intervention, between intervened and control children. Child age, sex, diarrhoeal morbidity and initial W/A were important factors influencing children's growth. A summary of major findings and their implications are discussed below.

### 6.4.1. Determinants of child growth in rural Zaire

In both study years the attained W/A of young children in rural Bandundu was poor in comparison with the international (NCHS) reference medians for W/A[15]. Attained W/A in early infancy was generally adequate (except for girls in October 1988), but declined rapidly between 6 and 12-17 months. This pattern is interesting for a number of reasons. First, it suggests that there was probably not any significant foetal growth retardation, which has been associated with, among other things, intrauterine infection, poor maternal nutrition and malaria during pregnancy [16]. Second, the good growth of young infants suggests that infant feeding during the first few months was adequate. Third, the growth faltering with age indicates that environmental factors, such as poor nutrition or infectious diseases, were interfering with growth. A similar decline in growth in early life has been reported frequently in lesser developed countries[4,6,11,16-23]. The pattern has been attributed in many environments to early weaning[19-23]. In the study area, weaning begins at an early age (3-4 months) and this, in association with subsequent dietary insufficiency and infectious diseases, is likely to be a major contributor to the rapid growth faltering in the first year.

There was no consistent sex difference in child growth. In 1987 girls had better attained W/A, whilst in 1988 W/A among boys was better. The observed sex differences may be related to patterns of child feeding and/or birth weights of children. In 1987 there was no evidence of a predisposition of one sex to be born small relative to the reference population, since both began life at close to 100% of the reference median. In contrast, in 1988, girls were relatively small (81% of standard) at an early age (3-5 months). Interestingly, throughout 1988, older female infants (6-11 months) grew at only about 75% of standard, whereas boys grew at about 85%. Whether this represents mothers' tendency to breast feed boys more often, or to supplement boys' diets with other foods earlier, is uncertain. It is noteworthy that infant boys had more diarrhoea than infant girls in both years (see Sections 3.3.3-3.3.4). Earlier supplementation has indeed been associated with increased risk of diarrhoea, as reviewed by Feachem and Koblinsky[24] and reported again recently from Peru[25].

Children's initial W/A, after controlling for child age, was a very strong determinant of subsequent growth and attained W/A. This was evident throughout the analyses of 3- and 6-month growth (ie. 3-month changes in W/A in 1987 and 1988, and 6-month change in W/A in 1988). Multiple analyses of variance of attained W/A in December of both years, and of changes in W/A in both years, indicated that initial W/A was a consistently stronger explanatory variable than any of the diarrhoeal variables. The most poorly nourished children (ie. those with W/A <-3 s.d.) had trimestral growth rates approximately 3 times higher than their better nourished counterparts (Figures 6.5-

6.7). Faster growth among the most malnourished children is not surprising, and is likely to represent catch-up growth just after malnutrition - a very energy demanding process - which has been shown to result in increases up to 20 times the normal growth velocity[26].

It was also apparent that diarrhoea in this population had a negative impact on children's short-term growth (ie. 3-month change in W/A status), in 1987 and 1988 (Section 6.3.1.1, 6.3.2.1-2, Figures 6.4-6.6). This is concordant with the substantial body of literature documenting an adverse effect of diarrhoea on short-term weight gain in young children[17,19,22,27-32]. Growth faltering after diarrhoea may be due to loss of body fluids and may be very brief, or may be associated with decreased dietary intake, increased catabolism and malabsorption[25, 33-37], and may be prolonged, particularly if repeated diarrhoeal episodes occur. In this study, only the number of days of diarrhoea, but not diarrhoeal duration or the number of episodes, was associated with a smaller 6-month change in W/A (Section 6.3.2.3). It was not possible to assess the impact of diarrhoea on 6-month growth fully, because diarrhoeal data were available for only the last 3 months of this 6-month period.

Whilst the negative impact of diarrhoea on child growth was not an unexpected finding, it was surprising that diarrhoea had no effect on the 3-month change in W/A among the most poorly nourished children. Significant catch-up growth among the worst nourished children - despite the occurrence of frequent diarrhoea - may have improved their overall growth during the 3-month period and counteracted the potential adverse effects of diarrhoea, relative to better nourished children who were not undergoing similar catch-up growth. These findings are unlike those from Guatemala[38] and Brazil[39], where investigators reported that diarrhoea impaired catch-up growth among malnourished children. In Guatemala, gastrointestinal disorders among moderately malnourished children 0-24 months were reported to impair trimestral gain in W/A. In Brazil, severe malnutrition and high diarrhoeal prevalence were reported to have an interactive negative effect on the monthly weight gain of children less than 5 years. The results from the present study indicate that although diarrhoea had a negative impact on the trimestral W/A change among children with initial W/A z-scores $\geq$-3, it had very little effect on the W/A change of children with initial W/A z-scores <-3. Moreover, among children in the lowest category of initial W/A, there were no differences in trimestral W/A change between intervened and control children. These findings imply that the intervention's impact on growth was related (not surprisingly) to its diarrhoeal impact, with lower diarrhoeal rates associated with better trimestral improvements in W/A. This impact appeared to be focused on children with initial W/A $\geq$-3.

Season appeared to play an important role in the growth of children, undoubtedly in association with diarrhoeal morbidity. When attained W/A was studied according to child age at measurement time (see Figure 6.1), in both years children's December z-scores were lower than October z-scores. The diarrhoeal studies were conducted during months of heavy rainfall, and the high diarrhoeal rates during these months appear to have had a negative impact on child growth.

### 6.4.2. Main health impact findings

The analyses suggest that the intervention had a favourable impact on children's growth. Comparisons of attained W/A and trimestral changes in W/A between intervened and control children, post-intervention, illustrate this. After just 3 months of intervention there was already some evidence of an improvement in attained W/A in intervened relative to control children: children aged 24-35 months in intervened sites had higher mean z-scores in October 1988 than children of the same age in control sites, and proportionately fewer intervened than control children were in the worst (<-3 s.d.) category of October W/A 1988 (Table 6.4). After 6 months of intervention (December, 1988) the differences between the two study groups became larger and statistically stronger. The greatest differences were among children aged 3-5 months (intervened -.98 v. control -1.54, p<.0001) and 24-35 months (intervened -1.78 v. control -2.04, p<.005) (Table 6.3, Figure 6.2). At the end of the intervention, overall, intervened children's W/A was significantly higher than W/A among the controls (-1.79 v. -1.92, p=.05).

Analysis of post-intervention trimestral change in W/A revealed that intervened children grew sgnificantly faster than controls (mean W/A changes intervened +.02 v. control -.13, p=.0003, Figure 6.3). The strongest effect occurred among infants, with those from intervened sites declining by just -.18 s.d. compared to -.45 s.d. among the controls (p<.01), possibly reflecting the greater relative impact of reduced diarrhoeal incidence on infants' growth. After infants, the largest improvement was among children 24-35 months of age, with intervened actually gaining +.10 s.d., compared to a change of .00 s.d. among controls (p=.05).

Comparisons of *changes* in trimestral W/A change from the pre- to post-intervention years also suggested that intervened children were growing significantly better than controls. Whilst children from both study groups grew better in 1988 compared to 1987 (possibly due to lower overall rates of diarrhoea), improvements were substantially (ie. 31%) greater among intervened children than among controls (1988-1987 differences, intervened +.21 s.d. v. control +.16 s.d.). The largest improvements from the previous year were among infants, with those from intervened sites improving 80% more than those from control sites (1988-1987 differences, intervened +.54 s.d. v. control +.30 s.d.). Once again, the stronger impact among infants may be due to the greater relative effect of diarrhoeal reductions on the growth of infants due to their small body mass.

When the changes in W/A over the 6-month intervention interval were studied, the decline in z-scores among intervened children was less, overall, than among controls (-.32 s.d. vs. -.40 s.d.), however the difference was not significant. It is possible that the intervention had little effect on long term growth, as Briend et al[38] have suggested may occur in diarrhoeal interventions, if significant catch-up growth among the control children, who had more diarrhoea, occurred. However, as diarrhoeal morbidity during the first 3 months of intervention could have influenced growth during this interval, but was not measured, the impact of the intervention on long term growth cannot be assessed properly.

Overall, the analyses of the intervention's impact on the growth of children are consistent with the analyses of the intervention's impact on diarrhoeal morbidity, described in Chapter 4. Intervened children had significantly less diarrhoea than controls, and intervened children had significantly higher attained W/A than controls at the end of the intervention. Among all children with W/A z-scores $\geq -3$, improved trimestral growth was inversely associated with the total number of days of diarrhoea and diarrhoeal duration. The largest differences in end-of-intervention attained W/A were among children 24-35 months (-1.78 v. -2.04, p<.005), which corresponds with the largest improvements in diarrhoeal rates among children of this age. Whilst trimestral changes in W/A appeared to be improved most among infants, this is likely to reflect the greater impact of diarrhoeal reductions on the growth of children having a small body mass relative to older children (having a larger body mass), rather than a greater impact of the intervention on infants relative to older children.

Analyses of nutritional impact at the site level suggested that end-of-intervention site W/A was inversely associated with site activity rank (Figure 6.8). Sites with low activity ranks (ie. better volunteer performance and community participation) tended to have higher mean W/A z-scores in December 1988, particularly among control sites. This corresponds with the significant inverse association between diarrhoeal reduction and site activity ranks, discussed in Section 4.3.6. The stronger association between W/A and activity ranks in control sites may be related to the promotion of breast-feeding during diarrhoea, which may have improved the growth of control children. No associations were found between post-intervention site change in W/A and activity ranks, or between site W/A (or change in W/A) and site behaviour scores. The limitations of the site level analyses have been discussed in Section 4.4.

### 6.4.3. Implications

The analyses in this chapter suggest that the educational intervention in rural Zaire had a favourable impact on children's attained W/A and trimestral growth by reducing diarrhoeal morbidity.

Improvements in attained W/A appeared to benefit children aged 24-35 months most, and these children also showed the greatest reductions in diarrhoeal rates.

In any health impact study it is important to consider the possibility of bias, i.e. the likelihood that the results obtained were due to confounding factors not controlled for in the study design or analysis. The direction of the association between diarrhoea and malnutrition (which is not, to date, established with certainty) may introduce bias in a study such as this. Cousens et al[40] have suggested that in studies of environmental risk factors associated with diarrhoeal diseases, nutritional assessment may be biased by interactions between the effects on diarrhoea of environmental interventions and initial nutritional status. In other words, a child's initial W/A may affect his/her susceptibility to infection which could, in turn, influence subsequent growth. This would occur if poor nutritional status increases the risk of diarrhoea. Whilst several studies have reported that in malnourished children, poor nutritional status predisposes to diarrhoea or aggravates diarrhoea - either through increased incidence or prevalence[38,41-43], or increased duration[23,44-46], the relationship remains controversial, and Feachem[47] concluded that the evidence that poor nutritional status leads to diarrhoea is weak. This suggests that any modification of the effect of hygiene improvements on diarrhoea may be small. In the present study, even if the most poorly nourished children are more prone to diarrhoea, it is unlikely that the associations reported are biased, because the effect of diarrhoea on their growth was essentially insignificant before and after the intervention.

The possibility that the results obtained were biased because of group differences that were not controlled for was also considered. Both the study design and analytical methods took this possibility into account. Because all sites were separated geographically by about 30 km of road or more, and were randomly allocated to treatment and control groups, it seems unlikely that underlying factors were responsible for the results obtained. The fact that in the baseline year there were slight differences between intervened and control children in initial W/A is in all probability due to chance. Some investigators have stressed the importance of within-child control to address the possibility of noncomparability of groups[17,27]. This was also incorporated in the analyses. By using the changes in W/A z-score over time (in addition to attained W/A), within-child control was provided for by measuring each child's change in relative nutritional status. Overall, the results appear to be free of important sources of bias.

By evaluating the impact of the project on growth, the "responsiveness" of child growth indicators to hygiene intervention has, in effect, also been studied. Because both attained W/A and change in W/A were used, it was possible to observe how different aspects of diarrhoeal morbidity affect these two indicators. Both before and after the intervention, the change in W/A was quite sensitive to the impact of the intervention and the associated effects of diarrhoea. Change in W/A was negatively affected by diarrhoeal duration, the number of days of diarrhoea and the number of episodes (Sections 6.3.1.1, 6.3.2.1). This observation confirms previous reports of adverse effects of diarrhoea on monthly[17,22,29,48], bimonthly[30,45], trimestral[31,32] and semestral[27] weight gain. W/A change was most strongly affected by diarrhoeal duration, with prolonged episodes associated with decreased relative growth (Section 6.3.2.1, Figure 6.4). Bairagi et al[45] from Bangladesh reported a very similar inverse association between diarrhoeal duration (defined as the percentage of days with diarrhoea, with >10% considered prolonged) and short-term weight gain in children 1-4 years. These results suggest that evaluation of the nutritional impact of hygiene interventions to reduce diarrhoea should include, in addition to diarrhoeal data, measures of changes in anthropometric status over time, in conjunction with attained anthropometric status. Indicators associated with anthropometric changes over time may be more sensitive to changes in diarrhoeal rates, and to differential effects of diarrhoea associated with child age, than attained anthropometric status alone. This suggestion may be applicable to other environmental interventions against diarrhoea. It cannot be inferred from the results of this study that anthropometric measures *per se* are more sensitive than diarrhoeal data to the health impacts of hygiene interventions, as Esrey and Habicht have suggested[2]. However, the study does show that anthropometric indicators complement observed changes in diarrhoeal rates and reinforces the evidence that the changes are due to the intervention.

Although the association between diarrhoea and poor nutritional status has been the subject of much research since the leading studies of Rowland et al[17], Mata et al[19], and Martorell et al[27], there are few reports of how this association may differ between very poorly nourished and better nourished children. The findings in the present study of a difference between very poorly nourished and better nourished children in the effects of the intervention are intriguing. Diarrhoeal morbidity was lower overall in 1988, but diarrhoea had very little effect on the growth of the most poorly nourished children. It is possible that the most poorly nourished children in the study were recovering from very recent diarrhoea and were experiencing catch-up growth but, without knowing the previous diarrhoeal histories of these children, it is impossible to be certain. It is also possible that other factors interfering with the growth of the extremely malnourished children may be more important than, or mask, diarrhoea's specific effect. Black et al[30] reported that among rural Bengali children, diarrhoea accounted for only 20% of their deficit in linear growth. Martorell et al[33], finding that diarrhoea and other common infections were responsible for about 20% of the energy gap in Guatemalan children's dietary intake, concluded that childhood illnesses are just one of the major causes of malnutrition. Cole and Parkin[29] reported that the influence of diarrhoea on the growth of Gambian and Ugandan children was reduced when an effect of season was controlled for, suggesting that food availability, or other factors, werewas involved, and Briend et al[32] have argued even further that anti-diarrhoeal interventions should not be expected to reduce child malnutrition. Infections other than diarrhoea have adverse growth effects, notably malaria[17], respiratory infections[22,28] and measles[34]. Other possible reasons for poor growth are dietary insufficiency and maternal malnutrition. Thus, there are many other possible contributory factors to malnutrition in this population which may mask the effect of diarrhoea *per se*.

In summary, the results support the evidence that an educational intervention designed to reduce diarrhoeal disease may have a positive impact on children's short-term growth. The correspondence between diarrhoeal reductions and improvements in W/A with respect to child age imply that the improvements in W/A were linked to the improvements in diarrhoeal rates. The largest differences between intervened and control children, post-intervention, were among children in the third year of life. The stronger response of older children probably reflects the effects of cumulative attacks of diarrhoea. Finally, improvements in end-of-intervention site mean W/A were associated with better volunteer and hence, intervention, quality, in the sites. Collectively, these results suggest that the changes in diarrhoeal morbidity and growth may be attributed to the intervention.

## 6.5. References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# CHAPTER 7. SUMMARY AND CONCLUSIONS

A longitudinal, prospective study of a community-based hygiene educational intervention to reduce diarrhoeal diseasein weaning age children in rural Zaire has been reported. The intervention was based on simple messages intended to improve personal and domestic hygiene practices associated with the risk of diarrhoea in children. In particular, messages were designed to promote: (1) disposal of animal faeces from the yard, by sweeping at least twice per day, (2) handwashing before meal preparation and before eating, (3) handwashing after defecation and washing the child's hands and buttocks after child defecation, and (4) proper disposal of human faeces from the yard. The intervention was implemented by trained female community volunteers for 6 months. The intervention's impacts on diarrhoeal morbidity, hygiene practices and child growth were assessed.

The main hypothesis of this study was that personal and domestic hygiene education can reduce diarrhoeal morbidity in small children by improving behaviours associated with the transmission of enteric pathogens that cause diarrhoea. A secondary hypothesis was that hygiene education, by reducing diarrhoea, can lead to improvements in child growth. These hypotheses were tested using a randomized controlled trial design, in which 18 geographically separate rural sites were ordered from lowest to highest according to their child age-adjusted baseline diarrhoeal rates, grouped into adjacent pairs and then within each pair randomly assigned to either receive the intervention or serve as a control. Thus 9 experimental and 9 control sites with comparable baseline diarrhoeal rates were the principal units of study. Evaluation of the study was based on comparisons of post-intervention diarrhoeal morbidity rates between intervened and control sites, and of the changes in diarrhoeal rates from the pre- to post-intervention periods between intervened and control sites. A similar analytic approach was used to compare differences in child growth in 3- and 6-month intervals, and in risk factor behaviours, between the study groups.

Chapter 3 described the results of the baseline study of diarrhoeal morbidity in young children. These data suggested an annual incidence rate of 6.3 episodes per child in the study area, which was considerably higher than a previous WHO estimate of 2.7 episodes, but within the range of rates reported elsewhere in Africa. Mothers' reporting of the starts and stops of episodes, however, was found to be strongly influenced by the occurrence of home interviews, leading to differences in the estimates of episode duration and point prevalence according to the study day. After correcting for these reporting discrepancies, the estimated mean duration of episodes was 4.8 days. Overall point prevalence was not markedly affected by this adjustment, and was 11% during the 3 months of study. The analyses suggested that the presence of an interviewer and the timing of the home visit may have been more important determinants of mothers' reporting than either the duration of episodes or their perceived severity. These findings led to the concluding suggestion that in longitudinal diarrhoeal studies either the recall period should be shorter than 1 week, or mothers' reporting of the start and end dates of diarrhoeal episodes should be examined with respect to study interview days, and adjustments made if required.

In Chapter 4 the results of evaluation of the intervention's impact on diarrhoeal morbidity were reported. Children in intervened sites had an 11% lower risk of diarrhoea ($p<.025$), fewer total days of diarrhoea ($p<.025$), and shorter mean durations of episodes ($p=.04$) than children in control sites. The largest post-intervention differences were among children 24-35 months, with those from intervened sites having significantly fewer days of diarrhoea and shorter episode durations relative to controls. Diarrhoeal incidence rates declined by about 50% in both study groups from pre- to post-intervention, a result which may be due to: (1) a general decline in diarrhoeal morbidity from 1987 to 1988 in this region of Bandundu, (2) a "Hawthorne" effect in all sites, which may have improved people's overall attentiveness to diarrhoea and other illnesses in children, and (3) the fact that messages promoted in the control sites may also have had a diarrhoea lowering effect. The pre- to post-intervention reductions were, however, larger in intervened compared to control sites. Moreover, diarrhoeal reductions were positively associated with volunteer performance and hence, intervention quality, in all sites, suggesting that the selection, training and follow-up of community volunteers was a critical factor in the effectiveness of the intervention.

Results of the evaluation of the intervention's impact on hygiene behaviours were described in Chapter 5. Post-intervention personal and domestic hygiene behaviours were significantly better among intervened relative to control sentinel families, for the majority of about 20 observed message-related practices. In addition, improvements in approximately 12 practices observed in both the pre- and post-intervention periods were substantially greater among intervened compared to control families. Good behaviours were actually practised much more frequently in both study groups after the intervention than before, however the improvements in all but two of the observed behaviours were superior among intervened families. In intervened families, the reduction in bad behaviours pre- to post-intervention was estimated to be 25%, whilst in control families the reduction was 15%, leading to the conclusion that the intervention was responsible for about a 10% reduction in bad behaviours. It was suggested that the large improvements in behaviours in both study groups were due to both a "Hawthorne" effect in intervened and control sentinel families, which may have ameliorated a wide range of behaviours, and to the possibility that control volunteers, as free agents, could have promoted other messages in addition to the two control messages, based on their own knowledge and enthusiasm. These possibilities seem likely, since behaviours (measured as composite behaviour scores) were significantly better among sentinel families in both intervened and control sites having high site activity ranks, ie. in sites where volunteer performance and community participation were very good. Among all sentinel families, improvements in behaviours were positively and significantly associated with improvements in diarrhoeal rates, after controlling for child age, suggesting that the mechanism of the intervention's diarrhoeal impact was via behavioural improvements.

Finally, in Chapter 6, results of the evaluation of the intervention's impact on child growth were presented. The analyses indicated that the intervention had a favourable impact on child growth, and that the improvements in growth corresponded to improvements in diarrhoea. At the end of the intervention, children in intervened sites had significantly higher mean W/A z-scores than control children ($p<.05$), with children aged 24-35 months appearing to benefit most. Furthermore, the change in W/A, from October-December, post-intervention, was considerably better among intervened compared to control children ($p<.0003$). The largest improvements in W/A change, post-intervention, were among infants, which probably reflects the greater impact of diarrhoea on the growth of infants than on older children. From the pre- to the post-intervention periods, 3-month growth (ie. W/A change, from October to December) improved in both study groups, however the change among intervened children was greater than among controls (+.21 s.d. v. +.16 s.d.) and, once again, the largest relative improvements occurred in infancy. Both before and after the intervention, child growth was strongly influenced by diarrhoeal morbidity, with the duration of episodes having a stronger effect than either the number of episodes or the number of days of diarrhoea. Change in W/A was, consistently, a more sensitive indicator of this association than attained W/A. When children's initial W/A was controlled for, diarrhoea had no apparent effect on the growth of the most poorly nourished children, ie. those with initial W/A scores <-3, and this was observed both before and after the intervention, in intervened and control children, and when any of the 3 diarrhoeal variables was considered. In concordance with this finding, it was not surprising that no differences were found between intervened and control children with initial W/A <-3, in trimestral growth, post-intervention. This notwithstanding, growth of the most poorly nourished children was approximately 3 times faster than the growth of better nourished children. It was suggested that children with very low initial W/A scores may have been children undergoing high rates of catch-up growth following recent diarrhoea. Alternatively, other factors influencing the growth of the most malnourished children may have been more important determinants of their growth than diarrhoea *per se*.

Finally, when site mean W/A z-scores at the end of the intervention were examined according to site activity ranks, with both intervened and control sites ranked 1-9 (ie. best to worst), there was a significant negative correlation between the site mean W/A and rank ($p<.01$), suggesting that mean attained W/A was higher in sites with the best performance of volunteers and participation of community members.

The purpose of this study was to assess whether a community-based hygiene educational intervention could be an effective means of reducing childhood diarrhoea in rural Zaire. It was hypothesized that diarrhoeal reductions would occur via improvements in personal and domestic hygiene behaviours, and that such reductions could also lead to improved child growth. The evaluations of the intervention's impacts on diarrhoea, behaviour and child growth suggest that the intervention was effective and feasible. The estimated reduction in diarrhoea of about 11% is modest, however corresponding improvements in behaviours and child growth indicate that the observed reduction was truly attributable to the intervention. For public health planning purposes, these coordinated findings are important, because they illustrate the mechanism through which hygiene education may reduce diarrhoea. For many reasons (discussed in Section 4.4), the reductions obtained were in all probability lower than they could have been under more favourable circumstances. The correspondence between improved diarrhoeal rates, improved behaviours, and improved growth rates, imply that under more favourable conditions hygiene educational interventions could lead to larger reductions in diarrhoea which would also be accompanied by larger improvements in nutritional status. Moreover, whilst this type of intervention, in terms of diarrhoeal reductions, appears to benefit most the children aged about 12-35 months, the significance of the relatively larger impact of diarrhoeal reductions on the growth of infants compared to older children should not be underestimated. Improved growth among infants may enhance their ability to resist subsequent diarrhoeal infection, and shorten the duration of subsequent diarrhoeal episodes. The results of the present study are most important because they illustrate the potential effectiveness of hygiene education when conducted by community volunteers. Further research is needed to clarify the conditions under which both effectiveness and feasibility may be maximized.

Based on the findings of this study, a number of suggestions for similarly focused interventions seem appropriate. These are described below.

(1) Longitudinal studies of diarrhoeal diseases should use diarrhoeal recall periods of <1 week if possible. If this is not possible, mothers' recall of the start and end dates of episodes should be examined with respect to study interview day, and adjustments made if necessary.

(2) Hygiene educational interventions should be focused on children of weaning age, ie. aged about 3-35 months, if possible. If resources are constrained, such interventions should be focused on children approximately 12-35 months of age.

(3) Adequate time should be allocated to the selection of community volunteers, in order to minimize the need for close supervision and increase the likelihood of good volunteer performance. Participation of community members in the selection of volunteers is

desirable, and therefore project leaders may need to meet several times with community leaders in order to select appropriate individuals.

(4) Adequate time and resources should be allocated to the training and on site follow-up of community volunteers, in order to maximize volunteer performance. Initial training of volunteers in groups is most important, in order to foster exchanges and coordination of ideas, and simulate potential problems and situations which volunteers may encounter at the village level. However, group training should be followed by on site training of volunteers. The purpose of on site training would be to provide both social and technical support. Resources (ie. transport and personnel) need not be flamboyant, but should be reliable. Biweekly on site follow-up training is ideal, but follow-up every three weeks may be sufficient in some settings. Longer follow-up intervals are likely to lead to declines in volunteer performance.

(5) Training of community volunteers should be informal and incorporate locally appropriate teaching methods, eg. songs, proverbs, dance, drama, dialogue, etc., to the extent possible. Such informal methods are likely to elicit a high degree of response and participation of volunteers. Visual representation of messages (eg. posters, paintings) is highly desirable since volunteers may be illiterate, and adequate resources should be allocated to reproduce visual materials. Such materials, in addition to conveying intervention messages accurately, may be expected to have a favourable "Hawthorne" effect on volunteers as well as village members.

(7) Message dissemination techniques should be pretested and developed to the extent possible prior to the training of community

volunteers. Such techniques are likely to be quite closely tied to local customs and circumstances, and may play a very significant role in subsequent volunteer effectiveness. Adequate time should be planned for trainers of volunteers to develop such techniques and incorporate them into the training programme.

(7) A qualitative method of monitoring on site volunteer performance and community participation should be planned. This should be designed in accordance with training objectives and should be simple (eg. based on 10-15 criteria which may be scored). The same monitoring method should be applied to all communities where volunteers are located, but volunteers should be blind to criteria used during on site assessments. In controlled trials, the same method should be used to monitor volunteers in control and intervened communities. Efficient qualitative monitoring systems may eliminate the need for detailed observational studies of behaviour when evaluating intervention behavioural impact.

(8) Educational messages should be few in number and uncomplicated. Simplicity in the number and content of messages is likely to minimize supervision requirements, as well as the probability that messages will be tranmsitted incorrectly. In general, message simplicity is likely to increase volunteer performance and community participation.

(8) Behavioural changes occur slowly in communities, and therefore educational interventions should be implemented for as long as resources permit, preferably longer than 6 months, in order to achieve the greatest possible behavioural changes. A period of one year may be feasible in many settings, and is likely to lead to larger reductions in diarrhoea than were observed in the present study.

(9) In evaluating the health impact of hygiene educational interventions, anthropometric indicators of child growth should accompany diarrhoeal data. Indicators of changes in child growth over time, in addition to attained anthropometric status, should be used, in order to clarify the nature of associations between diarrhoea and growth.

The study has raised a number of questions which suggest further research. The most important of these are summarized below.

(1) Further study of mothers' reporting of diarrhoea is needed. Many poorly founded assumptions about mother's memory and perceptions of diarrhoea have led to some conclusions about the validity of weekly diarrhoeal recall which may be inaccurate. Mother's "own definition" of diarrhoea is frequently used in studies of diarrhoea, without much appreciation of what such local definitions imply. Moreover, little is known about the factors that influence mothers' reporting of diarrhoea, including the effects of an interviewer in the home, the hour of the interview, and the repetition and periodicity of reporting. What mothers' believe constitute a severe diarrhoeal episode is also poorly understood. Focused ethnographic and epidemiologic research on these aspects of diarrhoeal reporting would be of great value.

(2) Community-based educational interventions in poor societies, in particular those addressing diarrhoea, may stimulate a wide range of preventive health practices in unforseen ways. The attention given to community residents - by community volunteers, fieldworkers and others - may, through a "Hawthorne effect", alter behaviours in addition to those specifically addressed by the

intervention. In longitudinal, controlled trials to reduce diarrhoea through educational approaches, it may be difficult not to plan a diarrhoea-related programme for control areas. The "Hawthorne effect" may, therefore, confound the evaluation of such interventions, when both intervened and control areas are given diarrhoea-related interventions (albeit differently focused). Investigation of this potential problem would provide topical, helpful information for the design and assessment of community-based hygiene interventions.

(3) The results of the present study suggest that the quality of volunteer performance and the participation of community members was a key factor in the effectiveness of the intervention. A simple system of rating of both volunteers' and villagers' participation was devised, allowing sites to be ranked from best to worst according to intervention quality. Although rough, this ranking system was found to correlate surprisingly well with changes in behaviour, reductions in diarrhoea and, to some extent, improvements in nutritional status. If the qualitative effectiveness of interventions such as this can be measured simply at the community (or volunteer) level, detailed observational studies of behaviour (to assess impact) may not be necessary. Further research should be pursued on simple methods to measure behaviour change and intervention quality at the community level.

(4) This study and others have suggested that promotion of personal and domestic hygiene may be most effective in the age group of about 12-35 months. Additional information is needed to clarify the extent to which this may or may not be true, and the magnitude of the possible differential impact of such interventions on diarrhoea and child growth. Although the youngest children almost certainly

benefit to some degree, cost- and operational effectiveness may be affected significantly, and research into this question would be of considerable practical value.

(5) Hygiene educational interventions may have differential health impacts in children according to their initial anthropometric status. Moreover, whether diarrhoea impairs or enhances catch-up growth in extremely malnourished children is uncertain. Specific research attention should be given to impact of hygiene education on the diarrhoeal and growth rates of very poorly nourished children, and on the interactions between diarrhoea and growth in these children.

## APPENDIX 1. CHAPTER NOTES

### Notes to Chapter 2

1. Language, rather than ethnic group per se, was the most important factor differentiating groups sociologically. People speaking the same local dialect generally had similar beliefs and customs related to food choices, child care, treatment of illness, marriage and laws of inheritance. Conversely, petty rivalry and disputes frequently occurred between groups speaking different dialects.

2. Among the small number of mothers who possessed birth certificates issued by local authorities, many had incorrect birthdates. In some villages birth certificates were issued several months or more after the birth of a child. This practice was begun soon after a law was passed (in the 1980's) making it mandatory for a child to have a birth certificate in order to enter primary school. Consequently, many birth certificates were issued simply as a formality, and required only parental recollection of the child's birth, which was often inaccurate. Such errors were discovered by comparing birthdates on the certificates with birthdates determined through the local calendars.

3. Secondary school consisted of either a short cycle (4 years post-primary) or a long cycle (6 years post-primary).

4. A frequent problem in the villages was that villagers asked study workers for money or medicines. Since refusal on the part of the interviewer could have caused serious problems with village authorities, we decided on a uniform "response" that interviewers could give, and which they practised during training. They were instructed to refuse to give money or medicines and to explain that their purpose was to collect information about child sickness, which could be of benefit to the villagers in the long term. Villagers generally accepted this response.

5. Most data on diarrhoeal morbidity and mortality for the Bandundu region are hospital-based. Few community-based data exist. Hospital records of ambulatory and hospitalized cases and deaths between 1978 and 1983 indicate that diarrhoea reporting to hospital peaks between the months of August and November, with August being the highest month. These are also the months of heaviest rainfall. Another, smaller peak occurs between April and July, with May registering the highest number of cases. These months are also rainy, although less so than the months of August through January. For the calendar year 1985, diarrhoea cases reported to Kikwit General Hospital were greatest between the months of July and September (unpublished data).

6. Definition of diarrhoea used by WHO for rotavirus field trials.

7. Typically, women rose at 5 or 6 a.m., swept the yard and prepared the first family meal. By 8 or 9 a.m. most left home to work

in the family's field. Women were absent from the home for about 7 hours, after which they returned, to resume other domestic work, including preparation of another meal.

8. Although disproportionately many episodes were reported to have ended the day before the interview, or to have started on the day of the interview, these errors appear to have affected the estimated duration of the episodes rather than their frequency. This is discussed in Chapter 3.

9. Preparation of rice water solution was as follows: 7 tablespoons of rice in one litre of water with 1 teaspoon of salt, boiled for 25 minutes and drained after cooking. Mothers were advised to give this to the child after each passage of stools.

## Notes to Chapter 3

1. Pre-intervention diarrhoeal morbidity figures, before and after adjustments:

| | | |
|---|---|---|
| 1. | Total number of children with ≥9 weeks data: | 1914 |
| 2. | Total number of children with diarrhoea: | 1347 |
| 3. | Total number reported episodes: | 3543 |
| 4. | Total number of episodes, adjusted for incomplete follow-up: | 3584 |
| 5. | Total number of episodes starting on study day 3 or later: | 3329 |
| 6. | Total number of complete episodes, prior adjustment for reporting discrepancy: | 3098 |
| 7. | Total number of complete episodes, after adjustment for reporting discrepancy: | 3137 |
| 8. | Mean duration of all reported episodes, prior to adjustment for reporting discrepancy: | 4.92 days |
| 9. | Mean duration of (3098) complete episodes, prior to adjustment for reporting discrepancy: | 4.77 days |
| 10. | Mean duration of (3137) complete episodes, after adjustment for reporting discrepancy: | 4.80 days |
| 11. | Mean duration of all reported episodes, after adjustment for reporting discrepancy: | 4.85 days |

## Notes to Chapter 4

1. Pre-intervention diarrhoeal morbidity figures, before and after adjustments:

| | | |
|---|---|---|
| 1. | Total number of children with ≥9 weeks data: | 1764 |
| 2. | Total number of children with diarrhoea: | 850 |
| 3. | Total number reported episodes: | 1533 |
| 4. | Total number of episodes, adjusted for incomplete follow-up: | 1547 |
| 5. | Total number of episodes starting on study day 3 or later: | 1390 |
| 6. | Total number of complete episodes, prior adjustment for reporting discrepancy: | 1334 |
| 7. | Total number of complete episodes, after adjustment for reporting discrepancy: | 1348 |
| 8. | Mean duration of all reported episodes, prior to adjustment for reporting discrepancy: | 4.23 days |
| 9. | Mean duration of (1334) complete episodes, prior to adjustment for reporting discrepancy: | 4.05 days |
| 10. | Mean duration of (1348) complete episodes, after adjustment for reporting discrepancy: | 4.07 days |
| 11. | Mean duration of all reported episodes, after adjustment for reporting discrepancy: | 4.24 days |

(cont'd.)

Notes to Chapter 4, cont'd.

2. Reported annual hospital admissions and deaths due to diarrhoea among children ≤5 years, 1985-1989, Kikwit, Bandundu °

| Age | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | |
|---|---|---|---|---|---|---|---|---|---|---|
| (mths) | Cases | Deaths | Cases | Deaths | Cases | Deaths | Cases | Deaths | Cases | Deaths |
| 0-11 | 173 | 23 | 209 | 16 | 249 | 13 | 95 | 5 | 179 | 10 |
| 12-23 | 51 | 2 | 109 | 6 | 117 | 2 | 70 | 1 | 148 | 7 |
| 24-59 | 49 | 3 | 69 | 1 | 90 | 3 | 63 | - | 88 | 3 |
| Total | 273 | 28 | 387 | 23 | 454 | 18 | 228 | 6 | 415 | 20 |
| Pop'n.°° Estim.≤5y | 103219 | | 102792 | | 102792 | | 145335 | | 145000 | |
| Diar.Prev. | 6.6% | | 9.4% | | 11% | | 3.9% | | 7.2% | |

° Data derived from monthly records of Kikwit General Hospital and Kikwit Health Clinic, provided by Kikwit regional bureau of WHO Expanded Immunization Programme.

°°Estimated proportion of population ≤5 years of age 4% .

# APPENDIX 2. QUESTIONNAIRES AND DATA COLLECTION FORMS

# P E C O D I Z

DIARRHOEA RECALL FORM - 1987 and 1988

SITE : ______________________ N° VISITE : ______________

VILLAGE : ______________________ ENQUETEUR : ______________

## HISTOIRE DE DIARRHEE

1. N° de la Visite : |_|_|
2. Nom de mère : ______________________
3. N° d'identification de mère : |_|_|_|_|_|_|
4. Nom de l'enfant : ______________________
5. N° d'identification de l'enfant : |_|_|_|_|_|_|
6. Site code : |_|_|
7. Date d'enquête : __ __/__ __/__ __
8. L'enfant a-t-il eu la diarrhée aujourd'hui ?)
   Keti mwana mene sala pulu-pulu (diarrhée) bubu yayi ? |_|

   1 = Oui (Yinga) 2 = non (Ve)

   N.B. Pulu-pulu = Tufi (W.C.) ya masa-masa (pete-pete) mbala iya (4) to mingi na kilumbu mosi.
9. Dans les derniers sept jours est-ce que l'enfant a eu la diarrhée ?)
   Keti mwana salaka diarrhée na bilumbu nsambwadi mene kuluta ? |_|

   1 = Oui (Yinga) 2 = non (Ve)

   SI LA REPONSE EST <u>OUI</u>, REMPLISSEZ LE TABLEAU EN DESSOUS DE LA MANIERE SUIVANTE :

   (1) METTRE "X" DANS LA COLONNE "DIARRHEE" POUR CHAQUE JOUR QUE L'ENFANT A EU LA DIARRHEE.

   (Inki bilumbu ya mwana salaka diarrhée ?)

   (2) DEMANDER S'IL Y A EU DU SANG DANS LES SELLES POUR CHAQUE JOUR QU'IL AVAIT LA DIARRHEE.
   (Keti menga vandaka na kati ya tufi (pulu-pulu) ya ngo ?)

   SI LA REPONSE EST OUI, METTEZ "X" DANS LA COLONNE "SANG" S'IL Y A EU DU SANG DANS LES SELLES.

   (3) DEMANDER SI L'ENFANT A EU LA FIEVRE POUR CHAQUE JOUR QU'IL Y AVAIT LA DIARRHEE.
   (Keti nitu ya mwana vandaka tiya na ntangu ya yandi salaka diarrhée ?)

   SI LA REPONSE EST OUI, METTEZ "X" DANS LA COLONNE "FIEVRE."

   SI LA REPONSE EST <u>NON</u>, METTEZ "X" DANS LA COLONNE "PAS DE DIARRHEE" A COTE DE CHAQUE JOUR. PASSEZ A LA QUESTION 18.

| JOUR | | PAS DE DIARRHEE | DIARRHEE | SANG | FIEVRE | CODE |
|---|---|---|---|---|---|---|
| 10. | Hier (1) | | | | | |
| 11. Avant | Hier (2) | | | | | |
| 12. Jour Avant | (3) | | | | | |
| 13. Jour Avant | (4) | | | | | |
| 14. Jour Avant | (5) | | | | | |
| 15. Jour Avant | (6) | | | | | |
| 16. Jour Avant | (7) | | | | | |

Codes :

0 = Pas de diarrhée
1 = Diarrhée
2 = Diarrhée + sang
3 = Diarrhée + fièvre
4 = Diarrhée + sang + fièvre

17. (Qu'est-ce que vous lui avez donné pour la diarrhée dans les derniers sept jours ?)
Inki nge pesaka yandi na ntangu ya yandi salaka diarrhée na bilumbu nsambwadi mene kuluta ? |__|

0 = rien donné

1 = SRO (sachet)

2 = SSS Solution sucré salé (maison)

3 = remèdes traditionnels (feuilles eau de riz, etc)

4 = médicaments, produits pharmaceutiques

5 = combinaison :________________________________

18. (Quelles autres maladies a-t-il eu l'enfant dans les derniers sept jours ?)
Inki ba maladies ya nkaka mwana kubelaka na bilumbu nsambwadi mene kuluta ?

1.|__|

2.|__|

3.|__|

0 = pas d'autres maladies

1 = malaria/fièvre

2 = toux/respiratoire

3 = rougeole

4 = vomissement

5 = maux de ventre

6 = infection peau

7 = autre :________________________

N.B. (S'IL N'Y A PAS D'AUTRES MAMADIES, METTEZ "0" DANS LES CASES.)

DIARRHOEA RECALL FORM. WEEK 1, 1987 ONLY

**SITE** :______________________ **N° Visite** :______________

**VILLAGE** :____________________ **Enquêteur** :______________

**HISTOIRE DE DIARRHEE - VISITE 1**

01. N° de la Visite : |_|_|

02. Nom de mère :____________________

03. N° d'identification de mère : |_|_|_|_|_|_|

04. Nom de l'enfant :____________

05. N° d'identification de l'enfant : |_|_|_|_|_|_|

06. Site Code : |_|_|

07. Date d'enquête : __ __/__ __/__ __

08. (Allaitez-vous l'enfant encore ?) Keti mwana ikele kunwaka diaka mabele ? |_|

    1 = Oui (Yinga 2 = non (Ve)

09. (Prend-il autre lait que du lait maternel actuellement) Keti yandi kele nwaka mabele (milk, lait) |_|

    1 = Oui (Yinga) 2 = non (Ve)

10. (Prend-il de la bouillie actuellement ?) Keti yandi kele kudiaka poto-poto ? |_|

    1 = Oui (Yinga) 2 = non (Ve)

11. (Mange-t-il du plat familial actuellement ?) Keti yandi mene diaka bima ya bambuta ? |_|

    1 = Oui (Yinga) 2 = non (Ve)

12. (Poids de l'enfant) Kilo ya mwana |_|_|.|_|

13. (L'enfant a-t-il eu de la diarrhée aujourd'hui ?) Keti mwana mene sala pulu-pulu (diarrhée) |_|

    1 = Oui (Yinga) 2 = non (Ve)

    N.B. Pulu-pulu = Tufi (W.C.) ya masa-masa (pete-pete) mbala iya (4) to mingi na kilumbu mosi.

14. (Dans les dernières sept jours est-ce que l'enfant a eu la diarrhée ?) Keti mwana salaka diarrhée na bilumbu nsambwadi mene kuluta ? |_|

    1 = Oui (Yinga 2 = non (Ve)

SI LA REPONSE EST <u>OUI</u>, REMPLISSEZ LE TABLEAU EN DESSOUS DE LA MANIERE SUIVANTE :

(1) METTRE "X" DANS LA COLONNE "DIARRHEE" POUR CHAQUE JOUR QUE L'ENFANT A EU LA DIARRHEE (Inki bilumbu ya mwana salaka diarrhée ?)

(2) DAMANDER S'IL Y A EU DU SANG DANS LES SELLES POUR CHAQUE JOUR QU'IL AVAIT LA DIARRHEE. (Keti menga vandaka na kati ya tufi (pulu-pulu) yango ?) SI LA REPONSE EST OUI, METTEZ "X" DANS LA COLONNE "SANG" S'IL Y A EU DU SANG DANS LES SELLES.

CONT'D

(3) DEMANDER SI L'ENFANT A EU LA FIEVRE POUR CHAQUE JOUR QU'IL Y AVAIT LA DIARRHEE
(Keti nitu ya mwana vandaka tiya na ntangu ya yandi salaka diarrhée ?)
SI LA REPONSE EST OUI, METTEZ "X" DANS LA COLONNE "FIEVRE."

SI LA REPONSE EST NON, METTEZ "X" DANS LA COLONNE "PAS DE DIARRHEE" A COTE DE CHAQUE JOUR. PASSEZ A LA QUESTION 23.

| JOUR | PAS DE DIARRHEE | DIARRHEE | SANG | FIEVRE | CODE |
|---|---|---|---|---|---|
| 15. Hier (1) | | | | | |
| 16. Avant Hier (2) | | | | | |
| 17. Jour Avant (3) | | | | | |
| 18. Jour Avant (4) | | | | | |
| 19. Jour Avant (5) | | | | | |
| 20. Jour Avant (6) | | | | | |
| 21. Jour Avant (7) | | | | | |

Codes :

0 = Pas de diarrhée   1 = Diarrhée   2 = Diarrhée + Sang

3 = Diarrhée + fièvre   4 = Diarrhée + Sang + fièvre

22. (Qu'est-ce que vous lui avez donné pour la diarrhée dans les dernier sept jours ?)
Inki ngc pesaka yandi na ntangu ya yandi salaka diarrhée na bilumbu nsambwadi mene kuluta ? ... |__|

0 = rien donnée

1 = SRO (sachet)

2 = SSS solution sucré salé (maison)

3 = remèdes traditionnels
(feuilles eau de riz, etc)

4 = médicaments, produits pharmaceutiques

5 = combinaison :______________________

23. (Quelles autres maladies a-t-il eu l'enfant dans les derniers sept jours ?)
Inki ba maladies ya nkaka mwana kubelaka na bilumbu nsambwadi mene kuluta ?)

| | | |
|---|---|---|
| 0 = pas d'autres maladies | 5 = maux de ventre | 1. |__| |
| 1 = malaria/fièvre | 6 = infection peau | 2. |__| |
| 2 = toux/respiratoire | 7 = autre :__________ | 3. |__| |
| 3 = rougeole | | |
| 4 = vomissement | | |

N.B. (SI L'ENFANT A EU PLUS D'UNE MALADIE, INDIQUEZ CHACUNE A DROITE S'IL N'Y A PAS D'AUTRES MALADIES, METTEZ "O" DANS LES CASES.)

# P E C O D I Z

DIARRHOEA RECALL FORM - 1987 and 1988

SITE : ______________________ N° VISITE :______________

VILLAGE :______________________ ENQUETEUR :______________

## HISTOIRE DE DIARRHEE

1. N° de la Visite : |_|_|
2. Nom de mère :______________________
3. N° d'identification de mère : |_|_|_|_|_|_|
4. Nom de l'enfant :______________________
5. N° d'identification de l'enfant : |_|_|_|_|_|_|
6. Site code : |_|_|_|
7. Date d'enquête : __ __/__ __/__ __
8. L'enfant a-t-il eu la diarrhée aujourd'hui ?)
   Keti mwana mene sala pulu-pulu (diarrhée) bubu yayi ? |_|

   1 = Oui (Yinga) 2 = non (Ve)

   N.B. Pulu-pulu = Tufi (W.C.) ya masa-masa (pete-pete) mbala iya (4) to mingi na kilumbu mosi.
9. Dans les derniers sept jours est-ce que l'enfant a eu la diarrhée ?)
   Keti mwana salaka diarrhée na bilumbu nsambwadi mene kuluta ? |_|

   1 = Oui (Yinga) 2 = non (Ve)

   SI LA REPONSE EST OUI, REMPLISSEZ LE TABLEAU EN DESSOUS DE LA MANIERE SUIVANTE :

   (1) METTRE "X" DANS LA COLONNE "DIARRHEE" POUR CHAQUE JOUR QUE L'ENFANT A EU LA DIARRHEE.

   (Inki bilumbu ya mwana salaka diarrhée ?)

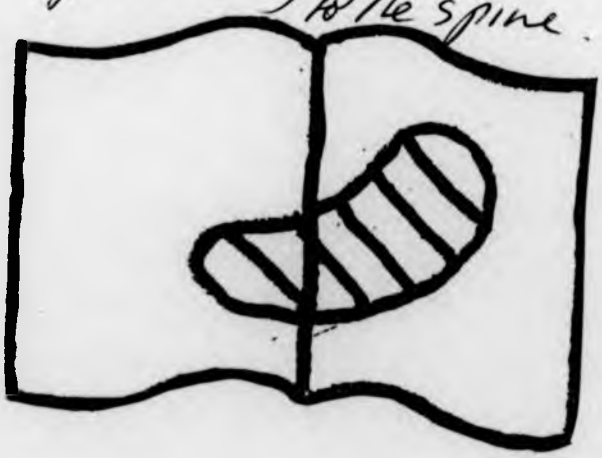
   (2) DEMANDER S'IL Y A EU DU SANG DANS LES SELLES POUR CHAQUE JOUR QU'IL AVAIT LA DIARRHEE.
   (Keti menga vandaka na kati ya tufi (pulu-pulu) ya ngo ?)

   SI LA REPONSE EST OUI, METTEZ "X" DANS LA COLONNE "SANG" S'IL Y A EU DU SANG DANS LES SELLES.

   (3) DEMANDER SI L'ENFANT A EU LA FIEVRE POUR CHAQUE JOUR QU'IL Y AVAIT LA DIARRHEE.
   (Keti nitu ya mwana vandaka tiya na ntangu ya yandi salaka diarrhée ?)

   SI LA REPONSE EST OUI, METTEZ "X" DANS LA COLONNE "FIEVRE."

SI LA REPONSE EST NON, METTEZ "X" DANS LA COLONNE "PAS DE DIARRHEE" A COTE DE CHAQUE JOUR. PASSEZ A LA QUESTION 18.



# P E C O D I Z

DIARRHOEA RECALL FORM - 1987 and 1988

SITE : ______________________________ N° VISITE : ______________

VILLAGE : ______________________________ ENQUETEUR : ______________

## HISTOIRE DE DIARRHEE

1. N° de la Visite : |_|_|
2. Nom de mère : ________________________________
3. N° d'identification de mère : |_|_|_|_|_|_|
4. Nom de l'enfant : ________________________________
5. N° d'identification de l'enfant : |_|_|_|_|_|_|
6. Site code : |_|_|
7. Date d'enquête : __ __/__ __/__ __
8. L'enfant a-t-il eu la diarrhée aujourd'hui ?)
   Keti mwana mene sala pulu-pulu (diarrhée) bubu yayi ? |_|

   1 = Oui (Yinga) 2 = non (Ve)

   N.B. Pulu-pulu = Tufi (W.C.) ya masa-masa (pete-pete) mbala iya (4) to mingi na kilumbu mosi.
9. Dans les derniers sept jours est-ce que l'enfant a eu la diarrhée ?)
   Keti mwana salaka diarrhée na bilumbu nsambwadi mene kuluta ? |_|

   1 = Oui (Yinga) 2 = non (Ve)

   SI LA REPONSE EST OUI, REMPLISSEZ LE TABLEAU EN DESSOUS DE LA MANIERE SUIVANTE :

   (1) METTRE "X" DANS LA COLONNE "DIARRHEE" POUR CHAQUE JOUR QUE L'ENFANT A EU LA DIARRHEE.

   (Inki bilumbu ya mwana salaka diarrhée ?)

   (2) DEMANDER S'IL Y A EU DU SANG DANS LES SELLES POUR CHAQUE JOUR QU'IL AVAIT LA DIARRHEE.
   (Keti menga vandaka na kati ya tufi (pulu-pulu) ya ngo ?)

   SI LA REPONSE EST OUI, METTEZ "X" DANS LA COLONNE "SANG" S'IL Y A EU DU SANG DANS LES SELLES.

   (3) DEMANDER SI L'ENFANT A EU LA FIEVRE POUR CHAQUE JOUR QU'IL Y AVAIT LA DIARRHEE.
   (Keti nitu ya mwana vandaka tiya na ntangu ya yandi salaka diarrhée ?)

   SI LA REPONSE EST OUI, METTEZ "X" DANS LA COLONNE "FIEVRE."

SI LA REPONSE EST NON, METTEZ "X" DANS LA COLONNE "PAS DE DIARRHEE" A COTE DE CHAQUE JOUR. PASSEZ A LA QUESTION 18.

| JOUR | PAS DE DIARRHEE | DIARRHEE | SANG | FIEVRE | CODE |
|---|---|---|---|---|---|
| 10. Hier (1) | | | | | |
| 11. Avant Hier (2) | | | | | |
| 12. Jour Avant (3) | | | | | |
| 13. Jour Avant (4) | | | | | |
| 14. Jour Avant (5) | | | | | |
| 15. Jour Avant (6) | | | | | |
| 16. Jour Avant (7) | | | | | |

Codes :

0 = Pas de diarrhée
1 = Diarrhée
2 = Diarrhée + sang
3 = Diarrhée + fièvre
4 = Diarrhée + sang + fièvre

17. (Qu'est-ce que vous lui avez donné pour la diarrhée dans les derniers sept jours ?)
Inki nge pesaka yandi na ntangu ya yandi salaka diarrhée na bilumbu nsambwadi mene kuluta ? |__|

0 = rien donné

1 = SRO (sachet)

2 = SSS Solution sucré salé (maison)

3 = remèdes traditionnels (feuilles eau de riz, etc)

4 = médicaments, produits pharmaceutiques

5 = combinaison :______________________________

18. (Quelles autres maladies a-t-il eu l'enfant dans les derniers sept jours ?)
Inki ba maladies ya nkaka mwana kubelaka na bilumbu nsambwadi mene kuluta ?

1.|__|
2.|__|
3.|__|

0 = pas d'autres maladies

1 = malaria/fièvre

2 = toux/respiratoire

3 = rougeole

4 = vomissement

5 = maux de ventre

6 = infection peau

7 = autre :______________________

N.B. (S'IL N'Y A PAS D'AUTRES MALADIES, METTEZ "O" DANS LES CASES.)

CEPLANUT
B.P. 298
KIKWIT

DIARRHOEA RECALL FORM, WEEK 12, 1987 ONLY

SITE : ______________________ N° Visite : ______________

VILLAGE : ______________________ enquêteur : ______________

HISTOIRE DE DIARRHEE - VISITE

1. N° de la Visite : |__|__|

2. Nom de mère : ______________________

3. N° d'identification de mère : |__|__|__|__|__|__|

4. Nom de l'enfant : ______________________

5. N° d'identification de l'enfant : |__|__|__|__|__|__|

6. Site code : |__|__|

7. Date d'enquête : __ __/__ __/__ __

8. (Allaitez-vous l'enfant encore ?)
Keti mwana ikele kunwaka diaka mabele ? |__|
   0 = Oui (Yinga) 1 = non (Ve)

9. (Si non, à quel âge avez-vous cessé à donner le sein)
Kana ve, na nima ya bangonda ikwa ya nge bikaka kupesa
yandi mabele ? |__|__| (mois)
   99 = non/applicable;
   = jamais allaité;
   = allaite encore

10. (Avez-vous donné du premier lait (colostrum) ?
Keti yandi kunwaka mabele ya ntete ?
   0 = Oui (Yinga) 1 = non (Ve) |__|

11. (Prend-il autre lait que du lait maternel ?)
Keti yandi kele nwaka miliki (lait) |__|
   0 = Oui (Yinga) 1 = non (Ve)

12. (Si oui, l'enfant a eu combien de mois quand avez-vous
commencé l'autre lait )?
Kana yinga, mwana kuvandaka na ngonda ikwa na ntangu
ya nge yantikaka kupesa yandi mabele ya nkaka (lait, miliki) |__|__| (mois)
   (99 = non - applicable)

13. (Prend-il du thé, du café, de jus de fruits ou autres boissons
(sucrées, alcooliques ?)
Keti yandi ke nwaka thé, café, masa ya mabundu to malafu
ya sukadi ou bière ? |__|
   0 = Oui (Yinga) 1 = non (Ve)

14. (Prend-il du biberon ?)

Keti yandi ke bakaka biberon ?

O = Oui (Yinga) 1 = non (Ve)

15. (Prend-il de la bouillie) ?

Keti yandi kele kudiaka poto-poto ?

O = Oui (Yinga) 1 = non (Ve)

16. (Combien de mois a-t-il eu quand vous avez commencé à donner la bouillie ?)

Yandi yantikaka kudia poto-poto na nima ngonda (mvula) ikwa ? (mois)

17. (Mange-t-il du plat familial ?)

Keti yandi mene diaka bima ya bambuta ?

O = Oui (Yinga) 1 = non (Ve)

18. (Combien de mois a-t-il eu quand vous avez commencé le plat familial ?)

Yandi diaka madia ya kimvuka na nima ya bangonda ikwa ? (mois)

19. (Poids de l'enfant)

Kilo ya mwana

20. (L'enfant a-t-il eu de la diarrhée aujourd'hui ?)

Keti mwana mene sala pulu-pulu (diarrhée) bubu yayi ?

O = Oui (Yinga) 1 = non (Ve)

N.B. Pulu-pulu = Tufi (W.C.) ya masa-masa (pete-pete) mbala iya (4) to mingi na kilumbu mosi.

21. (Dans les dernières sept jours est-ce que l'enfant a eu la diarrhée ?)

Keti mwana salaka diarrhée na bilumbu nsambwadi mene kuluta ?

O = Oui (Yinga) 1 = non (Ve)

SI LA REPONSE EST <u>OUI</u>, REMPLISSEZ LE TABLEAU EN DESSOUS DE LA MANIERE SUIVANTE :

(1) METTEZ "X" DANS LA COLONNE "DIARRHEE" POUR CHAQUE JOUR QUE L'ENFANT A EU LA DIARRHEE

(Inki bilumbu ya mwana salaka diarrhée ?)

(3) DEMANDER SI L'ENFANT A EU LA FIEVRE POUR CHAQUE JOUR QU'IL Y AVAIT LA DIARRHEE

(Keti nitu ya mwana vandaka tiya na ntangu yandi salaka diarrhée ?)

SI LA REPONSE EST OUI, METTEZ "X" DANS LA COLONNE "FIEVRE."

SI LA REPONSE EST <u>NON</u>, METTEZ "X" DANS LA COLONNE "PAS DE DIARRHEE" A COTE DE CHAQUE JOUR. PASSEZ A LA QUESTION 30.

| JOUR | | PAS DE DIARRHEE | DIARRHEE | SANG | FIEVRE | CODE |
|---|---|---|---|---|---|---|
| 22. | Hier (1) | | | | | |
| 23. | Avant Hier (2) | | | | | |
| 24. | Jour Avant (3) | | | | | |
| 25. | Jour Avant (4) | | | | | |
| 26. | Jour Avant (5) | | | | | |
| 27. | Jour Avant (6) | | | | | |
| 28. | Jour Avant (7) | | | | | |

Codes :

0 = Pas de diarrhée

1 = Diarrhée

2 = Diarrhée + sang

3 = Diarrhée + fièvre

4 = Diarrhée + sang + fièvre

29.(Qu'est-ce que vous lui avez donné pour la diarrhée dans les derniers sept jours ? )

Inki nge pesaka yandi na ntangu ya yandi salaka diarrhée na bilumbu nsamowadi mene kuluta ?

0 = rien donné

1 = SRO (sachet)

2 = SSS eau sucré salé (maison)

3 = remèdes traditionnels (feuilles eau de riz, etc)

4 = médicaments, produits pharmaceutiques

5 = combinaison

9 = non-applicable

30 (Quelles autres maladies a-t-il eu l'enfant dans la dernière semaine ? )

Inki ba maladies ya nkaka mwana kubelaka na mposo yayi imene kuluta ?

0 = pas d'autres maladies

1 = malaria/fièvre

2 = toux/respiratoire

3 = rougeole

4 = menengite

5 = autres

N.B. (SI L'ENFANT A EU PLUS D'UNE MALADIE, INDIQUEZ CELLE QUI EST LA PLUS GRAVE).

CEPLANUT
B.P. 298
KIKWIT

INSTRUCTION MANUAL FOR OBSERVATIONAL STUDY BEFORE THE INTERVENTION, 1987

# ETUDE D'OBSERVATION DES PRATIQUES DE SEVRAGE ET D'HYGIENE.- MANUEL D'INSTRUCTIONS

## I. METHODOLOGIE

L'étude d'observation sera menée en cours de l'enquête communautaire sur l'histoire de la diarrhée infantile. On observera trois cents familles dénommées les familles sentinelles. La famille sentinelle est définie comme une mère avec son (ses) enfant (s) cible (s).
Chaque famille sentinelle sera observée une fois au cours de l'étude. L'observation devra commencer à six heures du matin ou bien au moment ou la famille se réveille; cela prendra six à huit heures de temps. Dans la plupart des cas, les observateurs arriveront dans des villages la nuit ou le soir avant le jour de l'observation et dormiront dans ce même village de crainte qu'ils ne manquent pas à voir certaines activités matinales.

Les trois cents familles sentinelles seront choisies au hasard, partant d'une population globale de 2.000 enfants cibles recensés de chaque site d'étude. Le nombre des familles à observer dépendra du taux proportionnel de quinze pour cent (15%) que l'on doit tirer de l'effectif de mères cibles retenues dans chaque site. Par exemple, dans le site de LUSANGA qui a 224 mères cibles recensées, nous retiendrons 34 mères; tandis que dans le site de KIPUKA qui a 80 mères cibles recensées, nous retiendrons 12 mères.

L'étude d'observation met l'accent sur l'enfant cible. Dans des familles où il y a plus d'un enfant cible, on mettra un accent sur le plus âgé. Au cas ou il y a des jumeaux, on étudiera (observera) l'un de deux; mais une fois un des deux est choisi, on ne changera pas d'enfant au cours de la période d'observation. Les observations sur la préparation du repas (la nouvelle ou le restant) et sur la prise du repas, ainsi que sur les activités en intervalle de 10 minutes se basent sur l'enfant cible et la mère ou bien le garde-bébé. Les activités de la mère ou du garde-bébé particulièrement en rapport avec l'enfant cible sont enregistrées.

Dans certains cas, la maman de l'enfant peut être une suppléante, c'est à dire une femme qui assumait la responsabilité maternelle de l'enfant cible. Prenons l'exemple d'un orphelin ou d'un enfant cible qui est resté avec la famille de la mère pendant une longue période d'absence de la maman. La mère suppléante peut être soit une grande-mère, soit une tante ou une autre femme adulte.

Les intervalles de repos de l'observateur seront pris au cours de l'observation selon les activités de la famille sentinelle. Les observateurs se reposeront par exemple quand l'enfant dort et quand il y a ni préparation d'une nourriture, ni la prise d'un repas. Toutefois les observateurs ne peuvent se réposer que lorsqu'ils auraient terminés à remplir toute les autres fiches de contrôles d'observation. Enfin, il est également utile de rapporter les données d'observations telles qu'on les auraient vues, sans présomption ni sentiment quelconque.

## II. INTRODUCTION POUR TOUS LES PARTICIPANTS

Bonjour, je travaille au Département de la Santé, au CEPLANUT, le Centre National de Planification de Nutrition Humaine, à Kikwit. Je suis ici dans votre village dans le but de savoir comment vous vivez avec vos enfants, surtout ceux qui n'ont pas encore atteint l'âge de scolarité; aussi pour savoir les maladies qui tracassent (tourmentent) dans votre famille, enfin de nous aider à chercher les voies et moyens de les réduire. Pour ne pas perturber vos activités, notre Bureau a trouvé utile que je passe un avant-midi dans votre ménage, enfin de bien comprendre toute ces maladies qui vous dérangent.

## III. INSTRUCTIONS POUR ADMINISTRER L'INSTRUMENT D'OBSERVATION

Il y a deux principaux constituants (éléments) pour l'instrument d'observation le contrôle d'observation et les observations chronométrées.

### III.A.) FICHE DE CONTROLE D'OBSERVATION

Une série des questions ou des simples observations sont présentées dans chaque section. Les quatre fiches suivantes sont celles qui comprennent la section de fiche de contrôle d'observation. Ils s'agissent d'événements ou de comportements bien défini en catégories spécifiques. Au cours de l'observation des ou un comportement spécifique est vu, la case suivante à la réponse appropriée doit être cochée. Dans certains cas, la durée et/ou le temps de l'affichage d'un comportement est demandé (e). Tout ceci doit être soigneusement signalé. Dans le cas qu'un comportement n'est pas vu, on laissera la case vide.

### FICHE 1. HYGIENE DE LA PARCELLE ET DE LA MAISON :

Cette fiche doit être remplie immédiatement après l'arrivée, entre 6hoo-6h30'. Si les membres de la famille préparent un principal repas (en exclusion du café/thé du matin) ou qu'ils sont entrain de manger un repas en soi, cette liste de contrôle doit être complétée juste après la fin du repas. Pour chaque question, on ne marquera qu'une seule réponse.

### FICHE 2. HYGIENE DE L'EAU :

Cette fiche doit être remplie à n'importe quel moment que l'observation serait exécutée - de préférence au même moment qu'on remplirait la fiche N°1. Il est probable que l'observation sur la conservation de l'eau à boire ne soit pas faite jusqu'après le premier repas, qui est le moment pendant lequel l'eau est d'habitude formellement bue. Les questions de cette fiche peuvent avoir plus qu'une réponse.

### FICHE 3. HYGIENE ALIMENTAIRE : LA PREPARATION ET LE REPAS :

- Par un repas, nous nous entendons qu'on mange un des aliments de base qui suivent : LUKU, RIZ, BOUILLIE, CHIKWANGUE.
  Quand un de ces repas est nouvellement préparé ou mangé comme un restant, ce repas suit la même procédure comme étant préparé et/ou mangé.
- Il y a de l'espace sur cette fiche (2 pages) pour enregistrer les observations sur la préparation et le moment de manger. Il se peut qu'il ait trois différents repas. Un repas est mangé lorsque n'importe quel membre de la famille mange dans leur propre ménage sans se soucier de l'enfant cible, c'est à dire que l'enfant cible peut ou ne pas manger.
  Un repas se termine lorsqu'on enlève les assiettes; même si les assiettes vides traînent dehors après avoir mangé, le repas est terminé. Mais s'il y a quelques restes de nourriture dans les assiettes, et que cela traînent encore dehors, le repas n'est pas encore terminé.
- Pour chaque repas et chaque aliment dans ce repas, il existe 2 sections à compléter :
  (1) - préparation (la nouvelle ou le restant)
  (2) - la prise du repas.

- La préparation nouvelle doit nécessairement correspondre au repas bien que celle-ci serait la 1ère préparation nouvelle. Donc la 1ère préparation nouvelle peut ou ne peut pas être dans la 1ère colonne. S'il y a eu restant, la 1ère préparation nouvelle doit être dans la 2ème colonne.
- L'observateur doit faire attention à chaque rubrique présentée. S'il n'y a pas une réponse appropriée, l'observateur laissera la rubrique vide. Mais il se peut que dans une rubrique plus d'une réponse peut être cochée.

N.B. Boire de l'eau après le repas ainsi qu'allaiter l'enfant doivent être inclus dans la section de l'observation chronométrée (observation de 10 minutes). Chaque fiche de contrôle d'observation a un espace convenable (derrière) pour les commentaires de l'observateur, c'est à dire au cas où il n'y a pas de réponse appropriée, ou une grande confusion etc...

FICHE 4. LA DEFECATION

Cette fiche doit également être remplie dès que vous auriez vu l'enfant cible entrain de faire sec selles (chier) durant toute la période d'observation. On suppose que l'unique fois constatée révèle les réalités des autrefois que l'enfant cible fera ses selles. Chaque question aura une seule réponse.

III. B. LES OBSERVATIONS CHRONOMETREES

FICHE 5 : OBSERVATIONS CHRONOMETREES

Cette section concerne 12 unités d'observation de 10 minutes. Au cours de chaque observation de 10', il faut que l'observateur mentionne tout ce que l'enfant cible met dans sa bouche. Il faut aussi signaler l'heure de chaque intervalle de 10 minutes ainsi que le principal gardien, c'est à dire la personne qui reste le plus longtemps possible avec l'enfant pendant une intervalle de 10'. Les observations chronométrées doivent commencer immédiatement à la fin du 1er repas ou à 9hoo du matin, lequel vient en 1ère position. S'il arrivait qu'à la fin du 1er repas les fiches N°1 et N°2 ne soient pas encore remplies, l'observation chronométrée devra commencer après avoir completé ces fiches N°1 et N°2. Si on prépare ou on mange un repas au cours d'une intervalle de 10 minutes données : - on annule cette unité d'observation en cours dans la mesure où elle a pris moins de 5 minutes.
- on considère cette unité si l'observation a déjà pris 5 minutes ou plus; et on devra faire attention à la fiche N°3.
A la fin de ce repas, les observations chronométrées doivent reprendre jusqu'à totaliser 12 unités d'observations.
L'observateur doit faire très attention à cocher la case appartenant à l'intervalle en cours.

LES INSTRUCTIONS SUR LE MANUEL D'OBSERVATION

INSTRUCTIONS : FICHE N°1 : HYGIENE DE LA PARCELLE ET DE LA CUISINE

1. Cette fiche d'observation doit être remplie le matin dès l'arrivée dans un ménage après le mot d'introduction. Mais dans la mesure où vous trouverez les membres de la famille entrain de préparer un repas ou entrain de manger, vous remplisserez d'abord la Fiche N°1 directement après le repas et en priorité au début du moment d'observation.

NOTE : le temps d'observation est la première chose à remplir. Ne marquez que l'heure début.

2. Maison : Construction

Elle peut être :
* En chaumes : toiture et murs en chaumes (feuilles, paille)
* Pisé : toiture en chaume et murs en terre
* Sémi-durable : toiture en tôles (tuiles, briques daubes, etc) avec les murs en terre.
* Durable : toiture en tôles et murs en briques (ciment)

3. Fenêtres : La fenêtre : pièce formelle que l'on peut ouvrir et fermer aussi; mais différent d'un simple trou d'aération; qui n'est pas une fenêtre. En plus, elles sont considérées ouvertes lorsque toutes, la moitié ou plus de la moitié sont ouvertes; et fermées lorsque plus de la moitié ne sont pas fermées.
Nombre : il y a 4 possibilités sur le nombre de fenêtres (0,1 à 2,3 à 4 et 5 plus).

4. W.C. :

a) Noter la présence d'un WC si un W.C. existe. S'il n'y en a pas ne cochez rien.
b) La distance qui sépare la maison du W.C. est mesurée par des pas standarisés plus ou moins entre les observateurs. Un pas standard correspond à un mètre.
c) utilisé : pour savoir si le W.C. est utilisé ou pas, il est nécessaire que les observateurs entrent dans le W.C. pour voir et non pas se baser sur le fait de voir quelqu'un y aller. Alors on note que le WC est utilisé que lorsque vous verrez qu'il y a la traînée des pas à l'entrée, plus la présence des mouches aux alentours de trou de défécation, ainsi que la traînée d'urines sur les planches transversales du WC. Dans le cas contraire, le WC n'est pas utilisé.
d) Etat : le WC est considéré en état :
   . + (bon) = Si le W.C. a une porte, un couvercle, est balayé et a une bonne distance $\pm$ 10 m (4 conditions)
   . $\bar{x}$ (moyen) = lorsque le WC remplit 2 - 3 de ces conditions précédentes.
   . - (mauvais) = lorsque le WC répond qu'à une seule condition de ces quatres précédente.

5. Trou à Ordure : C'est un endroit creux qui sert à jetter les ordures (différent d'un trou qui n'est pas utilisé pour les ordures). L'observateur indique que le trou existe si il est situé dans la parcelle où à proximité de la parcelle; contrairement, le trou est absent (n'existe pas), et on ne cochera rien.
S'il y a un trou on doit alors distinguer les ordures qu'il y a dedans :
- matière organique : on fait allusion aux cendres de brûlure de bois ou des braises, aux poussières et terre provenant du balayage de la maison et aux restes de la nourriture préparée ou les déchets de la nourriture (ossements, les noyaux de fruits et les écorces etc...), ainsi que les feuilles mortes en décomposition.
- matière durable : ex. : des morceaux de bouteilles cassées, des papiers, des lambeaux (vieux habits), etc...
Enfin, si ces ordures sont exposées en pleine parcelle, prenez soin de spécifier ces ordures comme précédemment.

6. Parcelle balayée ou traces de balaie : On voit si ou ou non toute la parcelle était balayée très tôt le matin (sauf les jardins). Si qu'une moitié de la parcelle est balayée, il est considéré non-balayé. L'obaservateur fera le tour de la parcelle 2 fois pour vérifier. L'observateur notera aussi, s'il y a de la matière organique ou durable dans la parcelle, et cochera la case appropriée. Ses observations doivent être faites que ça soit une parcelle balayée ou non.

7. Animaux domestiques

a) Faisons allusion à n'importe quel animal vu dans la parcelle, même si ça appartient au ménage observé ou pas. Si on voit un animal libre, malgré l'enclos ou bien que d'autres animaux sont liés, la case libre doit être signalée (remplie).

b) Accès à la maison/cuisine : c'est une observation qui doit se faire pendant tout le matin (avant-midi).

c) Présence des selles animales - l'observateur doit faire 2 fois le tour de la parcelle, et entrer ensuite dans la maison/cuisine pour vérifier la présence ou l'absence des selles animales. Même des très petites quantités et morceaux des selles constituent un "oui" sur la fiche.

8. Présence des selles humaines

On note la présence des selles humaines dans la parcelle lorsqu'elles sont vues, mais préciser également l'emplacement de ces selles qui peut être soit derrière la maison, soit en pleine parcelle, soit enfin en brousse (à la limite ou hors la limite parcellaire).

9. Cuisine : C'est un endroit destiné pour la préparation des aliments. Pour déterminer la présence ou l'absence d'une cuisine dans une maison, l'observateur doit demander au responsable de la parcelle de voir la cuisine.
Cette cuisine peut être soit :
. une case : qui réfère une place bien déterminée pour préparer hors la maison.
. une chambre-maison : faison allusion à une chambre précise dans la maison (ou attachée à la maison) où on peut préparer bien qu'on ne peut pas nécessairement y préparer.
. inéxistente lorsqu'il ne dispose pas une cuisine.
Aussi l'observateur peut noter si la cuisine est balayée ou non balayée selon qu'il voit les traces de balayage ou ne voit pas. Si une cuisine n'existe pas, l'observateur ne marquera rien par la rubrique balayée (6), mais il doit répondre quand même aux rubriques c, d, et e.
Noter également, comment la vaisselle était conservée pendant toute la nuit jusqu'au matin, tout en précisant si elle est propre ou sale, et si c'est par terre ou élevée. Une assiette par terre constitue une réponse "par terre". La cuisine est "meublée" lorsqu'il y a un ou plusieurs meubles dans lequel on garde la plupart de nourriture ou les accessoires de la maison. Des étalages comptent comme des meubles.
"Mortier/pilon" : Si vu pendant le matin, le mortier étant horizontal à la terre ou le pilon étant déposé par terre, la case doit être mentionné dans le cas contraire ce n'est pas vu, et on ne marquera rien. Cette question se réfère à n'importe quel mortier/pilon.

10. SAVON : Il est mieux de remplir cette rubrique à la fin de la période d'observation. On cochera la case seulement si l'observateur a vu réellement le savon. En plus, prêter attention pour voir l'utilisation (les usages) de ce savon, qui peut servir soit pour se laver, soit pour laver les mains avant le repas et après le repas, soit pour la vaisselle soit enfin pour la buanderie. Prenez soin de noter alors une case dans chacune des possibilités précédentes, selon qu'on verra l'utilisation (les usages) de ce savon.

INSTRUCTIONS FICHE N°II : HYGIENE DE L'EAU

Cette fiche nous donne les renseignements d'observations sur les points ci-suivants:

1. Le lieu de stockage : Signifie l'endroit (le lieu) où l'on dépose le (s) recipient (s) contenant l'eau. Cet endroit peut être à l'intérieur de la maison où à l'extérieur de la maison. Ici l'observateur cochera tous recipients contenant l'eau, en spécifiant (précisant) l'endroit de dépôt, qui sera soit interne, soit externe, soit les deux possibilités à la fois.

2. L'emplacement : donne une idée précise de la place sur laquelle on a déposé les précédents récipients contenant l'eau. Cette place peut être par terre, lorsque le recipient est en contact direct avec la terre; et, elle peut aussi être élevée, lorsque le recipient contenant l'eau est posé dans une armoire ou au-dessus une table ou d'une armoire, ou même au-dessus d'un trepied ou autre instrument servant d'élévation où de support.

3. Les usages : nous renseignent sur les différents services réalisés avec cette eau gardée dans les recipients. Cette eau peut servir de boisson tout comme ça peut également servir pour autres usages (douche, nettoyage de vaisselles, préparation des aliments...) et vice versa. En effet, il est conseillé de demander l'usage d'eau de chaque recipient et vérifier au cours de l'observation si les usages changent. Il est conseillé également de vérifier d'où vient l'eau en posant certaines questions au cours de l'observation; mais si l'usage de l'eau observée est différent de ce qui était indiqué sur la fiche, il vous faut changer immédiatement l'information déjà écrite sur la fiche. L'observateur demandera de visiter les recipients qui contiennent les eau. On demandera des renseignements pour le stockage et usage actuel d'eau.

4. Couvert : Spécifie le (s) matériel (s) ayant servi de couvercle, pour couvrir l'ouverture du recipient contenant l'eau. Ce couvercle peut être : soit durable s'il est en matière qui ne se détériore pas facilement (métal,plastic...). Soit non durable s'il est en matière qui s'abîme facilement (bois, feuille...). Mais si le recipient concerné n'est pas couvert, cochez dans la case correspondante de la négation Non.

5. Vu Bouillie : Au cours de la journée d'observation, cherchez à voir si l'eau destinée à la boisson est bouillie. Et l'on notera dans la case correspondante, selon qu'on aurait vu bouillir l'eau ou pas vu bouillir l'eau.

6. Gobelet réservé au transfert : on neut savoir s'il y a disponibilité où pas d'une vase quelconque réservé uniquement au transfert d'eau du recipient de stockage vers un autre recipient, lors des différents services. Par conséquent, la louche (Gobelet) utilisée pour le transfert bien que c'est propre, une fois déposée par terre lors de l'observation, elle est considérée sale, sans hésitation.

7. Les Origines d'Eau : nous renseigne sur les différentes issues d'eau que la population concernée utilise. L'observateur doit intéresser (demander) au préalable le responsable de la localité de sorte qu'on lui accorde un guide, pour aller visiter les issues d'eau du milieu. Plus d'une réponse peut être donnée. Ses issues peuvent être, soit :
   - une source aménagée : lorsque la source est sarclée, construite de digues en pierre, avec dépôt des cailloux plus caillasses, ainsi qu'avec un pavement du dessus cimenté et munie d'un tuyau en métal ou en plastic.
   - une source non aménagée : lorsqu'elle ne répond pas aux conditions précitées.
   - une mare d'eau (marigot) : un cours d'eau stagnante ou presque stagnante, semblable à un étang naturel.

- une pompe à eau : un robinet qui fait jaillir l'eau.

  Enfin, l'observateur prendra soin de bien notifier toute ces observations; raison pour laquelle, il faut que l'observateur demande la permission d'entrer dans la maison pour voir les différents recipients servant de stockage d'eau.
- eau de pluie : l'eau de pluie qui est ramassée dans les différents recipients.

INSTRUCTIONS : FICHE N°3 : LA PREPARATION DU REPAS ET LA PRISE DU REPAS

1. Cette fiche comprend 2 parties : la préparation du repas et la prise du repas.

2. Nous avons également donnés la liste des aliments les plus fréquemment préparés. L'observateur doit se référer au numéro de chaque aliment approprié dans chaque plat (assiette) et mentionner dans la case correspondante.
   Au cas ou on combine plusieurs aliments dans une même assiette, on écrira tous les chiffres dans la même rubrique.
   Ex. : dans 1 cassérole on a : feuilles de manioc + huile de palme + tomate + poisson. Noter dans la case : 13 + 31 + 19 + 35
   dans une autre assiette on a : le Luku
   Noter dans la case : 1
   Au cas où on prépare une "bouillie", il faut signaler tous les ingrédients. Par "bouillie", on sous entend n'importe quel aliment de base préparé uniquement (séparement) pour l'enfant cible, tel que la phosphatine, la bouillie de farine de maïs, la bouillie de farine de manioc plus banane écrasée.

3. Cette fiche doit être remplie à n'importe quel moment que l'on prépare et/ou on mange un repas. On parle d'un repas lorsqu'on mange/prépare une des nourritures suivantes : Luku, riz, chikwangue ou bouillie.
   Le repas termine quand on enlève les assiettes. Mais quand les membres de la famille mangent sans l'enfant cible et ils abandonnent les assiettes vides sur place; et que l'enfant arrive pour être servi dans les mêmes assiettes sales, c'est un autre repas (2è repas).

4. Il y a un vide entre les 3 repas quant à la préparation et la prise du repas. Si on observe seulement le repas et non pas la préparation, la partie correspondant à la préparation ci-haut ne peut pas être remplie. Pour la remplir, il faudrait qu'il y ait une cassérole dans laquelle on prépare une nouvelle préparation ou l'on rechauffe le restant d'hier soir ou du repas précédent. Si on mange un luku non rechauffé, c'est aussi un repas. Mais si on mange seulement le restant de Saka-Saka (feuilles de manioc), ou restant des condiments en général, ce n'est pas un repas, mais c'est une des observations de 10 minutes. Si un membre du ménage de l'enfant cible mange, malgré que l'enfant cible ne mange pas, c'est un repas. On ne marquera rien dans la section de l'enfant mange pour signifier que l'enfant cible n'a pas mangé.

5. Le thé/café est considéré comme un des aliments d'un repas si c'est pris avant le repas. Mais si après le repas, on boit le thé, le café, l'eau ou on allaite l'enfant, ceux-ci seront inclus dans les observations de 10 minutes.

LA PREPARATION NOUVELLE DU REPAS

C'est une observation des aliments fraichement préparés. Par conséquent :
- notez l'heure du début et de la fin de la préparation;
- signalez si les mains ont été lavées avant de préparer; et si c'était avec eau et/ou savon.
- notez si les aliments sont lavés.

- notez comment on lave la cassérole en votre présence; la catégorie "Non" est aussi ajouté.
- signalez le lieu de préparation (interne ou externe), et le lieu d'emplacement des casséroles lors de cuisson (par terre ou en position élevée).
  "par terre" = la marmite sur le trepied, les bois, le réchaud ou la braisière par terre. "Elevée" = Réchaud ou la braisière sur la table ou sur une place élevée.
- Mentionnez si les bêtes s'approchent vers les aliments qu'on prépare ou qu'on a déjà préparé avant de manger;
- Notez la qualité d'ustensile qui a servi de malaxage, de simple tournure d'aliments lors de la préparation ou lors du transfert. Cela peut se faire soit avec les mains, avec la cuiller, soit avec du bois/feuille.
- Signalez si les cassèroles sont couvertes pendant la préparation ou avant de servir (sauf quand on malaxe) et avec quelle sorte de couvercle (en feuille ou en métallique-dur), contrairement, on retient "Non".
- Voir s'il y a superposition pendant/après la préparation, ainsi qu'au moment de servir, c'est à dire si une assiette/cassérole est posée au-dessus d'une autre. (Superposition - si l'assiette/cassérole d'en-dessous n'est pas couverte, même si celle qui est posée au-dessus est couverte.)
- Ustensiles utilisés pour la préparation, le malaxage et la mise de nourriture dans les assiettes.

## LA PREPARATION DU RESTANT

Il y a 3 catégories de restant :
- d'hier soir (1er repas)
- du 1er repas (2ème repas)
- du 2e repas (3ème repas)

Les premières 4 rubriques du restant concerne la conservation de restant de la nourriture avant le réchauffage ou avant de manger. Tandis que la 5ème rubrique est celle du réchauffage. Si le lieu de conservation est à l'intérieur, laissez la case "emplacement" vide, et remplissez la case "couvert" seulement si vous le voyez.
Pour le transfert des aliments, l'observateur doit noter si l'aliment est transféré ou pas dans une cassérole lavée ou pas lavée, avec eau et/ou savon.
Observer si le restant est réchauffé ou pas. Dans le cas ou c'est réchauffé, il faut :
- chronométrer la durée de réchauffage;
- préciser le lieu de réchauffage (interne ou externe).
- remplir les restes des cases du restant en suivant les mêmes instructions comme celle de la nouvelle préparation (l'approche des animaux, ustensiles, couvercle et superposition).

## LA PRISE DU REPAS

On suppose, qu'on observera pas plus de 3 repas pour le temps d'observation prévu. En haut de cette fiche, il faut transposer les numéros des aliments nouvellement préparés ou le restant, de la 3ème fiche vers la fiche précédente. Dans la rubrique transfert des aliments de la cassérole vers les assiettes, se fait :

a) vers l'assiette vue nettoyée (lavée) : les possibilités retenues : soit non transfert lorsqu'on mange dans la marmite dans laquelle on a préparé, lavée avec eau et savon; lavée avec eau; ou pas lavée.
Au cas où il y a transfert et en même temps on mange dans la marmite dans laquelle on a préparé, on considère le transfert, car le transfert domine.

b) Vers la place où se trouvait l'assiette lors du transfert :
- <u>par terre</u> : si elle est en contact direct avec la terre, ou sur une natte, ou à un niveau facilement accessible par les animaux domestiques.
- <u>élevée</u> : si l'assiette est posée de préférence sur une table, ou à un endroit difficilement accessible par les animaux domestiques (une étagère par ex.).

Après ce transfert, les restes d'observations concernant les assiettes, doivent être remplies, suivant la procédure de la page précédente sur les casseroles.
Lorsque la famille mange spécifier si tous les membres lavent les mains avec eau simple ou avec eau plus savon, en notant dans chaque cas, si ce lavage se réalise dans un bassin commun ou si c'est individuel. Notez si les mains n'étaient pas lavées lors de la fin du repas. Cette observation se réalise au cours de la prise du repas, et doit être conçu à la fin du repas.
Mentionnez également, si lorsque la famille mange, il y a approche des animaux domestiques près d'elle. Si non, ne marquez rien.
Dans la rubrique, Enfant cible mange :

- remplissez comme précédemment, la série des mains lavées;
- notifiez l'assiette dans laquelle il mange, si elle est commune (partagée) ou si elle est individuelle (à part), voir même les deux possibilités à la fois.
- mentionner également si cette prise de repas de l'enfant cible est éffectuée juste avant, à la fois, ou juste après que les autres membres de la famille aient pris leur repas; mais, ces trois possibilités peuvent également être retenues toute à la fois. Au cas ou l'enfant cible mange seul, après qu'on ait enlevé les assiettes dans lesquelles les autres membres du ménage ont mangés, ce n'est pas "juste après", mais plutôt voir ce qu'il mange, si ça peut être considéré comme un autre (nouveau) repas, ou si ça peut être inclus dans les observations de 10 minutes.
- Signalez enfin, si l'enfant cible prend la nourriture de ses propres mains ou s'il est nourri par une autre personne; par conséquent, l'état de propreté de ses mains doit être noté à se référant à l'état de propreté de la Série mains lavées.

## INSTRUCTION : FICHE N°4 : LA DEFECATION

1. Le responsable de l'enfant : c'est la personne qui s'occupe de l'enfant au moment où il chie. Elle peut être, un adulte homme (ou adulte femme) âgé de plus de 15 ans; tandis qu'un enfant garçon (ou une fille) âgé (é) de moins de 15 ans.

2. L'observateur marque défécation "Vu" ou "pas Vu" selon qu'il aurait vu l'enfant chier ou pas. Il doit noter également l'heure à laquelle l'enfant a fait ses selles.

3. Habillé : spécifiez l'habit que l'enfant a porté au moment de la défécation; souvent il est habillé soit en linge ou en couche ou en pagne, soit en caleçon ou culottes ou parfois il se présente les fesses nues. Ici, l'observateur doit noter une de trois cases présentes devant lui.

4. Lieu de défécation : c'est l'endroit où l'enfant a déposé ses selles. Dans ce cas, l'observateur a six possibilités dont il pointe qu'une seule.

5. **Ramassage des selles**

   L'observateur est obligé de noter qu'une seule case. Considérez une seule proposition : soit les selles sont laissées par terre, soit elles sont ramassées par un autre matériel pour être rejetté ailleurs.

6. Habits ou couches sales

   Les habits ou couches sales sont ceux dans lesquels l'enfant a chié. Dans ce cas, l'observateur doit signaler la case correspondant à l'endroit où ces habits sales ont été installés ou exposés. Toutefois, il est conseillé de noter "pas d'habits sales" si l'enfant n'a pas fait les selles dans ses habits ou couches.

7. Habits ou couches sales pris pour nettoyage

L'observateur mentionne à quelle heure les habits ou couches dans lesquels l'enfant a fait ses selles, sont amenés pour nettoyage. Il marque "pas Vu" lorsqu'il ne voit pas ses habits sales amenés pour être nettoyés.

8. Essuyage de l'enfant

C'est l'un des moyens qu'on se sert pour enlever les matières fécales qui sont sur le corps de l'enfant. Le responsable peut nettoyer ou essuyer l'enfant en utilisant :
- habit : une couche ou un vêtement que porte l'enfant lorsqu'il chie dessus.
- linge : une étoffe ou un lambeau d'habit sec ou mouillé, que l'on se sert pour essuyer l'enfant qui vient de chier.
- feuille :

Après avoir essuié l'enfant, il faut dire si le responsable et l'enfant cible ont lavés leurs mains ou pas.

9. Lavage de l'enfant

L'observateur doit noter si le corps de l'enfant est nettoyé, soit avec eau simple, eau et savon, ou pas vu.

INSTRUCTIONS : FICHE N°5 : OBSERVATIONS DE DIX MINUTES

1. Les observations commencent immédiatement après le premier repas (une boisson prise après le premier repas est incluse dans l'observation de 10'), ou à 9hoo si jusque là on ne prépare/on ne mange pas encore. Lorsqu'on prépare ou on mange un deuxième ou un 3è repas à l'intervalle d'une boservation, considérer l'une de ces propositions suivantes :
   - annulez l'unité d'observation si elle a pris moins de 5 minutes
   - considérez d'abord l'unité d'observation si elle a pris 5 minutes de plus, et rentrer ensuite à la fiche N°3.

   Dès que le 2e ou 3e repas se termine, revenez sur les observations chronométrées jusqu'à atteindre 10 à 12 unités d'observation de 10 minutes.

2. Ne considérez pas le repos (sommeil de l'enfant) comme une observation chronométrée. A ce moment, l'observateur se repose éveillé en attendant que l'enfant se réveille; ou s'en occupe de remplir la fiche sur la préparation des aliments si pareille activité se présenterait.

3. Mentionnez chaque activités de l'enfant cible qui aboutit à la mise d'une chose quelconque dans sa bouche (l'enfant). Excepté l'allaitement, n'importe quelle activité qui a eu lieu une fois ou plus pendant un intervalle de 10' ne doit jusque là être écrit qu'une seule fois.

4. Les deux heures d'observations d'intervalle de 10 minutes sont cumulatives; par conséquent, il ne faut pas inclure les minutes de repos dans les deux heures d'observation de 10 minutes. Ce n'est pas obligatoire que les intervalles soient consécutives, c.à.d. qu'ils se terminent dans l'espace de 120 minutes.
   Deux situations principales peuvent intérrompre l'observation en cours :
   1) le sommeil de l'enfant
   2) la préparation d'un repas ou le début de la prise d'un repas.

   En effet, l'observateur tiendra compte des instructions suivantes :
   a) si l'observation en cours de 10' a pris moins de 5 minutes, cette unité d'observation est carrément annulée.
   b) mais si l'observation a pris 5 minutes ou plus, on considère cette unité d'observation.

5. CATEGORIES

a. HEURE : Notez l'heure du début de chaque intervalle de 10 minutes, pour nous permettre d'évaluer si les observations sont continues ou si elles sont intérrompues par un repas (des repas).

b. RESPONSABLE : C'est la personne responsable de l'enfant cible, qui a resté le plus longtemps possible avec lui, pendant un intervalle de 10 minutes. Le code pour les catégories de responsable est indiqué en haut de la page, à gauche. Pour l'allaitement on suppose que c'est toujours la mère ou une autre adulte femme, bien que le responsable peut être une autre personne.

c. ALLAITEMENT : Nous avons jugé utile de considérer 4 allaitements, car c'est une activité qui se réalise plusieurs fois pendant un intervalle de 10'. En effet, chaque fois que l'enfant téte, marquer chaque fois la durée de cette fin de tétée, qui est exprimée en minutes et en secondes; mais les fractions de sécondes sont arrondies de la manière suivante :

(a). 0,0"        30 sécondes = 0,0 minute
(b). 31"         45 sécondes = 0,5 minute
(c). 46"         60 sécondes = 1,0 minute

ex1. 1 min 27 sec = 1,0 minute
ex2. 6 min 45 sec = 6,5 minutes
ex3. 2 min 52 sec = 3,0 minutes

N.B. Ecrivez toujours la durée de l'allaitement avec un chiffre après la virgule.

d. L'EAU A BOIRE : Bien que l'enfant peut mettre de l'eau dans sa bouche plus d'une fois pour chaque intervalle de 10 minutes, on ne signale que la 1ère mise d'eau dans la bouche. Il y a 2 parties pour cette observation :
(1) la motivation ou ce qui pousse l'enfant à boire l'eau, qui est entre autre : la fin du repas, la consolation (enfant pleure ou demande à boire), et le bain ou la douche (jouer dans son bain).
(2) Les méthodes de prise d'eau (boisson) : signalez la (les) méthode (s) vue(s) en application :
- avec ses propres mains ou les doigts/main d'une autre personne.
- avec la cuiller
- avec une tasse/gobelet commun
- avec une tasse/gobelet
- **à l'aide** d'un biberon (ou bouteille).

On suppose que si l'enfant joue dans son bain, il boit de l'eau avec ses doigts ou mains ou ceux d'une autre personne.

e. Lait (Non-maternel ou conditionne)/thé, café :

Lorsque l'enfant prend 2 boissons ou plus de 2 dans cet intervalle de 10', considérez toujours la première boisson. Mentionnez enfin , la (les) méthode (s) utilisée (s) pour la prise de cette boisson, entre autres:
(1) doigts/main
(2) cuiller
(3) tasse/gobelet
(4) bouteille/biberon

f. Objets dans la bouche :

Ces objets peuvent comprendre :

- DOIGTS DE L'ENFANT : se réfère à n'importe quel moment (sauf pour manger ou boire), que l'enfant met ses propres doigts dans sa bouche.
- DOIGTS D'UN (E) AUTRE : N'importe quelle autre personne qui met ses doigts dans la bouche de l'enfant, sauf si la personne autre le nourrit ou le donne à boire.
- ORDURES ORGANIQUES : Faisons allusion aux issues des aliments non préparés. Ex. : les noyaux de fruit ou leurs épulchures, les tiges de légumes, miettes de viande vue jettées par terre etc... et les déchets de la nourriture. Ce sont les restes de la nourriture préparée, mais non conservée ou qui tombe par terre. ex. les os préparés, les croûtes de Luku.
- OBJETS DURS : tels que : stick, peigne, linge, vêtements, bic, clé, cuiller etc... signalez si l'objet en question est sale (dans la plupart des cas) ou c'est propre (ex. cuiller à peine lavée).
- SELLES ANIMALES : cocher dans la case correspondante, lorsqu'on aurait vu l'enfant cible entrain de mettre dans sa bouche les selles des animaux domestiques.
- SELLES DE L'ENFANT : signalez tout de même lorsqu'on aurait vu l'enfant mettre ses propres selles dans sa bouche, quoique ce n'est vraiment pas une voie de transmission microbienne à trop considérer.
- ALIMENTS : Notez les catégories des aliments appropriés que l'enfant consomme en dehors d'un repas (luku, riz, chikwangue, bouillie), car le repas a été pris à un autre moment (à part). (Nous considérons la tomate dans les légumes/feuilles).
- L'ENFANT DORT : Pour n'importe quel intervalle de 10 minutes :
  (1) spécifier s'il dort à l'intérieur ou à l'extérieur de la maison;
  (2) signaler également s'il est endormi par terre ou sur la natte/lit, ou enfin dans les bras/ou au sein.

En finalité, voilà l'essentiel qui a été conçu pour la meilleure application de notre Manuel d'observation sur terrain.-

C E P L A N U T
PROJET DIARRHEE/OMS
B.P. 298 - KIKWIT

OBSERVATION RECORDING FORM
PRE-INTERVENTION (1987)

ETUDE D'OBSERVATION

DATE D'OBSERVATION :__ __/__ __/__ __

OBSERVATEUR :______________________________

SITE :____________________________ CODE :________

LOCALITE :__________________________

NOM DE LA MERE :_________________________ N° ID.__/__/__/__/__/

NOM DE L'ENFANT :________________________ N° ID. __/__/__/__/__/

MOBILISATION DE L'ENFANT* : ASSIS - QUATRE PATTES - PIEDS

COMMENTAIRES

(*) BIFFER LA MENTION INUTILE.

# FICHE N° 1

## HYGIENE PARCELLE ET CUISINE

1. HEURE DEBUT: ____________

2. MAISON CONSTRUCTION

☐ Chaume ☐ pisé ☐ durable ☐ semi-durable

3. FENETRES
   a) nombre: ☐ 0 ☐ 1-2 ☐ 3-4 ☐ 5+
   b) est-ce: ☐ ouvertes ☐ fermées

4. W. C.
   a) présent: ☐
   b) distance: ☐ 0-5 Pas ☐ 6-9 Pas ☐ 10 Pas
   c) utilisé: ☐ Oui ☐ non
   d) etat: ☐ + ☐ $\bar{x}$ ☐ --

5. TROU À ORDURE
   a) présent ☐
   b) utilisé ☐
   c) matière organique ☐
   d) matière durable ☐

6. PARCELLE BALAYEE: ☐
   a) matière organique ☐
   b) matière durable ☐

7. ANIMAUX DOMESTIQUES VUES
   a) ☐ pas vu ☐ enclotures ☐ liés ☐ libres
   b) acces à la maison/cuisine ☐
   c) presence des selles animales 1) parcelle ☐ 2) maison/cuisine ☐

8. PRESENCE DES SELLES HUMAINES (EXTERIEUR)
   a) est-ce vu? ☐
   b) si oui, où? ☐ derrière maison ☐ pleine parcelle ☐ en brousse (limite parcelle)

9. CUISINE
   a) modèle: ☐ case ☐ chambre à l'intérieur ☐ non-existente
   b) balayée: ☐
   c) vaisselle ☐ propre/terre ☐ propre/élevé ☐ sale/terre ☐ sale/élevée
   d) meublé ☐
   e) mortier ou pilon horizontal par terre ☐

10. SAVON
    a) jamais vu pendant le matin? ☐
    usages:
    b) se laver ☐
    c) laver les mains avant repas ☐
    d) vaisselle ☐
    e) buanderie ☐

FICHE N° 2
HYGIENE DE L'EAU

| RECIPIENT | BASSIN | SEAU | MARMITE | CALEBASSE | DAME-JEANNE | CRUCHE | BIDON | BOUTEILLE | FÛT | AUTRES |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. LIEU DE STOCKAGE | | | | | | | | | | |
| a. intérieur | | | | | | | | | | |
| b. extérieur | | | | | | | | | | |
| 2. EMPLACEMENT | | | | | | | | | | |
| a. par terre | | | | | | | | | | |
| b. élevé | | | | | | | | | | |
| 3. USAGES | | | | | | | | | | |
| a. boissons | | | | | | | | | | |
| b. autres | | | | | | | | | | |
| 4. COUVERT | | | | | | | | | | |
| a. durable | | | | | | | | | | |
| b. non durable | | | | | | | | | | |
| c. non | | | | | | | | | | |
| 5. VU BOUILLIE | | | | | | | | | | |
| a. Oui | | | | | | | | | | |
| b. pas vu | | | | | | | | | | |
| 6. GOBELET RESERVE AU TRANSFERT | | | | | | | | | | |
| a. oui < propre | | | | | | | | | | |
| a. oui < sale | | | | | | | | | | |
| b. non | | | | | | | | | | |

| 7. ORIGINES D'EAU | L'EAU A BOIRE | AUTRES USAGES |
|---|---|---|
| Source < aménagée | | |
| Source < non-aménagée | | |
| Mare d'eau (marigot) | | |
| Rivière | | |
| Pompe à eau | | |
| Eau de pluie | | |

21 × 9

FICHE No. 3
PREPARATION
(p.1)

| | | 1e REPAS | | | 2e REPAS | | | 3e REPAS | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CHIFFRE ALIMENTS | | | | | | | | | | |
| PREPARATION NOUVELLE | | | | | | | | | | |
| HEURE | • debut | | | | | | | | | |
| | • fin | | | | | | | | | |
| MAINS | • eau + savon | | | | | | | | | |
| | • eau | | | | | | | | | |
| | • non-lavées | | | | | | | | | |
| ALIMENTS NETTOYES | | | | | | | | | | |
| CASS. NETTOYÉE | • eau + savon | | | | | | | | | |
| | • eau | | | | | | | | | |
| | • non-nettoyée | | | | | | | | | |
| LIEU PREPAR. | • intérieur | | | | | | | | | |
| | • extérieur | | | | | | | | | |
| CASS. EMPLAC. | • par terre | | | | | | | | | |
| | • élevée | | | | | | | | | |
| APPROCHE ANIMAUX | | | | | | | | | | |
| USTENCILS | • main | | | | | | | | | |
| | • dur | | | | | | | | | |
| | • bois/feuille | | | | | | | | | |
| COUVERT | • dur | | | | | | | | | |
| | • feuille/bois | | | | | | | | | |
| | • non-couvert | | | | | | | | | |
| | • superposition | | | | | | | | | |
| **RESTANT** | | | | | | | | | | |
| LIEU CONSERV. | • intérieur | | | | | | | | | |
| | • extérieur | | | | | | | | | |
| CONSERV. COUVERTE | • dur | | | | | | | | | |
| | • feuille | | | | | | | | | |
| | • non-couvert | | | | | | | | | |
| | • superposition | | | | | | | | | |
| CONSERV. EMPLAC. | • par terre | | | | | | | | | |
| | • élevée | | | | | | | | | |
| TRANSFERT A CASS. | • non transfert | | | | | | | | | |
| | • eau + savon | | | | | | | | | |
| | • eau | | | | | | | | | |
| | • pas-lavée | | | | | | | | | |
| RECHAUFFAGE | • durée (min) | | | | | | | | | |
| | • interieur | | | | | | | | | |
| | • exterieur | | | | | | | | | |
| APPROCHE ANIMAUX | | | | | | | | | | |
| USTENCILS | mains: lavées | | | | | | | | | |
| | mains: non lavé | | | | | | | | | |
| | autres: lavés | | | | | | | | | |
| | autres: non lavé | | | | | | | | | |
| COUVERT | • dur | | | | | | | | | |
| | • feuille | | | | | | | | | |
| | • non-couvert | | | | | | | | | |
| | • superposition | | | | | | | | | |

FICHE N° 3
REPAS (p. 2)

| | | 1e REPAS | | | 2e REPAS | | | 3e REPAS | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CHIFFRE ALIMENTS | | | | | | | | | | |
| **REPAS** | | | | | | | | | | |
| TRANSFERT CASS. A ASSIETTE | • non-transf. | | | | | | | | | |
| | • eau + savon | | | | | | | | | |
| | • eau | | | | | | | | | |
| | • pas lavée | | | | | | | | | |
| ASS. EMPLAC. | • par terre | | | | | | | | | |
| | • élevée | | | | | | | | | |
| APPROCHE ANIMAUX | | | | | | | | | | |
| ASS. COUVERT | • dur | | | | | | | | | |
| | • feuille | | | | | | | | | |
| | • non-couvert | | | | | | | | | |
| | • superposition | | | | | | | | | |
| LIEU DU REPAS | • intérieur | | | | | | | | | |
| | • extérieur | | | | | | | | | |
| | • par terre | | | | | | | | | |
| | • élevé | | | | | | | | | |
| **FAMILLE MANGE** | | | | | | | | | | |
| HEURE DEBUT | | | | | | | | | | |
| MAINS LAVEES AVANT FIN REPAS | • bassin commun | | | | | | | | | |
| | • individuel | | | | | | | | | |
| | • eau + savon | | | | | | | | | |
| | • eau | | | | | | | | | |
| | • non-lavées | | | | | | | | | |
| APPROCHE ANIMAUX | | | | | | | | | | |
| **ENFANT CIBLE MANGE** | | | | | | | | | | |
| MAINS LAVEES AVANT FIN REPAS | • bassin com. | | | | | | | | | |
| | • individuel | | | | | | | | | |
| | • eau + sav. | | | | | | | | | |
| | • eau | | | | | | | | | |
| | • non-lavées | | | | | | | | | |
| ENFANT ASS. | • partagée | | | | | | | | | |
| | • à part | | | | | | | | | |
| PAR RAPPORT AU TEMPS | • juste avant | | | | | | | | | |
| | • à la fois | | | | | | | | | |
| | • juste après | | | | | | | | | |
| PRIS AVEC SES PROPRES MAINS | | | | | | | | | | |
| NOURRI PAR AUTRE, AVEC | • mains | | | | | | | | | |
| | • cuillère | | | | | | | | | |
| MAINS D'AUTRE LAVÉES | • bassin com. | | | | | | | | | |
| | • individuel | | | | | | | | | |
| | • eau, savon | | | | | | | | | |
| | • eau | | | | | | | | | |
| | • non-lavées | | | | | | | | | |

# FICHE N°4 : DEFECATION

1. RESPONSABLE DE L'ENFANT

☐ adulte homme ☐ adulte femme ☐ maman
☐ enfant garçon ☐ enfant fille

2. DEFECATION < Vu ☐ / Pas vu ☐

Heure de défécation: ____________

3. HABILLE

☐ Linge/couche/Pagne ☐ caleçon-culottes
☐ fesses nues

4. LIEU DE DEFECATION

☐ dans les bras ☐ Par terre brousse ☐ Par terre pleine parcelle ☐ W.C. ☐ Pot
☐ sur son lit/natte

5. RAMASSAGE DES SELLES

☐ Laissées par terre ☐ Prises avec un instrument et jetées au W.C. ☐ Prises avec un instrument et jetées en brousses
☐ Prises avec une feuille/habits/couches et jetées en brousse ☐ prises avec une feuille/habits/couches et jetées au W.C.

6. HABITS OU COUCHES SALES

☐ arbre ☐ bassin intérieur ☐ bassin extérieur ☐ Pas d'habits sales
☐ toît ☐ Par terre maison ☐ par terre extérieur

7. HABITS OU COUCHES SALES PRISES POUR NETTOYAGE

☐ oui ☐ Pas vu

Heure : ____________
Durée de trainage: ____________

8. ESSUYAGE DE L'ENFANT

☐ Avec habits ☐ Avec linge ☐ Avec feuille

9. LAVAGE DE L'ENFANT

☐ eau simple ☐ eau + savon ☐ Pas vu

RESPONSABLE : A = MERE, B = ADULTE ♀, C = ADULTE ♂, D = ENFANT ♀, E = ENFANT ♂

# FICHE N° 5 : OBSERVATION CHRONOMETRÉE

| | | | ALLAITEMT. | | | | L'EAU À BOIRE | | | | | | | | MOYEN DE BOIRE T/C/L | | | | OBJETS DANS BOUCHE | | | | | | | ALIMENTS | | | | ENFANT QUI DORT | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | MOYEN | | | | | | | | | | | | | | | | | | | | | | | | | |
| N° OBSERVATION | HEURE | RESPONSABLE | DUREE | DUREE | DUREE | DUREE | APRES REPAS | PLEURER/DEMANDE | JOUER DANS BAIN | DOIGTS/MAIN | CUILLERE | TASSE | BIBERON | THE/CAFE/LAIT | DOIGTS/MAIN | CUILLERE | TASSE | BIBERON | DOIGTS - ENFANT | DOIGHTS - AUTRES | ORDURES ORGANIQUE | OBJETS DURS - PROPRE | OBJETS DURS - SALES | SELLES - ANIMALES | SELLES - ENFANTS | FRUITS | CEREALS/GRAINS | LEGUMINEUSES | LEGUMES/FEUILLES | SEIN/BRAS | INTERIEUR | EXTERIEUR | PAR TERRE | NATTE/LIT | |
| 01 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 02 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 03 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 06 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 07 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 08 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 09 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

# CODING FORM FOR PRE-INTERVENTION (1987) OBSERVATION RECORDING FORM

ETUDE D'OBSERVATION - LIVRE DE CODES

OBSERV1.DBF

| NOM DE VARIABLE | No. DE VARIABLE | No. DE COLONNES | CODES |
|---|---|---|---|
| **O. FICHE OUVERTE.** | | | |
| 1. Date d observatic- | O1 | 1-8 | |
| 2. Observateur | O2 | 9-18 | |
| 3. Code site | O3 | 19-20 | |
| 4. Localite | O4 | 21-35 | |
| 5. Numero de mere | O5 | 36-40 | |
| 6. Numero d'enfant | O6 | 41-45 | |
| 7. Mobilisation | O7 | 46 | 1=assis<br>2=quatre pattes<br>3=pieds |
| **I. FICHE I: HYGIENE PARCELLE ET CUISINE** | | | |
| 1. Heure debut | I1 | 47-50 | |
| 2. Maison constructic- | I2 | 51 | 1=chaume<br>2=pise<br>3=durable<br>4=semi-durable |
| 3a. Fenetres-nombres | I3A | 52 | 1=zero (0)<br>2=1 a 2<br>3=3 a 4<br>4=5+ |
| 3b. Fenetres-etat | I3B | 53 | 1=ouvertes<br>2=fermees<br>9=n/a |
| 4a. W.C. presence | I4A | 54 | 1=present<br>0=absent |
| 4b. W.C. distance | I4B | 55 | 1=0-5 pas<br>2=6-9 pas<br>3=10+ pas<br>9=n/a |
| 4c. W.C. utilise | I4C | 56 | 1=oui<br>2=non<br>9=n/a |
| 4d. W.C. etat | I4D | 57 | 1=+<br>2=moyen<br>3=-<br>9=n/a |
| Troi a ordure: | | | |
| [illegible]. presence | I5A | 58 | 1=oui<br>[illegible]=non |
| 5b. utilise | I5B | 59 | 1=oui<br>[illegible]=non<br>9=n/a |

| | | | |
|---|---|---|---|
| 5c. matiere organique | I5C | 61 | 1=oui<br>0=non<br>9=n/a |
| 5d. matiere durable | I5D | 61 | 1=oui<br>0=non<br>9=n/a |
| 6. parcelle balayee | I6 | 62 | 1=oui<br>0=non |
| 6a. matiere organique | I6A | 63 | 1=oui<br>0=non |
| 6b. matiere durable | I6B | 64 | 1=oui<br>0=non |
| 7a. Animaux domestiques | I7A | 65 | 0=pas<br>1=enclotures<br>2=lies<br>3=libres |
| 7b. Acces animal | I7B | 66 | 1=oui<br>0=non |
| 7c1. Selles animales, parcelle | I7C1 | 67 | 1=oui<br>0=non |
| 7c2. Selles animales, maison | I7C2 | 68 | 1=oui<br>0=non |
| 8a. Selles humaines vues | I8A | 69 | 1=oui<br>0=non |
| 8b. Selles vues ou? | I8B | 70 | 1=derriere maison<br>2=pleine parcelle<br>3=en brousse<br>9=n/a |
| 9a. Cuisine modele | I9A | 71 | 1=case<br>2=chambre int.<br>0=non-existante |
| 9b. Cuisine balayee | I9B | 72 | 1=oui<br>2=non<br>9=n/a |
| 9c. Vaisselle | I9C | 73 | 1=propre/terre<br>2=propre/elevee<br>3=sale/terre<br>4=sale/elevee |
| 9c. Meuble | I9C | 74 | 1=oui<br>0=non<br>9=n/a |
| 9e. Mortier/pilon terre | I9E | 75 | 1=oui<br>0=non |

| | | | |
|---|---|---|---|
| 10a. Savon vu | I10A | 76 | 1=oui<br>0=non |
| 10b. Se laver | I10B | 77 | 1=oui<br>0=non<br>9=n/a |
| 10c. Laver les mains | I10C | 78 | 1=oui<br>0=non<br>9=n/a |
| 10d. Vaisselle | I10D | 79 | 1=oui<br>0=non<br>9=n/a |
| 10e. Buanderie | I10E | 80 | 1=oui<br>0=non<br>9=n/a |

II. FICHE II: HYGIENE DE L'EAU

Categories des recipients : A = bassin/seau/marmite
B = calebasse/cruche/dame-jeanne/bouteille
C = bidon
D = futs/autres.

Lieu de stockage:

| | | | |
|---|---|---|---|
| 1a. A | IILA | 81 | 1=interieur |
| 1b. B | IILB | 82 | 2=exterieur |
| 1c. C | IILC | 83 | 3=les deux |
| 1d. D | IILD | 84 | 9=n/a |

Emplacement:

| | | | |
|---|---|---|---|
| 2a. A | IIEA | 85 | 1=par terre |
| 2b. B | IIEB | 86 | 2=eleve |
| 2c. C | IIEC | 87 | 3=les deux<br>9=n/a |

Usage:

| | | | |
|---|---|---|---|
| 3a. A | IIUA | 88 | 1=boisson |
| 3b. B | IIUB | 89 | 2=autres |
| 3c. C | IIUC | 90 | 3=les deux |
| 3d. D | IIUD | 91 | 9=n/a |

Couvert :

| | | | |
|---|---|---|---|
| 4a. A | IICA | 92 | 0=non |
| 4b. B | IICB | 93 | 1=durable |
| 4c. C | IICC | 94 | 2=non-durable |
| 4d. D | IICD | 95 | 3=(1+2)<br>4=(0+1)<br>5=(0+2)<br>9=n/a |

Vu [illegible]:

| | | | |
|---|---|---|---|
| 5a. A | IIBA | 96 | 0=pas vu |
| 5b. B | IIBB | 97 | 1=oui |
| 5c. C | IIBC | 98 | 2=(0+1)<br>9=n/a |

Gobelet au transfert:

| | | | |
|---|---|---|---|
| 6a. A | IIGA | 99 | 0=non |
| 6b. B | IIGB | 100 | 1=propre |
| 6c. C | IIGC | 101 | 2=sale |
| 6d. D | IIGD | 102 | 3=(1+2) |
| | | | 4=(0+1) |
| | | | 5=(0+2) |
| | | | 9=n/a |

Origine d'eau:

| | | | |
|---|---|---|---|
| 7a. Source amenagee | II7A | 103 | 0=pas d'usage |
| 7b. Source non-amenagee | II7B | 104 | 1=a boire |
| 7c. Mare/marigot | II7C | 105 | 2=autres |
| 7d. Riviere | II7D | 106 | 3=(1+2) |
| 7e. Pompe a eau | II7E | 107 | |
| 7f. Eau de pluie | II7F | 108 | |

III. FICHE III. PREPARATION NOUVELLE

OBSERV2.DEF

| | | | |
|---|---|---|---|
| 0. No. de mere | III0 | 1-5 | |
| 1. Nbr. d'assiettes | III1 | 6 | |
| 2. Aliments, ass.1 | III2 | 7-8 | |
| 3. " " 2 | III3 | 9-10 | |
| 4. " " 3 | III4 | 11-12 | |
| 5. " " 4 | III5 | 13-14 | |
| 6. " " 5 | III6 | 15-16 | |
| 7. " " 6 | III7 | 17-18 | |
| 8. " " 7 | III8 | 19-20 | |
| 9. " " 8 | III9 | 21-22 | |
| 10. " " 9 | III10 | 23-24 | |
| 11. Heure debut, ass.1 | III11 | 25-28 | 0000 - pas de prép |
| 12. " " " 2 | III12 | 29-32 | |
| 13. " " " 3 | III13 | 33-36 | |
| 14. " " " 4 | III14 | 37-40 | |
| 15. " " " 5 | III15 | 41-44 | |
| 16. " " " 6 | III16 | 45-48 | |
| 17. " " " 7 | III17 | 49-52 | |
| 18. " " " 8 | III18 | 53-56 | |
| 19. " " " 9 | III19 | 57-60 | |
| 20. Heure fin, ass. 1 | III20 | 61-64 | 0000 - pas de prép |
| 21. " " " 2 | III21 | 65-68 | |
| 22. " " " 3 | III22 | 69-72 | |
| 23. " " " 4 | III23 | 73-76 | |
| 24. " " " 5 | III24 | 77-80 | |
| 25. " " " 6 | III25 | 81-84 | |
| 26. " " " 7 | III26 | 85-88 | |
| 27. " " " 8 | III27 | 89-92 | |
| 28. " " " 9 | III28 | 93-96 | |

Mains lavees, nbr d'assiettes :

| | | |
|---|---|---|
| 29. eau/savon | III29 | 97 |
| 30. eau | III30 | 98 |
| 31. non-lavees | III31 | 99 |

| | | |
|---|---|---|
| 32. Aliments nettoyes | III32 | 100 |
| Casseroles nettoyees, nbr d'assiettes : | | |
| 33. eau/savon | III33 | 101 |
| 34. eau | III34 | 102 |
| 35. non-nettoyees | III35 | 103 |
| Lieu de preparation, nbr d'assiettes : | | |
| 36. interieur | III36 | 104 |
| 37. exterieur | III37 | 105 |
| Emplacement casseroles, nbr d'assiettes : | | |
| 38. par terre | III38 | 106 |
| 39. elevees | III39 | 107 |
| 40. Approche animale, nbr d'assiettes | III40 | 108 |
| Ustensils, nbr d'assiettes: | | |
| 41. mains | III41 | 109 |
| 42. dur | III42 | 110 |
| 43. feuilles/bois | III43 | 111 |
| Couvert, nbr d'assiettes : | | |
| 44. dur | III44 | 112 |
| 45. feuilles/bois | III45 | 113 |
| 46. non couvert | III46 | 114 |
| 47. superposition | III47 | 115 |

PREPARATION DU RESTANT.

| | | |
|---|---|---|
| 48. nbr. d'assiettes | III48 | 116 |
| 49. Aliments, ass. 1 | III49 | 117-118 |
| 50. " " 2 | III50 | 119-120 |
| 51. " " 3 | III51 | 121-122 |
| 52. " " 4 | III52 | 123-124 |
| 53. " " 5 | III53 | 125-126 |
| 54. " " 6 | III54 | 127-128 |
| 55. " " 7 | III55 | 129-130 |
| 56. " " 8 | III56 | 131-132 |
| 57. " " 9 | III57 | 133-134 |
| Lieu de conservation, nbr d'assiettes : | | |
| 58. interieur | III58 | 135 |
| 59. exterieur | III59 | 136 |
| Conservation couvert, nbr d'assiettes : | | |
| 60. dur | III60 | 137 |
| 61. feuille | III61 | 138 |
| 62. non-couvert | III62 | 139 |
| 63. superposition | III63 | 140 |

Emplacement conservation.
nbr d'assiettes :

| | | |
|---|---|---|
| 64. par terre | III64 | 141 |
| 65. elevee | III65 | 142 |

Transfert a casseroles.
nbr d'assiettes :

| | | |
|---|---|---|
| 66. non transfert | III66 | 143 |
| 67. eau/savon | III67 | 144 |
| 68. eau | III68 | 145 |
| 69. pas lavees | III69 | 146 |

Rechauffage :

| | | |
|---|---|---|
| 70. no. d'assiette | III70 | 147 |
| 71. duree (min) | III71 | 148-149 |
| 72. no. d'assiette | III72 | 150 |
| 73. duree (min) | III73 | 151-152 |
| 74. no. d'assiette | III74 | 153 |
| 75. duree (min | III75 | 154-155 |
| 76. interieur | III76 | 156 |
| 77. exterieur | III77 | 157 |
| 78 Approche animale. nbr d'assiettes | III78 | 158 |

Ustensils.
nbr d'assiettes :

| | | |
|---|---|---|
| 79. mains lavees | III79 | 159 |
| 80. mains non-lavees | III80 | 160 |
| 81. autres laves | III81 | 161 |
| 82. autres non-laves | III82 | 162 |

Couvert, nbr d'assiettes :

| | | |
|---|---|---|
| 83. dur | III83 | 163 |
| 84. feuille | III84 | 164 |
| 85. non-couvert | III85 | 165 |
| 86. superposition | III86 | 166 |
| 87. nbr. total de repas | III87 | 167 |

OBSERV3.DEF

| | | |
|---|---|---|
| 88a. No. de la mere | III88A | 1-5 |

Transfert casserole a assiette.
nbr d'assiettes :

| | | |
|---|---|---|
| 88. non-transfert | III88 | 6 |
| 89. eau/savon | III89 | 7 |
| 90. eau | III90 | 8 |
| 91. pas lavees | III91 | 9 |

Emplacement assiettes.
nbr d'assiettes:

| | | |
|---|---|---|
| 92. par terre | III92 | 10 |
| 93. elevees | III93 | 11 |
| 94. Approche animale | III94 | 12 |

Assiettes couvert,
nbr d'asssiettes :

| | | |
|---|---|---|
| 95. dur | III95 | 13 |
| 96. feuille | III96 | 14 |
| 97. non-couvert | III97 | 15 |
| 98. superposition | III98 | 16 |

Lieu du repas,
nbr d'assiettes :

| | | |
|---|---|---|
| 99. interieur | III99 | 17 |
| 100. exterieur | III100 | 18 |
| 101. par terre | III101 | 19 |
| 102. elevees | III102 | 20 |

FAMILLE MANGE

| | | |
|---|---|---|
| 103. Heure debut, ass. 1 | III103 | 21-24 |
| 104. " " " 2 | III104 | 25-28 |
| 105. " " " 3 | III105 | 29-32 |
| 106. " " " 4 | III106 | 33-36 |
| 107. " " " 5 | III107 | 37-40 |
| 108. " " " 6 | III108 | 41-44 |
| 109. " " " 7 | III109 | 45-48 |
| 110. " " " 8 | III110 | 49-52 |
| 111. " " " 9 | III111 | 53-56 |

Mains lavees avant fin.
nbr d'assiettes :

| | | |
|---|---|---|
| 112. bassin commun | III112 | 57 |
| 113. individuel | III113 | 58 |
| 114. eau/savon | III114 | 59 |
| 115. eau | III115 | 60 |
| 116. non-lavees | III116 | 61 |
| 117. Approche animale. nbr d'assiettes | III117 | 62 |

ENFANT CIBLE MANGE

Mains lavees avant fin.
nbr d'assiettes :

| | | |
|---|---|---|
| 118. bassin commun | III118 | 63 |
| 119. individuel | III119 | 64 |
| 120. eau/savon | III120 | 65 |
| 121. eau | III121 | 66 |
| 122. non-lavees | III122 | 67 |

Assiette d'enfant,
nbr d'assiettes :

| | | |
|---|---|---|
| 123. partage | III123 | 68 |
| 124. a part | III124 | 69 |

Par rapport au temoin,
nbr d'assiettes :

| | | |
|---|---|---|
| 125. juste avant | III125 | 70 |
| 126. a la fois | III126 | 71 |
| 127. juste apres | III127 | 72 |
| 128. Prise avec ses propres mains, nbr d'ass. | III128 | 73 |

| | | | |
|---|---|---|---|
| **Nourri par autre, nbr d'assiettes :** | | | |
| 129. avec mains | III129 | 74 | |
| 130. avec cuiller | III130 | 75 | |
| **Mains d'autre lavées, nbr d'assiettes :** | | | |
| 131. bassin commun | III131 | 76 | |
| 132. individuel | III132 | 77 | |
| 133. eau/savon | III133 | 78 | |
| 134. eau | III134 | 79 | |
| 135. non-lavees | III135 | 80 | |
| **IV. FICHE IV : DEFECATION.** | | | |
| 1. Responsable | IV1 | 81 | 0=pas de resp.<br>1=adulte homme<br>2=adulte femme<br>3=maman<br>4=enfant garcon<br>5=enfant fille |
| 2. Defecation | IV2 | 82 | 0=pas vue<br>1=vue |
| 2a. Heure | IV2A | 83-86 | 0000= pas de défécation |
| 3. Habille | IV3 | 87 | 1=linge/couche/pagne<br>2=calecon/culotte<br>3=fesses nues<br>9=n/a |
| 4. Lieu | IV4 | 88 | 1=bras<br>2=terre/brousse<br>3=terre/pleine parcelle/maison<br>4=w.c.<br>5=pot<br>6=lit/natte<br>9=n/a |
| 5. Ramassage | IV5 | 89 | 1=laisse terre/maison/parcelle/lechee par chien<br>2=instrument/w.c<br>3=instrument/brousse<br>4=feuille/habits/brousse<br>5=feuille/habits/w.c<br>9=n/a |
| 6. Habits/couches sales | IV6 | 90 | 1=arbre<br>2=bassin inter.<br>3=bassin exter.<br>4=pas habit sale<br>5=toit<br>6=terre/maison<br>7=terre/exterieur<br>9=n/a |

| | | | |
|---|---|---|---|
| 7. Nettoyage | IV7 | 91 | 0=pas vu<br>1=oui<br>9=n/a |
| 7a. Heure | IV7A | 92-95 | 0000=pas defeca tion |
| 7b. Duree | IV7B | 96-99 | |
| 8. Essuyage | IV8 | 100 | 0=rien/traine par terre/chien<br>1=habits<br>2=linge<br>3=feuille/objet dur<br>9=n/a |
| 9. Lavage | IV9 | 101 | 0=pas vu<br>1=eau<br>2=eau+savon<br>9=n/a |

V. <u>FICHE V: OBSERVATION CHRONOMETREE</u>

| | | |
|---|---|---|
| <u>Responsables, nbr de:</u> | | |
| 1. la maman | V1 | 102-103 |
| 2. adulte femme | V2 | 104-105 |
| 3. adulte homme | V3 | 106-107 |
| 4. enfant fille | V4 | 108-109 |
| 5. enfant garcon | V5 | 110-111 |
| 6. Nbr d'allaitements | V6 | 112-113 |
| 7. Duree moyenne d'allaitment | V7 | 114-117 |
| <u>L'eau a boire, nbr d'intervalles</u> : | | |
| 8. apres repas | V8 | 118-119 |
| 9. pleurer/demander | V9 | 120-121 |
| 10. jouer dans bain | V10 | 122-123 |
| 11. doigts/mains | V11 | 124-125 |
| 12. cuiller | V12 | 126-127 |
| 13. tasse | V13 | 128-129 |
| 14. biberon/btl | V14 | 130-131 |
| 15. Cafe/lait/autres nbr d'intervalles | V15 | 132-133 |
| <u>Moyen de boire the/cafe/lait/autre, nbr d'intervalles</u> : | | |
| 16. doigts/mains | V16 | 134-135 |
| 17. cuiller | V17 | 136-137 |
| 18. tasse | V18 | 138-139 |
| 19. biberon | V19 | 140-141 |

Objets dans bouche.
nbr d'intervalles :

| | | |
|---|---|---|
| 20. doigts enfant | V20 | 142-143 |
| 21. doigts/peau d autre | V21 | 144-145 |
| 22. ordures organiques | V22 | 146-147 |
| 23. objets durs propres | V23 | 148-149 |
| 24. objets durs sales | V24 | 150-151 |
| 25. selles animales | V25 | 152-153 |
| 26. selles enfants | V26 | 154-155 |

Aliments. nbr d'intervalles :

| | | |
|---|---|---|
| 27. fruits | V27 | 156-157 |
| 28. cereales/grains/ tubercules | V28 | 158-159 |
| 29. legumineuses | V29 | 160-161 |
| 30. legumes/feuilles | V30 | 162-163 |

Enfant qui dort.
nbr d'intervalles :

| | | |
|---|---|---|
| 31. sein/bras | V31 | 164-165 |
| 32. interieur | V32 | 166-167 |
| 33. exterieur | V33 | 168-169 |
| 34. par terre | V34 | 170-171 |
| 35. natte/lit | V35 | 172-173 |

PAT

PECODIZ
REVISED INSTRUCTION MANUAL FOR POST-INTERVENTION OBSERVATIONS
INSTRUCTIONS POUR OBSERVATIONS 1988

I. SOURCE ET HYGIENE D'EAU

Cette fiche est visee sur l'eau a boire utilisee dans la famille observee. Au cours de l'observation, l'observateur demandera de l'eau a boire. Il fera certains observations associes.

RECIPIENT - C'est le recipient dans laquelle l'eau est stockee. Si le recipient est a l'interieur, l'observateur demandera d'entrer et voir ou le recipient est place. Il observera si le recipient est couvert ou non, et s'il est propre ou sale.

SOURCE PRINCIPALE - On veut savoir quelle est la source principale (c.a.d. la source la plus frequentee) de l'eau a boire. Si l'eau donnee a l'observateur n'est pas venue de la source normalement utilisee pour boire, cette observation doit refleter la source utilisee la plupart du temps. L'observateur doit demander de voir la source, et il doit s'y rendre. En se rendant a la source, l'observateur doit noter s'il y a une contamination directe de cette source, eg. de w.c. qui coulent dedans, ou d'autres effluents.

DISTANCE - L'observateur doit noter le temps pour se rendre a la source a pieds, en utilisant son montre/chrono.

AUTRE SOURCE - De fois il y a une source secondaire utilisee par la famille, pour boire ou pour d'autres usages. L'observateur doit demander si c'est le cas, et quelle sorte de source. Il doit demander le nombre de minutes approximatif a pieds il faut pour y aller, s'il y a une source de contamination de cette eau, et noter cela. Il n'a pas besoin d'aller a la source secondaire.

II. HYGIENE DE PARCELLE

Cette fiche est visee sur l'hygiene de la parcelle, surtout l'acte de balayage, l'emplacement de dechets de balayage, et la presence de selles animales ou humaines. L'observateur evaluera l'etat (c.a.d. la proprete) de la parcelle a l'arrivee et au depart. Il fera certains observations entre son arrivee et son depart, surtout ceux qui concernent un balayage, et les noter dans le colonne "balayage en cours".

HEURE - Le premier rubrique est pour noter l'heure de l'arrivee de l'observateur au menage, et l'heure du depart.

PARCELLE BALAYEE - Lors de son arrivee, l'observateur notera si la parcelle est balayee. Le balayage peut etre fait avant l'arrivee de l'observateur, ou dans l'heure qui suit son arrivee, pour etre considere en dessous du colonne "etat parcelle arrivee". Si le balayage est observe lors de l'arrivee, l'observateur notera l'heure du balayage, qui balaye (soit la mere, un enfant (un enfant est une personne moins de 15 ans, tandis qu'un adulte est quelqu'un qui a 15 ans ou plus), ou un autre adulte) et si le balayage est complet, c.a.d. tout le court est balaye. Si le balayage n'est que sur une partie, eg. juste devant la maison, ce n'est pas complet et on laisse cette case vide. Si le balayage a ete fait avant l'arrivee de l'observateur, il demandera a quelle heure c'etait fait, qui l'a fait, et il observera si ce balayage etait complet ou non.

DECHETS DE BALAYAGE - On veut savoir ou les dechets de balayage sont mis... soit dans un trou a ordure, en brousse (c.a.d. a la peripherie de la parcelle) ou sur la rue, laisses ou enterres dans la parcelle, ou autre.

ENFANT CIBLE JOUE DEDANS - Il s'agit des dechets de balayage. L'observateur cochera cette case s'il observe qu'un enfant cible joue dans les dechets de balayage.

AUTRE ENFANT JOUE DEDANS - C'est aussi pour les dechets de balayage. On coche la case si on observe qu'un autre enfant (personne moins de 15 ans) joue dans les dechets.

SELLES ANIMALES - L'observateur observera la parcelle pour les traces de selles animales. Il fera deux tours de la parcelle. Si, apres un tour, il a deja vu de selles, il cochera la case "vues beaucoup"). S'il fait un tour, et il ne voit pas de selles, mais apres un deuxieme tour, il en voit, il cochera "vues un peu". La case "pas vues" sera cochee si l'observateur ne voit pas de selles apres deux tours.

SELLES HUMAINES - Normalement c'est l'observation de selles d'enfants. Si l'observateur voit de selles d'enfants dans la parcelle ou a sa peripherie (brousse), il cochera la case appropriee. S'il ne voit pas de selles, il coche "pas vues".

La colonne "Balayage en Cours" et reservee pour l'observation d'un balayage fait pendant la periode d'observation, c.a.d. plus d'une heure apres l'arrivee de l'observateur mais avant son depart. Dans ce cas, l'observateur se referera aux rubriques PARCELLE BALAYEE, DECHETS DE BALAYAGE, ENFT CIBLE JOUE DEDANS, et AUTRE ENFT JOUE DEDANS, en les remplissant d'une maniere appropriee selon les instructions decrits au dessus. Les rubriques HEURE, SELLES ANIMALES et SELLES HUMAINES ne sont pas concernes ici.

La colonne "Etat Parcelle Depart" est consacree a une evaluation de la proprete de la parcelle au depart de l'observateur. L'observateur notera l'heure de son depart (rubrique HEURE), s'il voit un enfant cible ou autre enfant en train de jouer dans les dechets de balayage (meme si ce balayage etait fait bien avant le depart) (rubriques ENFT CIBLE JOUE DEDANS, AUTRE ENFT JOUE DEDANS), et s'il y a des selles animales ou humaines observees (rubriques SELLES ANIMALES, SELLES HUMAINES). Les memes susdits instructions pour le remplissage de ces rubriques seront appliques.

TROU A ORDURE - C'est un groupe d'observations uniquement pour de trous a ordure. Nous faisons cette serie d'observations parce que c'est liee au balayage.

PLEIN PARCELLE/ELOIGNE - La case PLEIN PARCELLE sera cochee si l'observateur voit un trou a ordure dans la parcelle. S'il y a un trou a ordure, mais dehors de la parcelle, ou eloigne 15 metres ou plus de la maison, il laissera la case PLEIN PARCELLE vide mais cochera la case

ELOIGNE.

OUVERT - Cette case sera cochee s'il y a un trou a ordure (soit dans la parcelle ou eloigne) et si le trou est ouvert, c.a.d. il n'a pas un couvert, et il permet acces facile aux enfants ou animaux d'entrer la dedans.

PLEIN/PROFOND - C'est une observation sur le niveau de remplissage des dechets dans le trou. Si un enfant ou un animal peut facilement entrer et sortir du trou (parce que la surface des dechets est si haute d'en permettre), il est considere plein. C'est le cas pour les trous ouverts aussi bien que pour les trous couverts. Si un enfant ou un animal ne peut pas entrer et sortir du trou parce qu'il est trop profond, ou parce que les dechets n'arrivent pas vers la haute, c'est considere PROFOND.

PAS VU - Si l'observateur ne voit pas un trou a ordure, dans ou dehors de la parcelle, c'est a dire qu'il n'existe pas et il doit chocher cette case, PAS VU. Dans ce cas, toutes les autres rubriques deviennent non-applicables, et elles doivent etre laissees vides.

## III. PREPARATION DES ALIMENTS

Cette une fiche employee lors de l'observation de la preparation d'un repas principal. Pour un repas, nous nous entendons qu'on mange un des aliments de base, tel que le fufu, le riz, le chikwangue ou la bouillie. La preparation d'un repas peut s'agir des aliments nouvellement preparees, des aliments restants (rechauffees ou non-rechauffees), ou une combinaison des deux. En dessous des rubriques d'observation, il y a d'espace pour 5 preparations, chaque preparation etant representee sur un ligne horizontal.

HEURE - C'est l'heure du debut de la preparation du repas.

QUI PREPARE - C'est la rubrique qui indique la personne principale responsable pour la preparation observee, soit la mere cible, une fille (de moins de 15 ans), ou un autre personne (garcon ou autre adulte). Seulement un choix doit etre coche.

NOUVELLE PREPARATION - Si la preparation comprend des aliments preparees pour la premiere fois (c.a.d. fraiches), cette rubrique doit etre employee. Il y a 4 categories d'aliments (fufu, bouillie, feuilles/legumes, chairs/legumineuses), et chaqu'un de ces categories, s'il est observe dans la preparation, doit etre coche. L'observateur doit noter si parmi des aliments preparees, il y a certains qui doivent etre lavees. Si oui, il observera si ces aliments en questionne sont lavees ou pas, et cocher la case "aliments lavees" si ces aliments sont lavees.

RESTANTS - Si la preparation comprend des aliments restants d'une autre preparation (avant), l'observateur employera cette rubrique. Il y a 4 categories d'aliments, comme pour la nouvelle preparation et chaqu'un, si observe, doit etre coche. Il doit noter si les restants sont restes 3 heures ou moins avant de les remployer, ou plus de 3 heures, et cocher la case appropriee. Il est possible que l'observateur doit demander le temps que les restants sont restes. Il notera si les restants (eg. feuilles, chairs) sont rechauffes, et cochera cette case si oui.

RECIPIENTS - Cette rubrique s'agit de recipients de la preparation. L'observateur notera, en majorite, si les recipients de la preparation sont propres ou sales, et cocher la case appropriee. La case "sale" prend priorite s'il a un melange de recipients propres et sales et l'un ne domine pas l'autre.

COUVERT - Cette rubrique s'agit des recipients de la preparation. L'observateur notera si les recipients sont: 1) couverts avec de couvercles durable ou ils sont superposes, ou 2) couvert avec de couvercles non-durables, c.a.d. des feuilles ou pailles qui sont normalement utilise une fois seulement et puis jetes, ou bien ils ne son pas couverts. L'une ou l'autre case sera coche, mais pas les deux. Si les deux cas sont vus, la case "dur/superposition" prend priorite.

MAINS MERE/AUTRE LAVES - Il s'agit de lavage des mains de celui qui prepare (en predominance) avant la prepartion ou la maniement specifique des aliments. L'observateur notera si la personne qui prepare lave les mains avec de l eau et du savon, de l eau seulement, si les mains sont essuyes sec avec un tissu, lambeau, feuille, etc., ou s'ils ne sont pas laves ni essuyes, et cochera la case appropriee.

SOURCE D'EAU PREPARATION - Il s'agit de l source d'eau utilisee pour la preparation observee. L'observateur peut demander s'il ne sait pas.

IV. PRISE DES REPAS

Cette fiche est consacree a l'observation de la prise des repas. Elle s'agit principalement de plusieurs aspects de la prise des repas des enfants cibles, mais quelques rubriques concernent la prise des repas des autres. Comme pour la fiche de la preparation des aliments, il y a d'espace sur cette fiche pour 5 repas.

HEURE - C'est l'heure du debut de la prise du repas. Chaque differente prise (c.a.d. chaque nouveau repas) doit etre representee sur un ligne horizontal. Nous nous entendons qu'un repas termine quand on enleve les assiettes. Quand une famille mange sans l'enfant cible, et ils terminent a manger mais ils laissent les assiettes vides sur place, et l'enfant cible vient apres pour etre servi dans les memes assiettes sales, on considere que c est un autre repas, et pas compris dans le repas de la famille.

ENVIRONNEMENT DU REPAS - Ici il y a deux possibilites, propre ou sale, et l'observateur doit faire une evaluation generale. Il doit juger si l environnement ou on mange est en general propre (c.a.d. balaye, pas de selles, pas de dechets de balayage, pas de la salete) ou sale (le contraire), et cocher la case approprie. Cette rubrique est employee pour toutes les prises des repas vues.

ENFANT MANGE BOUILLIE - Cette rubrique s'applique quand le repas de l enfant cible observe comprend de la bouillie. L'observateur notera si cette bouillie est nouvellement preparee, si elle est restante couverte, ou si elle est restante non-couverte.

ENFANT MANGE FUFU - Cette rubrique s'applique quand le repas de l enfant cible comprend de fufu, de riz, ou de chikwangue. Pareillement a la rubrique precedente, l'observateur notera s'il est nouvelle, ou restant couvert ou non-couvert.

ENFANT MANGE SAKA-SAKA - Cette rubrique suit le meme principe que les 2 rubriques precedentes, sauf qu'elle s'agit des feuilles.

ENFANT NOURRI PAR UN AUTRE / ENFANT MANGE LUI-MEME SEUL / ENFANT MANGE LUI-MEME PARTAGE - Ces trois rubriques representent les trois possibilites qui peuvent existent lors qu'on observe la prise du repas par l'enfant cible. La premiere, ENFANT NOURRI PAR UN AUTRE, s'agit d'une prise observee ou quelqu'un(e) fait manger a l'enfant (eg. la mere, un enfant, un autre). L'enfant est normalement trop petit pour manger lui-meme dans ce cas. Cette premiere colonne doit etre cochee si c'est le cas observe. Ensuite, l'observateur notera si la personne qui donne a manger a l'enfant lave ses propres mains, et dans quelle maniere (eg. avec eau et savon, eau seul, essuyes sec, ou pas laves et pas essuyes). La deuxieme possibilite est que l'enfant mange lui-meme (c.a.d. il est assez grand et il se debrouille pour manger lui-meme) ET qu'il est seul ou il mange uniquement de sa propre assiette lors qu'on l'observe prendra son repas. Dans ce cas la colonne ENFANT MANGE LUI-MEME, SEUL doit etre cochee. La troisieme possibilite est que l'enfant mange lui-meme (c.a.d. il est assez grand et il se debrouille pour manger lui-meme) ET qu'il mange avec d'autre personnes et il partage leurs assiettes. Dans ce cas, l'observateur notera si les mains des autres avec qui l'enfant partage la nourriture sont laves, et dans quelle maniere (avec eau et savon, eau seule, essuyes sec, ou pas laves et pas essuyes).

MAINS D'ENFANT LAVES AVEC - Cette rubrique s'applique pour toutes les prises du repas de l'enfant cible observees. (N'importe si l'enfant est nourri par un autre, ou il mange lui-meme.) L'observateur doit observer si les mains de l'enfant sont laves (soit par lui-meme ou par un autre) avant qu'il prend le repas, et dans quelle maniere ils sont laves.

MODE DE FAIRE MANGER L'ENFANT - Cette rubrique s'agit de l'instrument utilise pour faire manger a l'enfant, ou utilise par l'enfant pour manger lui-meme. C.a.d., l'observateur notera si l'enfant mange avec des mains (de lui-meme ou d'un autre), une cuiliere, un gobelet ou tasse, ou un biberon. Si l'enfant utilise de mains et une cuillere, les mains prennent priorite.

on peut marquer plusieurs

RECIPIENTS/USTENCILS - Cette rubrique s'agit de la proprete des assiettes et cuilleres (forchettes, etc) utilises pour la prise du repas de l'enfant. Elle s'applique si l'enfant est nourri par un autre ou mange lui-meme. L'observateur evaluera l'etat de proprete de ces instruments et cochera la case appropriee.

CONTACT DES ANIMAUX - Il s'agit du contact direct des animaux dans les assiettes ou l'enfant mange. Si ce contact est observe, la case doit etre cochee.

ENFANT BOIT L'EAU DE - Il s'agit de la source de l'eau a boire apres (ou pendant) le repas de l'enfant cible. L'observateur notera si l'eau vient d'une source amenage ou non-amenage (autres sources y compris), et cochera une case ou l'autre. Il peut demander d'ou vient cette eau s'il ne sait pas. Il notera ensuite si cette eau est bouillie ou pas, et cochera la case appropriee.

MAINS D'AUTRES LAVES AVEC - Cette rubrique s applique quand on observe une prise du repas d'autres personnes a part de l'enfant cible. L'observateur notera la facon de laver les mains avant la prise, de la majorite d'autres personnes qui sont observes a manger.

V. DEFECATION

Cette fiche est visee sur des aspects d'hygiene associes a l defecation. Surtout, la defecation des petits enfants. On fera une serie d'observations sur la defecation des enfants cibles, des petits enfants (des enfants qui ne peuvent pas s'occuper de leur hygiene, c.a.d. des enfants a peu pres 5 ans et moins), des autres enfants (de 5 a 15 ans) et des adultes.

Il y a d'espace pour observer un maximum de 6 defecations (c.a.d. 6 lignes horizontals en dessous ces rubriques d'observation). Chaque fois qu'une defecation est observee. l'observateur notera dans la colonne a gauche, qui a ete observe, en suivant des codes qui represente des categories des personnes. Les codes sont:

Enfant cible = 1
Petit enfant = 2
Grand enfant = 3
Mere = 4
Autre Adulte = 5

Le trois quart des observations sont sur les enfants cibles et les petits enfants. On suppose que ces enfants ne peuvent pas s'occuper de leur propre hygiene (nettoyage, evacuation des selles) apres leur defecation, et que ca doit etre suivie par quelqu'un d'autre. Les observations sur ces enfants seront notees en dessous des 4 grandes rubriques comblees par la partie entitulee DEFECATION DES ENFANTS CIBLES/PETITS ENFANTS. Si un enfant est assez grand de s'occuper de son propre hygiene, il est considere un grand enfant et les observations sur lui, aussi bien que sur les adultes, seront rapportees seulement dans les dernieres trois rubriques de la fiche en dessous de la partie entitulee DEFECATION D'AUTRES.

DEFECATION DES ENFANTS CIBLES/PETITS ENFANTS

DEFECATION ENDROIT - C'est l'endroit observe ou l'enfant chie, eg dans la parcelle, en brousse (peripherie de parcelle ou sur la rue), dans le w.c., dans ses habits (calecons, couches, pagne, bras de qqn) ou autre.

EVACUATION DES SELLES - Il y a plusieurs observations a faire lies a l'evacuation des selles. Premierement, quand sont les selles evacuees? L'observateur notera si c'est tout de suite ou pas. Deuxiemement, ou sont les selles mises? Ca peut etre dans un trou a ordure, dans le w.c., dans la brousse ou sur la rue, jettees dans la riviere, un animal mange, ou elles sont enterrees dans la parcelle. Ensuite, avec quel instrument sont les selles evacuees? On peut observer la hou ou la peche, ou bien des feuilles, de lambeaux ou la brosse. Finalement, l'evacuation etait faite par qui? Ca peut etre la mere, un autre enfant ou un autre adulte.

tout de suite = ≤10 m

beche

NETTOYAGE D'ENFANT - Il s'agit de la nettoyage de l enfant observee apres sa defecation. On observera si les mains de l'enfant sont laves apres sa defecation ey aussi si le corps de l'enfant ou les traces de selles peuvent trainer (c.a.d. ses fesses et jambes) sont laves. L'observateur notera sur la fiche si ce nettoyage est fait avec l'eau et savon, eau seulement, ou si c'est un essuyage sec, avec tissu (pagne, habits, lambeaux) ou feuille (paille), (bois) ou s'il n'y a pas de nettoyage ou d'essuyage.

MAINS MERE/RESPONSABLE LAVES - Cette rubrique exige l'observation de lavage des mains de celui qui s'occupait de l'enfant apres sa defecation, c.a.d. pour nettoyer l'enfant et evacuer des selles. L'observateur doit noter sur la fiche si cette responsable lave ses mains, et dans quelle maniere.

DEFECATION D'AUTRES

DEFECATION ENDROIT - Ici on notera l'endroit ou la personne observe a chier l'a fait, c.a.d. dans la parcelle, en brousse (limite parcelle), dans le w.c. ou un autre endroit. L'observateur n'est pas oblige d'entrer la ou la personne a chie.

MAINS LAVES APRES AVEC - Il s'agit de l'observation de lavage des mains apres la defecation observee. Si la personne lave ses mains apres, l'observateur noter dans quelle maniere c'etait fait..

W.C. - Il s'agit d'observation du W.C., si ca existe. S'il existe, l'observateur notera sur la fiche l'emplacement du w.c., soit dans la parcelle ou eloigne (plus de 15 metres de la maison). Aussi, il notera si ce w.c. contamine la parcelle (en coulant la dedans) ou une source (eg. une riviere) avec des effluents. On cochera "pas vu" si un w.c. n'est pas vu. Cette rubrique s'applique à tout le monde, soit des pts enfts ou des adultes, en tout cas d'observation d'une defecation au w.c.

CODING FORM FOR POST-INTERVENTION OBSERVATION RECORDING FORM 1988
PECODIZ/CEPLANUT
FICHE DE CODIFICATION DES OBSERVATIONS 1988

OBSERVA1. db5.

No MERE : |_|_|_|_|_| MERENUM        OBSERVATEUR :______________
Codificateur :______________
No ENFANT : |_|_|_|_|_| ENFANT        DATE : / /88 DATE

CODESITE : |_|_| CODESITE        LOCALITE :______________

FICHE I. SOURCE ET HYGIENE D'EAU.

Choix        code

A. L'eau a boire.

- A1 Recipient : interieur=1 exterieur=2 ________ |__| A1

- A2 Recipient : couvert=1 non couvert=2 ________ |__| A2

- A3 Recipient : propre =1 sale=2 ________ |__| A3

B. Source d'eau.
- B1 Source principale ________ |__| B1
SA=1 SNA=2 mare/marigot=3
riviere =4 pompe=5
autre=7 pluie=6
-
- B2 Contaminee : oui=1 non=0 ________ |__| B2

- B3 Distance : < 10 mins=1 10-20 mins=2 > 20 mins=3 ________ |__| B3

C. Autres sources.
- C1 voire codes B1 ________ 1. |__| AC1 2. |__| AC2 3. |__| AC3

- C2 contaminee ________ |__| C2

- C3 distance ________ |__| C3

FICHE II. HYGIENE DE PARCELLE.

Heure arrivee : |_|_|_|_| ARRIVE

ETAT PARCELLE ARRIVEE.
- Parcelle balayee : oui=1 non=0 ________ |__| BALAYAR

- Heure de balayage : |_|_|_|_| HEUREB1

- Par qui : mere=1 enfant=2 autre=3 n/a=9 ________ |__| PARQUI1

- Complet : oui=1 non=2 n/a=9 ________ |__| COMPLET1

- Dechet de balayage : ___________ !__! DECHET1
  trou a ordure=1
  brousse/rue=2 parcelle=3 autre=4 n/a=9

ENFANT CIBLE JOUE DEDANS : oui=1 ___________ !__! CIBJOUE1
non=0
n/a=9

AUTRE ENFANT JOUE DEDANS : ___________ !__! AUTJOUE1

SELLES ANIMALES : vues bcp=1 ___________ !__! SELANIM1
vues peu=2
pas vues=0

SELLES HUMAINES : pas vues=0 ___________ !__! SELHUM1
vues parcelle/brousse=1

BALAYAGE EN COURS. (cire codes etat arrivee)

- parcelle balayee ___________ !__! BALAYENC
- Heure !_!_!_!_! HEUREB2
- Par qui ___________ !__! PARQUI2
- Complet ___________ !__! COMPLET2

DECHETS DE BALAYAGE ___________ !__! DECHET2

ENFANT CIBLE JOUE DEDANS ___________ !__! CIBJOUE2

AUTRE ENFANT JOUE DEDANS ___________ !__! AUTJOUE2

ETAT AU DEPART.

- Heure depart : !_!_!_!_! DEPART
- Enfant cible joue dedans ___________ !__! CIBJOUE3
- Autres enfants jouent dedans ___________ !__! AUTJOUE3
- Selles animales ___________ !__! SELANIM2
- Selles humaines ___________ !__! SELHUM2

TROU A ORDURE :

- Situation ___________ !__! TROUSIT
  plein parcelle=1 eloigne=2
  plein parcellle+eloigne=3 pas vu=0
- Couvert : oui=1 non=0 ___________ !__! TROUVERT
  n/a=9
- Plein : oui=1 non=0 n/a=9 ___________ !__! TROUPLEIN
- Profond : oui=1 non=0 n/a=9 ___________ !__! TROPROF

FICHE III. PREPARATION DES ALIMENTS.

RANG 1 2 3 4 5

PREPTIM1 2 3 4 5

Heure |_|_|_|_| |_|_|_|_| |_|_|_|_| |_|_|_|_| |_|_|_|_|

BYWHO1

QUI PREPARE mere=1 fille=2 autre=3 |__| |__| |__| |__| |__

PREPNOV1

NOUVELLE PREPARATION (1) |__| |__| |__| |__| |__

non=0 fufu=1 bouillie=2

feuille=3 chair=4

ALIMLAV1

ALIMENTS LAVES oui=1 non=0 n/a=9 |__| |__| |__| |__| |__

RESTANT1

RESTANTS (codes voire (1)) |__| |__| |__| |__| |__

RESTIME1

RESTANTS TEMPS ≤ 3H=1 >3H=2 n/a=9 |__| |__| |__| |__| |__

RECHAUF1

RESTANTS RECHAUFFES oui=1 non=0 n/a=9 |__| |__| |__| |__| |__

RECIPREP1

RECIPIENT : propre=1 sale=2 |__| |__| |__| |__| |__

n/a pas vu=9

autre/feuille=3

COUVERT1

Couvert : duarable/superposition=1 |__| |__| |__| |__| |__

unique usage/non=2

MAIMERE1

Mains mere/autre lavees : |__| |__| |__| |__| |__

avec eau+savon=1

eau=2 essuyees sec=3 pas lavees/essuyees=0

SOURCE1

Source d'eau preparee |__| |__| |__| |__| |__

(codes voire C1 FICHE I)

2 dbf →

FICHE IV. PRISE DES REPAS

HEUREP1

- Heure |_|_|_|_| |_|_|_|_| |_|_|_|_| |_|_|_|_| |_|_|_|_

ENVREP

- Environnement : propre=1 sale=2 |__| |__| |__| |__| |_

BOUILLI1

- Enfant mange bouillie |__| |__| |__| |__| |_

non=0 nouvelle prep.=1

restant couv.=2 restant non couv.=3

FUFU1

- Enfant mange fufu (memes codes) |__| |__| |__| |__| |_

FEUILLE1

- Enfant mange saka-saka (feuile) |__| |__| |__| |__| |_

NOURRI1

- Enfant nourri par un autre |__| |__| |__| |__| |_

oui=1 non=0

MAINAR1

- Mains d'autres lavees |__| |__| |__| |__| |_

eau+savon=1 eau=2 essuyes sec=3

pas lavees/essuyees=0 n/a=9

EMANGE1

- Enfant mange lui-meme |__| |__| |__| |__| |_

seul=1 partage=2

AUTALIM1

- Enfant mange d'autres aliments |_| |_| |_| |_| |_

MAINAP1

- Mains d'autres lavees (voire codes precedants) |__| |__| |__| |__| |_

MAINENF1

- Mains d'enfant lavees (idem) |__| |__| |__| |__| |_

MODE.

MODEMAIN1

- Mains : oui=1 non=0 |__| |__| |__| |__| |_

CUILLER1

- Cuiller |__| |__| |__| |__| |_

GOBELET1

- Gobelet |__| |__| |__| |__| |_

MODBIBE1

- biberon |__| |__| |__| |__| |_

RECIPROP1

RECIPIENT : propre=1 sale=2 |__| |__| |__| |__| |_

CONTANIM1

CONTACTS ANIMAUX : oui=1 non=0 |__| |__| |__| |__| |_

ENFBOIT1

ENFANT BOIT : SA=1 SNA=2 |__| |__| |__| |__| |_

EAUBOUILL1

Eau : bouillie=1 non bouillie=2 |__| |__| |__| |__| |_

REPAS D'AUTRES.

MAINAL1

- Mains lavees (codes avant) |__| |__| |__| |__| |_

OBSERVA3 . abs → 0

FICHE V. D E F E C A T I O N.

| Rang | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| QUI1 | | | | | |
| Qui : Enfant cible=1 petit enfant=2 grand enfant=3 mere=4 autre=5 | \|__\| | \|__\| | \|__\| | \|__\| | \|__\| |

DEFECATION DES ENFANTS CIBLES.

ENDROIT1

- Endroit : parcelle=1 brousse=2 W.C =3 habits=4 autre=5 |__| |__| |__| |__| |__|

EVACQ1

- Evacuation quand : tout de suite=1 pas de suite=2 |__| |__| |__| |__| |__|

OU1

- Evacuation ou : trou a ordure=1 W.C=2 brousse=3 riviere=4 animal mange=5 enterre parcelle=6 n/a=9 |__| |__| |__| |__| |__|

INSTRUM1

- Evacuation instruments : houe/beche=1 feuille=2 n/a=9 |__| |__| |__| |__| |__|

EVACQUI1

- Evacuation par qui : mere=1 autre enfant=2 autre adulte=3 n/a=9 |__| |__| |__| |__| |__|

NETTOYAGE.

NETTOYAGE1

- Mains enfant : oui=1 non=0 |__| |__| |__| |__| |__|

FESSE1

- Fesses : oui=1 non=0 |__| |__| |__| |__| |__|

AVEC1

- Nettoyage avec : eau+savon=1 eau=2 essuyes tissus=3 essuyes feuilles=4 pas d'essuyage=0 |__| |__| |__| |__| |__|

| | MRESPL1 | | | | | |
|---|---|---|---|---|---|---|
| - Mains mere/responsable lavees<br>eau+savon=1 eau=2 essuyees sec=3<br>pas lavees/essuyees=0 | \|__\| | \|__\| | \|__\| | \|__\| | \|__\| | \| |

DEFECATION D'AUTRES.

| | ADEFAUT1 | | | | | |
|---|---|---|---|---|---|---|
| - Endroit : parcelle=1 brousse=2<br>W.C=3 autre=4 | \|__\| | \|__\| | \|__\| | \|__\| | __\| | \| |
| | MANAP1 | | | | | |
| - Mains lavees apres avec :<br>eau+savon=1 eau=2<br>essuyees sec=3 pas lavees=0 | \|__\| | \|__\| | \|__\| | \|__\| | \|__\| | \| |

W.C.

| | WCSIT1 | | | | |
|---|---|---|---|---|---|
| - Situation : parcelle=1 eloigne=2<br>parcelle+eloigne=3<br>n/a et pas vu=9 | \|__\| | \|__\| | \|__\| | \|__\| | __ |
| | WCONTAM1 | | | | |
| - Conatmine : parcelle=1 source=2<br>parcelle+source=3<br>pas vu=9<br>0 = pas de contamination | \|__\| | \|__\| | \|__\| | \|__\| | __ |

# HOUSEHOLD SOCIOECONOMIC, DEMOGRAPHIC, PREGNANCY AND CHILD FEEDING QUESTIONNAIRE, FOR SENTINEL FAMILIES IN 1987

**PECODIZ**

## IDENTIFICATION

- N° du Site: |_|_| (1–2)
- N° de mère: |_|_|_|_|_| (3–7)
- Date de l'enquête: |_|_|_|_|_|_| (8–13)

## CARACTERISTIQUES DE L'HABITAT

**Nbr. de pièces d'habitation** |_|_| (14–15)

**Statut d'occupation**
Prop = 1
Locat = 2
Empl. = 3
Grat. = 4
Autres = 5
Indét. = 6
|_| (16)

**Nature d'habitation**

**Sol**
Terre = 1
Ciment = 2
Carr. = 3
Autre = 4
|_| (17)

**Mur**
Dur = 1
Adobe = 2
Pise = 3
Planches = 4
Végét. = 5
Autre = 6
|_| (18)

**Toiture**
T.met = 1
Eternite = 2
Tôles récup. = 3
Végét. = 4
Tuiles = 5
Autres = 6
|_| (19)

## COMPOSITION DU MENAGE

**N° d'Ordre**

**Noms et Postnoms**

**Sexe**
M = 1
F = 2

**Liende Parenté**
Sans lien = 0
Chef du menage = 1
Conjoint de... = 2
Enfant de P+M = 3
Enfant de P ou M = 4
Père, Mère de... = 5
Frère, Soeur demi-frère, demi-soeur. Oncle, neuv, nièce de... = 6
Autr. Parent = 7
Sans rép. = 8

**Statut de Résidence**
Résident = 1
Visiteur = 2

**Naissance**
- Lieu: Zone; Pays pour Etranger (V/E)
- Date: Inconnu = 99/99

**Tribu**
Tribu pour nationaux
Pays pour Etranger

**Etat Matrimon.**
Célibat. = 0
Marié monog. = 1
Marié polyg. = 2
Union de fait = 3
Divorce = 4
Séparé = 5
Veuf = 6
Desunion = 7
Autres = 8

**Instruction**
Sans instruction = 00
Sait lire/écrire = 01
Primaire = PX
Séconuaire = SX
Sup/Universit. = UX
Inconnu = 99

**Activité**

**Dégré D'Occupation**
Elève, Etud. = 0
Menagère = 1
Travail = 2
A perdu son emploi = 3
Jamais travail = 4
Femme lib. = 5
Pension. = 6
Inactif = 7
Autres = 8
Indéterminé = 9

**Etat Social**
Sans objet = 0
Cadre dirig. = 1
Employé = 2
Indépendant, seul = 3
Indép. + Sal. = 4
Ouvrier qual. = 5
Ouvrier S/qual. = 6
Ouvrier non qualifié = 7
Indéterminé = 8

| 21 | a | 22 | 23 | 24-25 | 26 | b | V/E | 27-29 | 30-31 (Mois/Année) | 32-33 | c | 34-36 | 37 | 38-39 | 40 | 41 | OBSERVATIONS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01 | | | | | | | | | | | | | | | | | |
| 02 | | | | | | | | | | | | | | | | | |
| 03 | | | | | | | | | | | | | | | | | |
| 04 | | | | | | | | | | | | | | | | | |
| 05 | | | | | | | | | | | | | | | | | |
| 06 | | | | | | | | | | | | | | | | | |
| 07 | | | | | | | | | | | | | | | | | |
| 08 | | | | | | | | | | | | | | | | | |
| 09 | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | |

[illegible] DE LA [illegible] (HOUSEHOLD QUESTIONNAIRE 1987 CONTD.)

| N° d'Ord. Mère | N° d'Ord. Grossesse | Date de Naissance de mère | | Issue de la Grossesse | Nom de l'Enfant | Date de l'Evenement | | Sexe de l'Enft | Poids de l'Enfant à la naiss. | Survie de l'Enfant: Envie | Survie de l'Enfant: Date de Décès | | Utilisation Contraceptives | ENFANTS DE 0 A 4 ANS SEULEMENT: Morbidité (2 semaines) | ENFANTS DE 0 A 4 ANS SEULEMENT: Cause de Décès |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Mois/Année<br>Inconnu = 99/99 | | S.O. = 0<br>Avorte=1<br>Mort-né=2<br>Né-vivant = 3<br>Grossesse en cours = 4<br>Autres =5 | | Mois/Année<br>S.O.=99/99<br>Inconnu = 88/88 | | S.O.=0<br>M =1<br>F =2 | S.O. = 0<br><2500 gm=1<br>2500 à 3499 gm=2<br>3500 à 4499 gm=3<br>4500 et plus = 4<br>Inconnu=5 | S.O. =0<br>Oui =1<br>Non =2 | Mois/Année<br>S.O. = 99/99<br>Inconnu =88/88 | | (depuis 01/85)<br>S.O. = 0<br>Oui = 1<br>Non = 2 | S.O. = 000<br>Diarrhée=001<br>Fièvre = 002<br>Céphalée=003<br>Vomissem.=004<br>Traumat. =005<br>Douleur abdom =006<br>Toux = 007<br>Infection peau = 008<br>Autre = 009<br>Enfant absent du ménage =999 | S.O. = 000<br>Diarrhée = 001<br>Fièvre =002<br>Céphalée =003<br>Vomiss.=004<br>Traum. =005<br>Douleur abd. =006<br>Toux = 007<br>Infection peau = 008<br>Autre = 009<br>Inconnu =999 |
| | | Mois | Année | | | Mois | Année | | | | Mois | Année | | | |
| 42-43 | 44-45 | 46-47 | 48-49 | 50 | d | 51-52 | 53-54 | 55 | 56 | 57 | 58-59 | 60-61 | 62 | 63 - 65 | 66 - 68 |
| | | | | | | | | | | | | | | | |

D 301

## CODING FORM FOR HOUSEHOLD SOCIOECONOMIC, DEMOGRAPHIC AND CHILD FEEDING QUESTIONNAIRE 1987

### LIVRE DE CODES DE L'ENQUETE MENAGERE

| No Libellees | Variables | Colonnes | codes |
|---|---|---|---|
| ENQUETE1.DBF | | | |
| IDENTIFICATION DU MENAGE | | | |
| 1. No du site | CODESITE | 1-2 | |
| 2. No de la mere | MERENUM | 3-7 | |
| 3. Date de l'enquete | DATE | 8-15 | |
| CARACTERISTIQUES DE L'HABITAT | | | |
| 4. Nbre de pieces d'habitation | HABPIECE | 16-17 | |
| 5. Statut d'occupation | OCCUPAT | 18 | 1=propre<br>2=location<br>3=empl.<br>4=grat.<br>5=autres<br>6=indet. |
| 6. Nature d'habitation | | | |
| a) Sol | SOL | 19 | 1=terre<br>2=ciment<br>3=carr<br>4=autre |
| b) Mur | MUR | 20 | 1=dur<br>2=adobe<br>3=pise<br>4=planches<br>5=autre |
| c) Toiture | TOITURE | 21 | 1=T. met.<br>2=Eternite<br>3=toles recup.<br>4=Veget.<br>5=tuiles<br>6=Autres |
| COMPOSITION DU MENAGE | | | |
| No d'ordre : | | | |
| 7. Personne 1 | ORD1 | 22-23 | |
| 8. " 2 | ORD2 | 24-25 | |
| 9. " 3 | ORD3 | 26-27 | |
| 10. " 4 | ORD4 | 28-29 | |
| 11. " 5 | ORD5 | 30-31 | |
| 12. " 6 | ORD6 | 32-33 | |
| 13. " 7 | ORD7 | 34-35 | |
| 14. " 8 | ORD8 | 36-37 | |
| 15. " 9 | ORD9 | 38-39 | |
| 16. " 10 | ORD10 | 41-42 | |
| 17. " 11 | ORD11 | 42-43 | |
| 18. " 12 | ORD12 | 44-45 | |
| 19. " 13 | ORD13 | 46-47 | |
| 20. " 14 | ORD14 | 48-49 | |
| 21. " 15 | ORD15 | 50-51 | |

Sexe :

| | | | | |
|---|---|---|---|---|
| 22. | Personne 1 | SEXE01 | 52 | 1=masculin |
| 23. | " 2 | SEXE02 | 53 | 2=feminin |
| 24. | " 3 | SEXE03 | 54 | |
| 25. | " 4 | SEXE04 | 55 | |
| 26. | " 5 | SEXE05 | 56 | |
| 27. | " 6 | SEXE06 | 57 | |
| 28. | " 7 | SEXE07 | 58 | |
| 29. | " 8 | SEXE08 | 59 | |
| 30. | " 9 | SEXE09 | 60 | |
| 31. | " 10 | SEXE10 | 61 | |
| 32. | " 11 | SEXE11 | 62 | |
| 33. | " 12 | SEXE12 | 63 | |
| 34. | " 13 | SEXE13 | 64 | |
| 35. | " 14 | SEXE14 | 65 | |
| 36. | " 15 | SEXE15 | 66 | |

Statut de residence :

| | | | | |
|---|---|---|---|---|
| 37. | Personne 1 | SR1 | 67 | 1=resident |
| 38. | " 2 | SR2 | 68 | 2=visiteur |
| 39. | " 3 | SR3 | 69 | |
| 40. | " 4 | SR4 | 70 | |
| 41. | " 5 | SR5 | 71 | |
| 42. | " 6 | SR6 | 72 | |
| 43. | " 7 | SR7 | 73 | |
| 44. | " 8 | SR8 | 74 | |
| 45. | " 9 | SR9 | 75 | |
| 46. | " 10 | SR10 | 76 | |
| 47. | " 11 | SR11 | 77 | |
| 48. | " 12 | SR12 | 78 | |
| 49. | " 13 | SR13 | 79 | |
| 50. | " 14 | SR14 | 80 | |
| 51. | " 15 | SR15 | 81 | |

Lien de parente :

| | | | | |
|---|---|---|---|---|
| 52. | Personne 1 | LP1 | 82 | 0=sans lien |
| 53. | " 2 | LP2 | 83 | 1=chef de famille |
| 54. | " 3 | LP3 | 84 | 2=conjoint de... |
| 55. | " 4 | LP4 | 85 | 3=enfant de P+M |
| 56. | " 5 | LP5 | 86 | 4=enfant de P ou M |
| 57. | " 6 | LP6 | 87 | 5=pere, mere de... |
| 58. | " 7 | LP7 | 88 | 6=soeur, frere, |
| 59. | " 8 | LP8 | 89 | demi-frere, |
| 60. | " 9 | LP9 | 90 | demi-soeur, oncle |
| 61. | " 10 | LP10 | 91 | neveux,niece de... |
| 62. | " 11 | LP11 | 92 | 7=autres parents |
| 63. | " 12 | LP12 | 93 | 8=sans rep. |
| 64. | " 13 | LP13 | 94 | |
| 65. | " 14 | LP14 | 95 | |
| 66. | " 15 | LP15 | 96 | |

Lien de parente avec :

| | | | |
|---|---|---|---|
| 67. | Personne 1 | LLP1 | 97-98 |
| 68. | " 2 | LLP2 | 99-100 |
| 69. | " 3 | LLP3 | 101-102 |
| 70. | " 4 | LLP4 | 103-104 |
| 71. | " 5 | LLP5 | 105-106 |
| 72. | " 6 | LLP6 | 107-108 |
| 73. | " 7 | LLP7 | 109-110 |
| 74. | " 8 | LLP8 | 111-112 |

| | | | |
|---|---|---|---|
| 75. " 9 | LLP9 | 113-114 | |
| 76. " 10 | LLP10 | 115-116 | |
| 77. " 11 | LLP11 | 117-118 | |
| 78. " 12 | LLP12 | 119-120 | |
| 79. " 13 | LLP13 | 121-122 | |
| 80. " 14 | LLP14 | 123-124 | |
| 81. " 15 | LLP15 | 125-126 | |

Lieu de naissance :

| | | | |
|---|---|---|---|
| 82. Personne 1 | Z1 | 127-129 | * Voire codes plus bas. |
| 83. " 2 | Z2 | 130-132 | |
| 84. " 3 | Z3 | 133-135 | |
| 85. " 4 | Z4 | 136-138 | |
| 86. " 5 | Z5 | 139-141 | |
| 87. " 6 | Z6 | 142-144 | |
| 88. " 7 | Z7 | 145-147 | |
| 89. " 8 | Z8 | 148-150 | |
| 90. " 9 | Z9 | 151-153 | ✗ |
| 91. " 10 | Z10 | 154-156 | |
| 92. " 11 | Z11 | 157-159 | |
| 93. " 12 | Z12 | 160-162 | |
| 94. " 13 | Z13 | 163-165 | |
| 95. " 14 | Z14 | 166-168 | |
| 96. " 15 | Z15 | 169-171 | |

Resident ou visiteur :

| | | | |
|---|---|---|---|
| 97. Personne 1 | VR1 | 172 | V=visiteur |
| 98. " 2 | VR2 | 173 | R=resident |
| 99. " 3 | VR3 | 174 | |
| 100. " 4 | VR4 | 175 | |
| 101. " 5 | VR5 | 176 | |
| 102. " 6 | VR6 | 177 | |
| 103. " 7 | VR7 | 178 | |
| 104. " 8 | VR8 | 179 | |
| 105. " 9 | VR9 | 180 | |
| 106. " 10 | VR10 | 181 | |
| 107. " 11 | VR11 | 182 | |
| 108. " 12 | VR12 | 183 | |
| 109. " 13 | VR13 | 184 | |
| 110. " 14 | VR14 | 185 | |
| 111. " 15 | VR15 | 186 | |

Date de naissance :

| | | | |
|---|---|---|---|
| 112. Personne 1 | D1 | 187-190 | 99/99=inconnue |
| 113. " 2 | D2 | 191-194 | |
| 114. " 3 | D3 | 195-198 | |
| 115. " 4 | D4 | 199-202 | |
| 116. " 5 | D5 | 203-206 | |
| 117. " 6 | D6 | 207-210 | |
| 118. " 7 | D7 | 211-214 | |
| 119. " 8 | D8 | 215-218 | |
| 120. " 9 | D9 | 219-222 | |
| 121. " 10 | D10 | 223-226 | |
| 123. " 11 | D11 | 227-230 | |
| 124. " 12 | D12 | 231-234 | |
| 125. " 13 | D13 | 235-236 | |
| 126. " 14 | D14 | 239-242 | |
| 127. " 15 | D15 | 243-246 | |

* codes des zones retenues pour l'enquete :

| | |
|---|---|
| 300 Bandundu | 325 Gungu |
| 320 Ville de Kikwit | 331 Kenge |
| 321 Bulungu | 332 Popo-Kabaka |
| 322 Bagata | 333 Kasongo-Lunda |
| 323 Idiofa | 334 Kahemba |
| 324 Masima-Manima | 335 Feshi |

ENQUETE2.DBF

| | | | |
|---|---|---|---|
| 128. Numero de la mere | MERENUM | 1-5 | |
| Etat matrimonial : | | | |
| 129. Personne 1 | EM1 | 6 | 0=celibataire |
| 130. " 2 | EM2 | 7 | 1=marie monogamie |
| 131. " 3 | EM3 | 8 | 2=marie polygamie |
| 132. " 4 | EM4 | 9 | 3=union de fait |
| 133. " 5 | EM5 | 10 | 4=divorce |
| 134. " 6 | EM6 | 11 | 5=separe |
| 135. " 7 | EM7 | 12 | 6=veuf |
| 136. " 8 | EM8 | 13 | 7=desunion |
| 137. " 9 | EM9 | 14 | 8=autres |
| 138. " 10 | EM10 | 15 | |
| 139. " 11 | EM11 | 16 | |
| 140. " 12 | EM12 | 17 | |
| 141. " 13 | EM13 | 18 | |
| 142. " 14 | EM14 | 19 | |
| 143 " 15 | EM15 | 20 | |
| Instruction : | | | |
| 144. Personne 1 | I1 | 21-22 | 00=sans instruction |
| 145. " 2 | I2 | 23-24 | 01=sait lire et ecrire |
| 146. " 3 | I3 | 25-26 | |
| 147. " 4 | I4 | 27-28 | PX=primaire |
| 148. " 5 | I5 | 29-30 | SX=secondaire |
| 149. " 6 | I6 | 31-32 | UX=sup/universitaire |
| 150. " 7 | I7 | 33-34 | 99=inconnu. |
| 151. " 8 | I8 | 35-36 | |
| 152. " 9 | I9 | 37-38 | |
| 153. " 10 | I10 | 39-40 | |
| 154. " 11 | I11 | 41-42 | |
| 155. " 12 | I12 | 43-44 | |
| 156. " 13 | I13 | 45-46 | |
| 157. " 14 | I14 | 47-48 | |
| 158. " 15 | I15 | 49-50 | |
| Activites, degre d'occupation : | | | |
| 159. Personne 1 | DO1 | 51 | 0=eleve, etudiant |
| 160. " 2 | DO2 | 52 | 1=menagere |
| 161. " 3 | DO3 | 53 | 2=travaille |
| 162. " 4 | DO4 | 54 | 3= a perdu son emploi |
| 163. " 5 | DO5 | 55 | |
| 164. " 6 | DO6 | 56 | 4=jamais travaille |
| 165. " 7 | DO7 | 57 | 5=femme libre |
| 166. " 8 | DO8 | 58 | 6=pension |
| 167. " 9 | DO9 | 59 | 7=inactif |
| 168. " 10 | DO10 | 60 | 8=autres |
| 169. " 11 | DO11 | 61 | 9=indetermine |
| 170. " 12 | DO12 | 62 | |
| 171. " 13 | DO13 | 63 | |
| 172. " 14 | DO14 | 64 | |
| 173. " 15 | DO15 | 65 | |

Activites, Etat social :

| | | | |
|---|---|---|---|
| 174. Personne 1 | ES1 | 66 | 0=sans objet |
| 175. " 2 | ES2 | 67 | 1=cadre dirigeant |
| 176. " 3 | ES3 | 68 | 2=employe |
| 177. " 4 | ES4 | 69 | 3=independant seul |
| 178. " 5 | ES5 | 70 | 4=indep +salaire |
| 179. " 6 | ES6 | 71 | 5=ouvrier qualifie |
| 180. " 7 | ES7 | 72 | 6=ouvrier s/qual. |
| 181. " 8 | ES8 | 73 | 7=ouvrier non qual |
| 182. " 9 | ES9 | 74 | 8=Indetermine |
| 183. " 10 | ES10 | 75 | |
| 184. " 11 | ES11 | 76 | |
| 185. " 12 | ES12 | 77 | |
| 186. " 13 | ES13 | 78 | |
| 187. " 14 | ES14 | 79 | |
| 188. " 15 | ES15 | 80 | |

ENQUETE3.DBF

| | | | |
|---|---|---|---|
| 189. Numero de la mere | MERENUM | 1-5 | |

HISTOIRE GENESIQUE DE LA MERE CIBLE

| | | | |
|---|---|---|---|
| 190. Numero d'ordre de la mere | NUMERE | 6-7 | |
| 191. Date de naissance de la mere Mois/annee | AGEMERE | 8-11 | 99/99=n/a |

Numeros des grossesses dans le menage :

| | | | |
|---|---|---|---|
| 192. Grossesse 1 | OG1 | 12-13 | 00=enfant decede ou vivant hors du menage. |
| 193. " 2 | OG2 | 14-15 | |
| 194. " 3 | OG3 | 16-17 | |
| 195. " 4 | OG4 | 18-19 | |
| 196. " 5 | OG5 | 20-21 | |
| 197. " 6 | OG6 | 22-23 | |
| 198. " 7 | OG7 | 24-25 | |
| 199. " 8 | OG8 | 26-27 | |
| 200. " 9 | OG9 | 28-29 | |
| 201. " 10 | OG10 | 30-31 | |
| 202. " 11 | OG11 | 32-33 | |
| 203. " 12 | OG12 | 34-35 | |

Ordre des grossesses de la mere :

| | | | |
|---|---|---|---|
| 204. Grossesse 1 | GROSSE1 | 36-37 | |
| 205. " 2 | GROSSE2 | 38-39 | |
| 206. " 3 | GROSSE3 | 40-41 | |
| 207. " 4 | GROSSE4 | 42-43 | |
| 208. " 5 | GROSSE5 | 44-45 | |
| 209. " 6 | GROSSE6 | 46-47 | |
| 210. " 7 | GROSSE7 | 48-49 | |
| 211. " 8 | GROSSE8 | 50-51 | |
| 212. " 9 | GROSSE9 | 52-53 | |
| 213. " 10 | GROSSE10 | 54-55 | |
| 214. " 11 | GROSSE11 | 56-57 | |
| 215. " 12 | GROSSE12 | 58-59 | |

Issue de la grossesse :

| | | | |
|---|---|---|---|
| 216. Grossesse 1 | IS1 | 60 | 0=sans objet |
| 217. " 2 | IS2 | 61 | 1=avorte |
| 218. " 3 | IS3 | 62 | 2=mort-ne |
| 219. " 4 | IS4 | 63 | 3=ne-vivant |

| | | | | |
|---|---|---|---|---|
| 220. | " 5 | IS5 | 64 | 4=grossesse en cours |
| 221. | " 6 | IS6 | 65 | 5=autres |
| 222. | " 7 | IS7 | 66 | |
| 223. | " 8 | IS8 | 67 | |
| 224. | " 9 | IS9 | 68 | |
| 225. | " 10 | IS10 | 69 | |
| 226. | " 11 | IS11 | 70 | |
| 227. | " 12 | IS12 | 71 | |

Date de l'evenement :

| | | | | |
|---|---|---|---|---|
| 228. | Grossesse 1 | AE1 | 72-75 | Mois/Annee |
| 229. | " 2 | AE2 | 76-79 | 99/99=sans objet |
| 230. | " 3 | AE3 | 80-83 | 88/88=inconnu |
| 231. | " 4 | AE4 | 84-87 | |
| 232. | " 5 | AE5 | 88-91 | |
| 233. | " 6 | AE6 | 92-95 | |
| 234. | " 7 | AE7 | 96-99 | |
| 235. | " 8 | AE8 | 100-103 | |
| 236. | " 9 | AE9 | 104-107 | |
| 237. | " 10 | AE10 | 108-111 | |
| 238. | " 11 | AE11 | 112-115 | |
| 239. | " 12 | AE12 | 116-119 | |

Sexe de l'enfant :

| | | | | |
|---|---|---|---|---|
| 240. | Grossesse 1 | SEX1 | 120 | 0=sans objet |
| 241. | " 2 | SEX2 | 121 | 1=Masculin |
| 242. | " 3 | SEX3 | 122 | 2=Feminin |
| 243. | " 4 | SEX4 | 123 | |
| 244. | " 5 | SEX5 | 124 | |
| 245. | " 6 | SEX6 | 125 | |
| 246. | " 7 | SEX7 | 126 | |
| 247. | " 8 | SEX8 | 127 | |
| 248. | " 9 | SEX9 | 128 | |
| 249. | " 10 | SEX10 | 129 | |
| 250. | " 11 | SEX11 | 130 | |
| 251. | " 12 | SEX12 | 131 | |

Poids de l'enfant :

| | | | | |
|---|---|---|---|---|
| 252. | Grossesse 1 | POID1 | 132 | 0=sans objet |
| 253. | " 2 | POID2 | 133 | 1=<2500 gm |
| 254. | " 3 | POID3 | 134 | 2=2500 a 3499 gm |
| 255. | " 4 | POID4 | 135 | 3=3500 a 4499 gm |
| 256. | " 5 | POID5 | 136 | 4=4500 et plus X |
| 257. | " 6 | POID6 | 137 | 5=inconnu |
| 258. | " 7 | POID7 | 138 | |
| 259. | " 8 | POID8 | 139 | |
| 260. | " 9 | POID9 | 140 | |
| 261. | " 10 | POID10 | 141 | |
| 262. | " 11 | POID11 | 142 | |
| 263. | " 12 | POID12 | 143 | |

<u>Survie de l'enfant.</u>

En vie :

| | | | | |
|---|---|---|---|---|
| 264. | Grossesse 1 | SURV1 | 144 | 0=sans objet |
| 265. | " 2 | SURV2 | 145 | 1=oui |
| 266. | " 3 | SURV3 | 146 | 2=non |
| 267. | " 4 | SURV4 | 147 | |
| 268. | " 5 | SURV5 | 148 | |
| 269. | " 6 | SURV6 | 149 | |
| 270. | " 7 | SURV7 | 150 | |

| | | | | |
|---|---|---|---|---|
| 271. " 8 | SURV8 | 151 | |
| 272. " 9 | SURV9 | 152 | |
| 273. " 10 | SURV10 | 153 | |
| 274. " 11 | SURV11 | 154 | |
| 275. " 12 | SURV12 | 155 | |

Date de deces :

| | | | |
|---|---|---|---|
| 276. Grossesse 1 | DECES1 | 156-159 | Mois/Annee |
| 277. " 2 | DECES2 | 160-163 | 99/99=sans objet |
| 278. " 3 | DECES3 | 164-167 | 88/88=inconnu |
| 279. " 4 | DECES4 | 168-171 | |
| 280. " 5 | DECES5 | 172-175 | |
| 281. " 6 | DECES6 | 176-179 | |
| 282. " 7 | DECES7 | 180-183 | |
| 283. " 8 | DECES8 | 184-187 | |
| 284. " 9 | DECES9 | 188-191 | |
| 285. " 10 | DECES10 | 192-195 | |
| 286. " 11 | DECES11 | 196-199 | |
| 287. " 12 | DECES12 | 200-203 | |

Utilisation contraceptive :

| | | | |
|---|---|---|---|
| 288. Grossesse 1 | CONTRAC1 | 204 | Depuis 01/85 |
| 289. " 2 | CONTRAC2 | 205 | 0=sans objet |
| 290. " 3 | CONTRAC3 | 206 | 1=oui |
| 291. " 4 | CONTRAC4 | 207 | 2=non |
| 292. " 5 | CONTRAC5 | 208 | |
| 293. " 6 | CONTRAC6 | 209 | |
| 294. " 7 | CONTRAC7 | 210 | |
| 295. " 8 | CONTRAC8 | 211 | |
| 296. " 9 | CONTRAC9 | 212 | |
| 297. " 10 | CONTRAC10 | 213 | |
| 298. " 11 | CONTRAC11 | 214 | |
| 299. " 12 | CONTRAC12 | 215 | |

Morbidite (2 semaines), enfants de 0 a 4 ans:

| | | | |
|---|---|---|---|
| 300. Grossesse 1 | MORB1 | 216-218 | 000=sans objet |
| 301. " 2 | MORB2 | 219-221 | 001=diarrhee |
| 302. " 3 | MORB3 | 222-224 | 002=fievre |
| 303. " 4 | MORB4 | 225-227 | 003=cephalee |
| 304. " 5 | MORB5 | 228-230 | 004=vomissement |
| 305. " 6 | MORB6 | 231-233 | 005=traumatisme |
| 306. " 7 | MORB7 | 234-236 | 006=douleur abdom |
| 307. " 8 | MORB8 | 237-239 | 007=toux |
| 308. " 9 | MORB9 | 240-242 | 008=infection peau |
| 309. " 10 | MORB10 | 243-245 | 009=autres. |
| 310. " 11 | MORB11 | 246-248 | 999=enfant absent |
| 311. " 12 | MORB12 | 249-251 | du menage. |
| 312. Numero de grossesse de l'enfant cible | CIBLE | 252-253 | |

ENQUETE4.DBF

| | | | |
|---|---|---|---|
| 313. Numero de la mere | MERENUM | 1-5 | |
| Cause de deces, enfant de 0 a 4 ans | | | |
| 314. Grossesse 1 | CAUSE1 | 6-8 | 000=sans objet |
| 315. " 2 | CAUSE2 | 9-11 | 001=diarrhee |
| 316. " 3 | CAUSE3 | 12-14 | 002=fievre |
| 317. " 4 | CAUSE4 | 15-17 | 003=cephalee |
| 318. " 5 | CAUSE5 | 18-20 | 004=vomissement |
| 319. " 6 | CAUSE6 | 21-23 | 005=traumatisme |

| | | | | |
|---|---|---|---|---|
| 320. | " 7 | CAUSE7 | 24-26 | 006=douleur abdom. |
| 321. | " 8 | CAUSE8 | 27-29 | 007=toux |
| 322. | " 9 | CAUSE9 | 30-32 | 008=infection peau |
| 323. | " 10 | CAUSE10 | 33-35 | 009=autres |
| 324. | " 11 | CAUSE11 | 36-38 | 999=inconnu |
| 325. | " 12 | CAUSE12 | 39-41 | |

ENQUETE MENAGERE.

I. Les activites et l'emploi du temps de la mere

| | | | |
|---|---|---|---|
| 1. Travaux de champs | V1 | 42 | 1=oui<br>2=non |
| 2. Nombre de jours par semaine | V2 | 43 | 1=1-2 jours<br>2=3-4 jours<br>3=5+<br>9=n/a |
| 3. Nombre d'heures de travail en foret/jour en saison pluie | V3 | 44-45 | 88=ne sait pas<br>99=non applicable |
| 4. Enfant cible en foret ? | V4 | 46 | 1=oui<br>2=non<br>3=parfois/occasion<br>9=n/a |
| 5. Si oui, surveille enfant cible en foret | V5 | 47 | 1=enfant fille<br>2= enfant garcon<br>3=autre adulte<br>4=presonne<br>9=n/a |
| 6. Repas de l'enfant cible en foret | V6 | 48 | 0=amene rien<br>1=plat fam. complet prepare au village<br>2=restant, mais prepare en foret<br>3=plat fam. complet prepare en foret<br>4=repas de base plus ingredient trouves en foret<br>5=nourriture trouvee en foret sans base<br>6=autre<br>7=combinaison<br>9=n/a |
| 7. Garde de l'enfant cible mere em foret | V7 | 49 | 0=personne<br>1=enfant fille<br>2=enfant garcon<br>4=voisin<br>5=membre de famille adulte<br>9=n/a |

| | | | |
|---|---|---|---|
| 10.a) Soins apportes a l'enfant pendant l'absence de la mere contente ? | V8 | 50 | 1=oui<br>2=non<br>3=ca depend<br>9=n/a |
| 11.a) Autres travail rentables ? | V9 | 51 | 1=oui<br>2=non |
| 11.b) Sorte de travail | V10 | 52 | 1=vente produits agircoles<br>2=agent de l Etat<br>3=travail independant<br>4=employee<br>5=combinaison<br>9=n/a |
| 11.c) Combien de jours/semaine de ce travail ? | V11 | 53 | 0=0<br>1=1-2 jours<br>2=3-4 jours<br>3=5+<br>9=n/a |
| 11.d) Garde de l'enfant cible pendant ce travail | V12 | 54 | 0=personne<br>1=enfant fille<br>2=enfant garcon<br>3=pere(mari)<br>4=voisin<br>5=membre de famille<br>9=n/a |
| 12.a) Est-ce la mere fait la peche ? | V13 | 55 | 1=oui<br>2=non |
| 12.b) Nombre de jours/semaine | V14 | 56 | 0=par occasion<br>1=1-2 jours<br>2=3-4 jours<br>3=5+<br>9=n/a |
| 13. Nombre de preparations de nourriture/jour | V15 | 57 | 0=0 fois<br>1=1 fois<br>2=2 fois<br>3=3+ |

II. Alimentation de l'enfant cible

V16 - V28 can be eliminated next round, except V17

| | | | |
|---|---|---|---|
| 14.a) Autre aliments a part le lait maternel ? | V16 | 58 | 1=oui<br>2=non |
| 14.b) Quels aliments | | | |
| 1. Bouillie | V17 | 59 | 1=oui<br>2=non<br>9=n/a |
| 2. Tubercule, grains, cereales | V18 | 60 | |
| 3. Chairs | V19 | 61 | |
| 4. Crustaces | V20 | 62 | |
| 5. Legumineuses | V21 | 63 | |

| | | | |
|---|---|---|---|
| 6. Feuilles vertes | V22 | 64 | |
| 7. Autres legumes | V23 | 65 | |
| 8. Insectes (larves) | V24 | 66 | |
| 9. Fruits | V25 | 67 | |
| 10. Autres | V26 | 68 | |
| 11. The, cafe, vin | V27 | 69 | |
| 12. Autre lait | V28 | 70 | |
| 14.c) Introduction de ces aliments apres combien de mois | | | |
| 01. Bouillie | V29 | 71-72 | |
| 02. Tubercule, grains, cereales | V30 | 73-74 | |
| 03. Chairs | V31 | 75-76 | |
| 04. Crustaces | V32 | 77-78 | |
| 05. Legumineuses | V33 | 79-80 | |
| 06. Feuilles vertes | V34 | 81-82 | |
| 07. Autres legumes | V35 | 83-84 | |
| 08. Insectes | V36 | 85-86 | |
| 09. Fruits | V37 | 87-88 | |
| 10. Autres | V38 | 89-90 | |
| 11. The, cafe, vin | V39 | 91-92 | |
| 12. Autre lait | V40 | 93-94 | |
| 15. Raisons de l'introduction d'autres aliments en plus du lait maternel | | | |
| Raisons donnees : 1. | V41 | 95-96 | 01=mere malade |
| 2. | V42 | 97-98 | 02=enfant malade |
| 3. | V43 | 99-100 | 03=mere grosse<br>04=lait maternel insuffisant<br>05=enfant pleurait de faim<br>06=conseil agent de sante<br>07=conseil de qlq 1 d'autre<br>08=bon pour sa sante et il a besoin d'etre fort pour grandir<br>09=carrence de lait maternel<br>10=blessures aux mamelons<br>11=a l'age pour prendre d autres aliments<br>12=autres raisons<br>77=pas d'autrea raisons<br>88= ne sait pas<br>99=n/a |
| 16. Nombre de repas/jours repas a base de fufu, bouillie ou chickwangue | V44 | 101 | 0=0 fois<br>1=1-2 fois<br>2=3-4 fois<br>3=5+ |

| | | | |
|---|---|---|---|
| 17.a) Enfant sevre | V45 | 102 | 1=oui<br>2=non<br>3=jamais allaite |
| 17.b) Apres combien de mois | V46 | 103-104 | 88=ne sait pas<br>99=n/a |
| 18. Raisons de sevrage a cet age<br>Raisons donnees : 1. | V47A | 105-106 | 01=enfant assez grand |
| 2. | V47B | 107-108 | 02=lait maternel insuffisant |
| 3. | V47C | 109-110 | 03=mere enceinte<br>04=mere occupee<br>05=refus du lait maternel<br>06=on m'a conseille<br>07=enfant malade<br>08=il mangeait deja d'autres aliments<br>09=les seins faisaient mal<br>10=absence de lait maternel<br>11=mort de mere<br>12=mere malade<br>13=autres raisons<br>77=pas autre raison<br>88=ne sait pas<br>99=n/a |
| 19.a) Age de commencement du biberon | V48 | 111-112 | 88=ne sait pas<br>99=n/a |
| 19.b) Duree de prise de biberon | V49 | 113-114 | 77=prend encore<br>88=ne sait pas<br>99=n/a (jamais pris) |
| III. Fratique d'hygiene | | | |
| 20.a) Lavage de mains chq jour | V50 | 115 | 1=oui<br>2=non |
| 21.a) Utilisation du savon pour le lavage des mains | V51 | 116 | 1=oui<br>2=jamais<br>3=occasionnellement |
| 22. Duree de conservation de la bouillie pour enfant | V52 | 117 | 1= - 1 heure<br>2=1-3 heures<br>3=4-6 heures<br>4=7-12 heures<br>5=13-24 heures<br>6=+ de 24 heures<br>8=ne sait pas<br>9=n/a (ne mange pas la bouillie) |

| | | | |
|---|---|---|---|
| 23.a) Si enfant peut tomber malade en mangeant les selles animales | V53 | 118 | 1=oui<br>2=non<br>9=n/a |
| 23.c)Si oui, quelles maladies | V54 | 119 | 1=rongeur de bouche<br>2=maux de ventre<br>3=kwashiorkor<br>4=diarrhee<br>5=verminose<br>6=autres<br>7=combinaison<br>8=ne sait pas<br>9=n/a |
| 24.a)Si enfant peut tomber malade en mangeant ses propres selles | V55 | 120 | 1=oui<br>2=non<br>9=n/a |
| 25.a) Si enfant peut tomber malade en mangeant les selles des autres | V56 | 121 | 1=oui<br>2=non<br>9=n/a |
| 26. Lieu habituel de defecation de l'enfant | V57 | 122 | 1=pleine parc/terre<br>2=brousse<br>3=W.C/pot<br>4=dans les bras<br>5=lit/natte<br>6=trou<br>7=combinaison<br>9=n/a |
| 27. Que fait la mere avec les selles de l'enfant | V58 | 123 | 1=jetter au W.C<br>2=jetter en brousse<br>3=laisser par terre<br>4=enterrer<br>5=jetter dans trou<br>6=couche(habit sale) depose au toit, arbre<br>9=n/a |
| 28.a) Bouillir l'eau a boire | V59 | 124 | 1=oui<br>2=non |
| 29.a) Mauvais si enfant met de la terre dans sa bouche | V60 | 125 | 1=oui<br>2=non<br>9=n/a |

IV. Source d'informations

| | | | |
|---|---|---|---|
| 30. Les animateurs possibles au villages | | | |
| 1. Chef du village | V61 | 126 | 1=oui |
| 2. Dirigeant | V62 | 127 | 2=non |
| 3. Les vieux du village (notables) | V63 | 128 | |
| 4. Infirmiers (Agent d'Etat) | V64 | 129 | |
| 5. Cathechiste (pasteur) | V65 | 130 | |
| 6. Instuteurs | V66 | 131 | |
| 7. Sage femme | V67 | 132 | |
| 8. MOFAP | V68 | 133 | |
| 9. Mama Bongisa (cond.f) | V69 | 134 | |
| 10. Autres | V70 | 135 | |
| 31. Lieu d'accouchement de l'enfant cible | V71 | 136 | 1=maternite (disp. hopit. C.S)<br>2=village<br>3=Brousse<br>4=en cours de route |
| 32.a) Enfant au C.P.S | V72 | 137 | 1=jamais<br>2=amene puis arrete<br>3=oui, je continue |
| 32.b) Raison de l'arret (si 2) | V73 | 138 | 1=vacc. complete<br>2=manque argent<br>3=trop loin<br>4=voyage<br>5=autres travaux<br>6=autres<br>8=ne sait pas<br>9=n/a |
| 32.c) Mere peut montrer carte C.P.S de l'enfant cible | V74 | 139 | 1=oui<br>2=non |
| 32.d) Selon la carte, est-ce que l'enfant a eu : | | | |
| 1. BCG | V75 | 140 | 1=oui |
| 2. Polio 1 | V76 | 141 | 2=non |
| 3. Polio 2 | V77 | 142 | 9=n/a |
| 4. Polio 3 | V78 | 143 | |
| 5. DTCoq 1 | V79 | 144 | |
| 6. DTCoq 2 | V80 | 145 | |
| 7. DTCoq 3 | V81 | 146 | |
| 8. Rougeole (VAR) | V82 | 147 | |
| 33.a) Reception message en matiere de sante | V83 | 148 | 1=oui<br>2=non |
| 33.b) Provenance des messages si oui : | | | |
| 1. Radio | V84 | 149 | 1=oui |
| 2. Dispensaire/maternite | V85 | 150 | 2=non |
| 3. Paroisse/cathechiste | V86 | 151 | 9=n/a |
| 4. Animateur rural | V87 | 152 | |
| 5. Gens du village | V88 | 153 | |
| 6. C.P.S | V89 | 154 | |
| 7. Autres (journaux, | | | |

| | | | |
|---|---|---|---|
| TV, Video) | V90 | 155 | |

V. Traitement de la diarrhee

| | | | |
|---|---|---|---|
| 34. Ce que l'on a fait quand l'enfant a eu de la diarrhee | | | |
| 1. Continuer a l'allaiter | V91 | 156 | 1=oui |
| 2. L'amener au dispensaire | V92 | 157 | 2=non |
| 3. lui donner la SSS | V93 | 158 | 9=n/a |
| 4. lui donner l'eau de riz | V94 | 159 | |
| 5. lui donner les medicaments traditionnels | V95 | 160 | |
| 6. Invoquer les ancetres ou des prieres | V96 | 161 | |
| 7. lui donner l'eau a boire | V97 | 162 | |
| 8. lui donner a manger | V98 | 163 | |
| 9. lui donner S.R.O | V99 | 164 | |
| 35. Explication sur la preparation de S.S.S | V100 | 165 | 1=correcte<br>2=incorrecte<br>3=jamais prepare<br>8=ne sait pas |

# P E C O D I Z

HOUSEHOLD SOCIOECONOMIC AND DEMOGRAPHIC QUESTIONNAIRE 1988

ENQUETE SOCIO-ECONOMIQUE ET DEMOGRAPHIQUE

## I. GENERALITES

1) DATE : ______

2) NOM DE MERE : ______________________________

3) N° ID. MERE : |__|__|__|__|__|

4) Nombre enfants cibles : |__|__|

5) CODE SITE : |__|__|

## II. SOCIO-ECONOMIE ET DEMOGRAPHIE

1) Nombre pièces d'habitation |__|__|

2) Nature d'habitation

a) SOL |__|

| | |
|---|---|
| Terre = 1 | Carrelage · 3 |
| Ciment = 2 | Autres 4 |

b) M U R |__|

| | |
|---|---|
| dur = 1 | planches = 4 |
| adobe = 2 | végétation = 5 |
| pisé = 3 | autres = 6 |

c) TOITURE |__|

| | |
|---|---|
| toiture métal = 1 | végétation = 4 |
| eternit = 2 | tuiles = 5 |
| tôles récup. = 3 | autre = 6 |

3) Sanitation

a) Toilette/W.C. |___|

| | |
|---|---|
| < 10 m de maison = 1 | n'existe pas = 3 |
| ≥ 10 m de maison = 2 | |

b) W.C. élevé par rapport à la maison/rivière |__|

| | |
|---|---|
| Oui = 1 | n/a = 9 |
| Non = 2 | |

c) Trou à ordure |__|

présent dans la parcelle = 1

présent hors de la parcelle = 2

absent = 3

d) Votre source principale d'eau à boire ? |__|

(Na nki kifulu beno ke luta mingi kubaka masa na beno ya kunwa).

| | |
|---|---|
| SA = 1 | Mare/Marigot = 4 |
| SNA = 2 | Pompe à eau = 5 |
| Rivière = 3 | eau de pluie = 6 |

4) Combien de personnes résident dans votre ménage ?
(Bantu ikwa ke zingaka awa na nzo ?)

a) adultes/Bambuta (> 15 ans) :

b) enfants/Baleki (< 15 ans) :

5) Quel est votre état matrimonial ?
(Nki mvandilu ya luzingu na nge ?)

Célibataire = 1
Mariée monog. = 2
Mariée polyg. = 3
Union de fait = 4
divorcée = 5
separée = 6
veuve = 7
desunion = 8
autre = 9

6) Est-ce que votre mari vit dans le ménage ?
(Keti bakala na nge ke zingaka na nzo na nge ?)

Oui = 1 non = 2

7) Quel est votre niveau d'instruction ?
(Keti nge zaba kutanga ti kusonika ?
Nge sukaka na nki nzo-nkanda ?)

Sans instruction = 00
Sait lire/écrire 01
Primaire = PX
Secondaire = SX
Universit/Sup. = UX
Inconnu = 88

8) Quel est le niveau d'instruction de votre mari ?
(Keti bakala na nge zaba kutanga ti kusonika ?
Yandi sukaka na nki nzo-nkanda ?)

Sans instruction = 00
Sait lire/écrire = 01
Primaire = XP
secondaire = SX
Universit/Sup. = UX
Inconnu = 88
N/A = = 99

9) Travaux de mère

a) Combien de jours par semaine partez-vous en forêt ?
(Na mposo mosi nge ke kwendaka bilumbu ikwa na mfinda ?)

1 - 2 jours = 1
3 - 4 jours = 2
5 + jours = 3
Non - applicable = 9

b) Faites-vous d'autres travaux rentables ?
(Keti nge ke salaka bisalu ya nkaka ya kele pesaka nge mbongo ?)

Oui = 1 non = 2

c) Combien de jours par semaine cet autre travail rentable est fait ?
(Nge kele salaka bisalu yango bilumbu ikwa na mposo mosi ?)

0 jours = 0
1 - 2 jours = 1
3 - 4 jours = 2
5 + jours = 3
non applicable = 9

d) Gagnez-vous de l'argent ?
(Keti nge ke zwaka mbongo ?)

Oui/qlq fois/Toujours = 1

Non, jamais = 2

e) Si oui, à peu près combien par mois pendant la saison pluvieuse ?
(Kana yinga, ikwa na ngonda mosi na nsungi ya mvula ?)

10) Travaux de Père

a) Quelle est l'occupation de votre mari ?
(Nki kisalu ya bakala na nge ?)

élève, étudiant = 1
Travail = 2
perdu son travail = 3
jamais travaillé = 4
Pensionné = 5
Inactif = 6
autres = 7
indéterminé = 8
non - applicable = 9

b) Gagne-t-il de l'argent ?
(Keti yandi ke zwaka mbongo ?)

Oui/qlq fois/toujours = 1

Non, jamais = 2

N/A = 9

c) Si oui, combien par mois (saison pluvieuse)
(Kana yinga, ikwa na ngonda mosi na nsungi ya mvula ?)

III. NUTRITION MATERNELLE

Circonférence du bras de mère (mm) :

BREASTFEEDING AND WEANING PRACTICES QUESTIONNAIRE 1988

## P E C O D I Z

## ALIMENTATION ET SEVRAGE

### I. GENERALITES

1) N° ID. MERE : |_|_|_|_|_|_|

2) NOM DE L'ENFANT :______________________________

3) N° ID. ENFANT : |_|_|_|_|_|_|

4) Cet enfant est-il adoptif ? |__|
(Keti mwana yai nge muntu butaka to nge bakaka yandi ?)

Oui = 1 non = 2

### II. ALLAITEMENT

1) Allaitez-vous votre enfant encore ? |__|
(Keti mwana ikele kunwaka diaka mabele ?)

Oui = 1 non = 2

2) Si non, à quel âge avez-vous arrêté ? (mois) |_|_|
(Kana ve, na nima bangonda ikwa ?)

Ne sais pas = 88

Non - applicable (pas encore arrêté) = 99

3) Pourquoi avez-vous arrêté à cet âge ? 1. |_|_|
(Sambu na nki nge katulaka yandi na mabele na bangonda yina ?) 2. |_|_|

(Donner 2 raisons)

L'enfant était assez grand = 00
Le lait maternel ne suffisait pas = 01
Le lait maternel ne sortait plus = 02
J'étais enceinte = 03
J'étais trop occupée = 04
L'enfant ne voulait plus le sein = 05
L'enfant (ou mère) malade = 06
L'enfant avait déjà pris d'autres aliments = 07
Les seins/mamelons faisaient mal = 08
La mort de la mère = 09
Autre = 10
Pas d'autres raisons = 77
N.S.P. = 88
Non-applicable = 99

4) Avez-vous donné à l'enfant le tout premier lait maternel (le colostrum) |__|
(Keti yandi kunwaka mabele ya ntete ?)

Oui = 1 non = 2

### III. S E V R A G E

1) Quel était le tout premier aliment (ou boisson) en déhors du lait maternel et de l'eau que vous avez donné à l'enfant ? |__|
(Katula mabele ti masa, nki madia ya ntete to kima yakunwa ya nge pesaka na mwana ?)

Bouillie =1 Thé/café/Vin = 2 Fufu/Riz = 3 Fruits = 4
Aliments = 5 Autre lait = 6 N.S.P. = 8 N/A = 9

2) L'enfant avait combien de mois quand vous av?z donné cet autre aliment (ou boisson) ?
(Mwana kuvandaka ti bangonda ikwa na ntangu ya nge pesaka yandi madia to kima ya kunwa yina yankaka ?)

N.S.P. = 88
N/A = 99

3) Si l'enfant a eu moins de 4 mois, Pourquoi avez-vous donné cet autre aliment (ou boisson) ?
(Kana mwana vanda na ngonda iya ntete ve, sambu na nki nge pesaka yandi madia to kima ya kunwa yina ya nkaka ?)

L'enfant a pleuré (de faim) = 01
C'est bon pour sa croissance/Santé = 02
L'enfant a eu l'âge de prendre = 03
Le lait maternel ne suffisait pas = 04
L'enfant/mère était malade = 05
Quelqu'un m'a conseillé = 06
Autres = 07
N.S.P. = 88
N/A = 99

4) Est-ce que l'enfant prend autre lait à part le lait maternel ?
(Keti mwana kele nwaka miliki (lait) ?

Oui = 1 non = 2

5) Si oui, il en prend combien de fois par jour ?
(Kana yinga, yandi ke nwaka yo mbala ikwa na kilumbu mosi ?)

0 à 1 = 1 5 + = 3
2 à 4 = 2 N/A = 9

6) Si oui, à quel âge avez-vous introduit cet autre lait ?
(Kana yinga, mwana vandaka na ngonda ikwa ntangu ya nge yantikaka kupesa yandi mabele yankaka (lait, miliki) ?)

N.S.P. = 88
N/A = 99

7) Si l'enfant a eu moins de 4 mois), Pourquoi lui en avez-vous introduit ?
(Kana mwana vandaka na ngonda iya ntete ve, sambu na nki nge pesaka yandi mabele yina yankaka ?

L'enfant a pleuré (de faim) = 01
C'est bon pour sa croissance/Santé = 2
L'enfant a eu l'âge de prendre = 03
Le lait maternel ne suffisait pas = 04
L'enfant/mère était malade = 05
Quelqu'un m'a conseillé = 06
Autres = 07
N.S.P. = 88
N/A = 99

8) Si vous avez donné du lait non-maternel à l'enfant, mais vous n'en donnez plus, pendant combien de mois a-t-il pris cet autre lait ?
(Kana nge pesaka mwana mabele yina yankaka kansi nge me bikaka kupesa yandi yo, bangonda ikwa yandi bakaka yo ?

N.S.P. = 88
A/N = 99

9) Est-ce que l'enfant prend de la bouillie ?
(Keti mwana kele kudiaka poto-poto ?)

Oui = 1 non = 2

10) Si oui, il en prend (normalement) combien de fois par jour ?
(Kana yinga, yandi ke bakaka yo mbala ikwa na kilumbu mosi ?)

0 à 1 = 1 5 + = 3
2 à 4 = 2 N/A = 9

11) L'enfant avait combien de mois quand vous avez introduit de la bouillie ?
(Yandi yantikaka kudia poto-poto na nima ngonda ikwa ?)

N.S.P. = 88
N/A = 99

12) Si vous avez donné la bouillie, mais vous n'en donnez plus, pendant combien de mois l'enfant l'a-t-il prise ?
(Kana nge pesaka mwana poto-poto kansi nge me bikaka kupesa yandi yo, bangonda ikwa yandi bakaka yo ?)

N.S.P. = 88
N/A = 99

13) Est-ce que l'enfant mange du plat familial ?
(Keti mwana mene dika madia ya bambuta ?)

Oui = 1 non = 2

14) Si oui, combien de mois a-t-il eu quand vous avez commencé le plat familial ?
(Yandi diaka madia ya kimvuka na nima ya bangonda ikwa ?)

N.S.P. = 88 N/A = 99

15) Si oui, il en prend combien de fois par jour ?
(Kana yinga, yandi ke diaka yo mbala ikwa na kilumbu mosi ?)

0 à 1 = 1 5 + = 3
2 à 4 = 2 N.S.P. = 8
N/A = 9

16) Est-ce que vous avez donné un biberon à l'enfant ?
(Keti nge pesaka biberon na mwana ?)

Oui = 1
Non = 2

17) Si oui, que contenait ce biberon ?
(Kana yinga, nki vandaka na kati ya biberon ?)

Lait non-maternel = 1
Eau sucrée = 2
Bouillie = 3
Jus de fruits = 4
Thé/café/vin = 5
N.S.P. = 8
N/A = 9

18) Si oui, l'enfant avait combien de mois quand vous avez donné le biberon pour la première fois ?
(Kana yinga, mwana vandaka na bangonda ikwa ntangu nge pesaka yandi biberon mbala ya ntete ?)

N.S.P. = 88

N/A = 99

19) Continuez-vous à donner le biberon ?
(Keti nge ke fula na kupesa mwana biberon ?)

Oui = 1

Non = 2

N/A = 9

20) Si non, pendant combien de mois l'enfant a-t-il pris le biberon ?
(Kana ve, bangonda ikwa mwana kunwaka biberon ?)

N.S.P. = 88

N/A = 99

IV. ETAT NUTRITIONNEL

Poids de l'enfant (Kg) :

CHILD WEIGHT FORM AT START OF INTERVENTION 1988

P E C O D I Z

SURVEILLANCE DE POIDS
AVANT INTERVENTION

Recenseur : ____________________

Date : __ __/__ __/__ __

Code Site : |_|_|

Nom de la mère : ____________________

N° de la mère : |_|_|_|_|_|

Nom de l'Enfant : ____________________

N° de l'Enfant : |_|_|_|_|_|

Poids de l'Enfant : |_|_|_|_|(Kg)

CHILD WEIGHT FORM AT MIDDLE AND END OF INTERVENTION 1988

PECODIZ

SURVEILLANCE DE POIDS APRES INTERVENTION

| | |
|---|---|
| Recenceur : | ________ |
| Date de pesée : | __ / __ /88 |
| Code site : | \|_\|_\|_\| |
| Nom de la mère : | ________ |
| N° de la mère : | \|_\|_\|_\|_\|_\|_\| |
| Année de Naissance de la mère : | ________ |
| Tribu de la mère : | ________ |
| Tribu du mari : | ________ (*) |
| Nom de l'enfant : | ________ |
| N° de l'enfant : | \|_\|_\|_\|_\|_\| |
| Poids de l'enfant : | \|_\|_,\|_\|(Kg) |

(*) Pour les non mariées laissez la case vide

**HISTOIRE DE LA DIARRHEE**
**FICHE D'ABSENCE**

1. Codesite : |__|__|
2. Numero de mere : |__|__|__|__|__|
3. Numero de visite prevue : |__|__|
4. Date de visite prevue : __/__/__
5. Numero de(s) enfant(s) absent(s) : |__|__|__|__|__|
|__|__|__|__|__|
|__|__|__|__|__|
6. Raison d'absence :

--------------------------------------------------------------------

--------------------------------------------------------------------

--------------------------------------------------------------------

--------------------------------------------------------------------

7. Visite recuperee :
1 = oui 0 = non |__|
8. Si oui, date de recuperation : __/__/__

A l'enqueteur:

9. Est-ce que vous avez pu recueillir les informations sur les jours prevus pour le rendez-vous ?
1 = oui 0 = non |__|

CENSUS FORM 1987-88

PROJET D'EDUCATION COMMUNAUTAIRE SUR LES MALADIES DIARRHÉIQUES AU ZAIRE

RECENSEMENT

SITE : ______________________ ENQUETEUR : ______________________

INTRODUCTION :

Zina na mono : ______________ Mono ke salaka na CEPLANUT na Kikwit. Beto me kwisa awa sambu na kufula bisalu ya me tadila pulu-pulu ya bana ya fioti; bana ya ikele na ngonda tatu ti kuna mvula zole na ngonda kumi na mosi.
Bonso bana mingi ya beto sonikaka mene kuma bambuta beto kele kusonika ba nkaka na kifulu na bo.

1. Date de recensement : __ __/__ __/__ __

2. Numero d'identification de la mère : |_|_|_|_|_|_|

(Nom de mère)

3. Zina ya maman : ______________________

4. Code de Site : |_|_|

| | |
|---|---|
| 01 = Cité Kipuka | 10 = Lusanga |
| 02 = Camp Kiyaka | 11 = Sungu |
| 03 = Camp Kakoy | 12 = Kinzambi Mbonga |
| 04 = Bumba Puta | 13 = Kikandji |
| 05 = Kazamba Ngwangwa | 14 = Cité Nkara |
| 06 = Sese Mulutu | 15 = Ngwari Ngwari |
| 07 = Mubondo | 16 = Kikamba |
| 08 = Kimbilangundu | 17 = Kimputu Nseke |
| 09 = Kwanga | 18 = Tango Ngomena |

5. Nom du Village ou Localité : ______________

6. (Il y a combien de personnes dans votre menage ?) Bantu ikwa ikele na nzo yayi ? |_|_|

__________ total (hommes + femmes + enfants)

7. (Combien de personnes mange ici, chez vous ?) Beno ikele kudiaka bantu ikwa awa na nzo na beno ? |_|_|

8. (Combien d'enfants âgés de 3 à 35 mois avez-vous ?) Beno ikele ti bana ikwa ya melungisa ngonda tatu ti kuna mvula zole ti ba ngonda kumi na mosi ? |_|

(AVANT DE REMPLIR CETTE REPONSE, VERIFIER LE NOMBRE A PARTIR DU TABLEAU CI-DESSOUS).

| | 1er ENFT. | 2e ENFT | 3e ENFT |
|---|---|---|---|
| 9. Zina na mwana (Nom de l'enfant) | | | |
| 10. N° d'identification | - - - - - - - | - - - - - - - | - - - - - - |
| 11. Sexe : 1 = G.<br>0 = F. | \|_\| | \|_\| | \|_\| |
| 12. Kilumbu ya kubutuka (Ngonda/Mvula) (Mois/An Naissance). | __ __/__ __ | __ __/__ __ | __ __/__ __ |
| 13. Naissance Vérifié :<br>1 = Acte Naissance<br>2 = Fiche de poids<br>3 = Mère sait<br>4 = Calendrier local<br>5 = Enregistré à l'hôpital<br>6 = Autre | \|_\| | \|_\| | \|_\| |

14. (Est-ce que vous êtes mariée ?)
Keti nge ikele nkento ya libala ?

1 = Yinga (Oui)    2 = Ve (Non)

SI OUI, PASSEZ DIRECTEMENT A Q. 16.

SI NON, PASSEZ A Q. 15.

15. (Si non, quel est votre état civil ?)
Kana ve :
1. Makangu (concubinage)
2. Kukabwana nitu (séparation du corps)
3. Libala imene kufwaka (divorcée)
4. Bakala imene kufwaka (veuve)
5. Ndumba (Prostituée
6. Mono imene balaka ntete ve (jamais mariée)

PASSEZ DIRECTEMENT A Q. 48

16. (Nom du mari)
Zina ya bakala na nge :________________________

17. (Est-ce que ton mari vit ici ?)
Keti bakala na nge ikele kuzingaka awa ?

1 = Yinga (Oui)    2 = Ve (Non)

18. (Est-ce que vous allez voyager pour un autre village cette année ?)
Keti nge ata kwenda kutambula na mbwala ya nkaka mvula yayi ?

1 = Yinga (Oui)    2 = Ve /Kuzamba ve (non/ne sait pas)

SI NON, QUESTIONNAIRE EST TERMINEE

SI OUI, CONTINUER

19. (SI OUI, pendant quel mois) ?    __/__
Kana yinga, na inki ngonda ?

20. (Ce voyage prendra combien de jours ?)
Yutambula yango ata baka bilumbu ikwa ?

1 = moins de 4 semaines
2 = 4 semaines ou plus
3 = pour toujours
4 = ne sait pas

## APPENDIX 3. EDUCATIONAL POSTERS


Na kutina pulu-pulu
SAVON
yobisa maboko na savon
na ntwaLa ya madia
pour éviter La diarrhée: Laver Les mains avec du savon
avant La prise du repas

Na kutina pulu-Pulu


yobisa maboko na savon
na ntwala ya kulamba

*Pour éviter la diarrhée: laver les mains avec du savon avant la préparation*


Na kutina pulu-pulu
komba Lupangu mbala
zole na kilumbu
pour éviter la diarrhée balayer au moins 2 fois
par jour vos parcelles

Na kutina pulu-pulu


Yobisa mwana na savon
na nima ya kunena

*pour éviter la diarrhée: Laver le corps de l'enfant avec du savon après la défecation*


**Na kutina** pulu-pulu
**katulaye** losa tufi na
kati ya Cabinet
*pour éviter la diarrhée: évacuer et jeter les selles dans le W.C.*

## Na kutina pulu-pulu


## yobisa maboko na savon
## na nima ya kunena

*pour éviter la diarrhée: Laver les mains avec du savon après la défecation*

# MabeLe ya Mama

Madia ya ngoLo, madia ya kuLunga madia ya mfunu mingi na Luzingu ya mwana ikiLe na puLu-puLu

Lait Maternel : [illegible] essentielle pour la vie de [illegible] l'enfant [illegible]

# Masa ya Loso

Nkisi ya mbote ya ke manisa pulu-pulu

L'eau de riz: est un bon médicament pour la réhydratation

RICE WATER SOLUTION HOME RECIPE

# BETO BELUSA BANA KE NENA PULU-PULU NA SERUM ORAL


1) Baka mulangi ya mpamba ya Primus go Skol go Simba. Fulusa yau na maza ya mpeto ti na nsongi. Tula maza yina na dilonga ya bunkete.

2) Baka mungwa na nsongi ya luto ya fioti mosi. Yika yau na maza yina; belusa yau mbote. Meka maza yina. Kana mungwa imene kulutana, tiamuna yau, sala ya nkaka.

3) Fulusa ba luto ya fioti iya na sukadi. Yika yau na maza yina ya mungwa.

4) Belusa yau mbote ti kuna mungwa na sukadi ke kunlena yonso.

5) Fulusa dikopa mosi na maza yina ya mungwa ti sukadi.

6) Pesa mwana dikopa mosi ya maza yina mbala nyonso yandi ke sala salité ya maza-maza, go yandi kekuwa kiwina. Landila kupesa yandi yau ti kuna pulu-pulu kekangama.

KIKONGO

## APPENDIX 4. CONSTRUCTION OF 12- AND 20-INDEX BEHAVIOUR SCORES

### Construction of 20-index Behaviour Score, Post-Intervention

| Observation Categories | Score |
|---|---|
| Thorough sweeping (*) | |
| thorough | 0 |
| partial | 1 |
| no sweeping | 2 |
| Sweepings disposal (*) | |
| garbage pit | 0 |
| other | 1 |
| no sweeping | 2 |
| Target child plays in sweepings (**) | |
| never | 0 |
| sometimes | 1 |
| Other children play in sweepings (**) | |
| never | 0 |
| sometimes | 1 |
| Animal faeces seen (**) | |
| none | 0 |
| some | 1 |
| much | 2 |
| Human faeces seen (**) | |
| none | 0 |
| some | 1 |
| Garbage pit | |
| distanced | 0 |
| in yard | 1 |
| none | 2 |
| Handwashing before food preparation | |
| always | 0 |
| sometimes | 1 |
| never | 2 |
| Child's hands washed before eating | |
| always | 0 |
| sometimes | 1 |
| never | 2 |
| Feeder's handwashing before feeding child | |
| always | 0 |
| sometimes | 1 |
| never | 2 |

| Observation Categories | Score |
|---|---|
| Sharer's handwashing before sharing w/child | |
| always | 0 |
| sometimes | 1 |
| never | 2 |
| Others' handwashing before eating meals | |
| always | 0 |
| sometimes | 1 |
| never | 2 |
| Caretaker's handwashing after child defecation | |
| always | 0 |
| sometimes | 1 |
| never | 2 |
| Childs' buttocks washed after defecation | |
| always | 0 |
| sometimes | 1 |
| never | 2 |
| Disposal of child faeces into latrine/garbage pit | |
| always | 0 |
| sometimes | 1 |
| never | 2 |
| Child faeces disposal instrument | |
| hoe/shovel | 0 |
| leaf | 1 |
| none | 2 |
| Latrine present | |
| no | 0 |
| yes | 1 |
| Latrine location | |
| <15 m from house | 0 |
| >15 m from house | 1 |
| Latrine use (adults) | |
| always | 0 |
| sometimes/not used | 1 |
| Handwashing after defecation/adults | |
| always | 0 |
| sometimes | 1 |
| never | 2 |

(*) Best recorded
(**) Worst recorded

(cont'd)

APPENDIX 4 (cont'd, p2 of 3)

Construction of 12-index Behaviour Score, Using Pre- and Post-Intervention Observational Categories

| Pre-intervention Observation Categories | Scores | Post-intervention Observation Categories | Scores |
|---|---|---|---|
| Thorough sweeping (*) | | Yard sweeping (****) | |
| no | 1 | none | 1 |
| yes | 0 | partial | 1 |
| | | thorough | 0 |
| Animal faeces seen (*) | | Animal faeces seen(****) | |
| no | 1 | none | 0 |
| yes | 0 | little | 0 |
| | | much | 1 |
| Human faeces seen (*) | | Human faeces seen (****) | |
| no | 1 | none | 0 |
| yes | 0 | some | 1 |
| Garbage pit | | Garbage pit | |
| absent | 1 | none | 1 |
| present | 0 | in yard | 0 |
| Handwashing before food preparation (**) | | Handwashing before food preparation (**) | |
| never | 1 | never | 1 |
| with water | 0 | with water | 0 |
| with soap | 0 | with soap | 0 |
| Others' handwashing before meals (***) | | Others' handwashing before meals (***) | |
| never | 1 | never | 1 |
| with water | 0 | with water | 0 |
| with soap | 0 | with soap | 0 |
| Child's hands washed before meals (**) | | Child's hands washed before meals (**) | |
| never | 1 | never | 1 |
| sometimes | 0 | sometimes | 0 |
| always | 0 | always | 0 |
| Feeder's handwashing before feeding child(**) | | Feeder's handwashing before feeding child(**) | |
| never | 1 | never | 1 |
| sometimes | 0 | sometimes | 0 |
| always | 0 | always | 0 |
| Child's buttocks washed after defecation (*) | | Child's buttocks washed after defecation (*****) | |
| no | 1 | no | 1 |
| with water | 0 | wiped dry | 0 |
| with soap | 0 | water &/or soap | 0 |
| n/a (no defecation) | 0 | | |
| Disposal of child faeces, method (*) | | Disposal of child faeces instrument (**) | |
| rags, clothing, leaf | 1 | nothing | 1 |
| covered with sand | 1 | leaf, cloth, rags | 1 |
| animals eat | 1 | hoe, shovel | 0 |
| hoe, shovel | 0 | | |
| n/a (no defecation) | 0 | | |

APPENDIX 4 (cont'd, p3 of 3)

Observational categories differ slightly between pre-and post-intervention periods due to modifications made prior to post-intervention observation study. These modifications were intended to refine and improve the second study, and to refocus observations on message-related behaviours. The pre- and post-intervention 12-index scores are, nonetheless, equivalent in weights given to each observation.

(*) Single event recorded
(**) Best recorded
(***) Worst recorded
(****) First event recorded
(*****) Either best or worst recorded. These variables could have been used to create dicotomous 'worst' or 'best' variables for inclusion in the post-intervention 12-index score. However, their counterparts in the pre-intervention data file were not specified as worst or best. Therefore, after trying both methods, worst or best was chosen based on the smallest resulting change from pre- to post-intervention in controls, the assumption being that control behaviour should not change.