

## Incidence of Diarrhea: Poor Parental Recall Ability

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Several methodological issues may have an impact on the incidence rates of childhood acute diarrhea reported by community-based studies. This study was performed to assess the impact of parental recall ability and definition of diarrhea on the estimate of incidence of acute diarrhea. Eighty-four children younger than 40 months were randomly selected and visited every other day for four weeks and the occurrence of diarrhea was registered. On the last day of the study, another visit was performed and the informants were inquired about the occurrence of diarrhea during the previous four weeks. Data gathered during the four weeks were compared to those obtained on the last visit. Additionally, the informants' definition of diarrhea was investigated and compared to the one adopted by this study. During the observation period, 33 children suffered diarrhea, but only 10 (30.3%) informants reported the occurrence of diarrhea. Although 42.4% of those informants reported that their children had been ill over that period, they did not report diarrhea. Further, 60.6% children who had diarrhea suffered at least one episode in the two weeks prior to the visitation. The same definition of diarrhea used in this study was adopted by 52.1% of the informants inquired. Parental recall is an unreliable method to estimate the incidence of diarrhea and studies with a short interval between the visits should be necessary to correctly evaluate this important health problem. Moreover, assessing the informants' own definition of diarrhea is a significant contribution to the interpretation of the results.

**Key words:** Acute diarrhea, diarrhea in children, diarrhea definition.

Acute diarrhea in children is associated with high levels of morbidity, consisting in a major health issue worldwide in spite of the falling rates of mortality [1-4]. Nevertheless, the real burden of the disease is possibly clouded by methodological handicaps on the different epidemiological studies addressing the incidence of acute diarrhea, which also harm considerably the comparison of those studies. An assessment of the different reports published so far suggests that the rates of incidence of acute diarrhea may vary widely depending on the definition of the case and on the sensitivity of the methods used to gather epidemiological information [1], highlighting the importance of performing home inquiries to determine incidence rates and to describe the natural history of the disease to provide more reliable data. Also high maternal knowledge seems to decrease hospitalization rates by diarrhea in young children [5].

Among important confounding factors to the definition of diarrhea are the parental ability to define and identify the illness, cultural models of diarrheal diseases and the infant's low age, while the methods used on data collection and the sample size are other points to be considered on the design of such studies [1-5]. Furthermore, the definition of diarrhea and the time intervals necessary to define different diarrheal episodes are also important factors that may lead to imprecise

estimates of incidence, duration and prevalence of the disease [1,6-9].

The objective of this study was to assess the importance of the recall period and the definition of diarrhea to the reliability of data provided by the informants enrolled on community-based studies reporting incidence of diarrhea.

### Material and Methods

This was a longitudinal, prospective study with the duration of four weeks. The study was conducted in Nova Divinéia and Vila Balbino, two urban slums in Salvador, Brazil, whose demographic, social and sanitary conditions are described elsewhere. [10] Eighty-four children younger than 40 months (42 from each slum) were enrolled in the study after being selected at random. Informed consent was obtained from the parents or legal guardians and the whole research was conducted under the guidance of the guidelines for research involving humans of the Ethics Committee of the Professor Edgard Santos University Hospital, Federal University of Bahia, Brazil.

Diarrhea was defined by the passing of three or more loose stools on a 24-hour period regardless of the presence of blood, mucus or pus, as detected by the parents or by the responsible caregiver. An episode of diarrhea was considered to be the occurrence of diarrhea after three or more days free of diarrhea.

Data were collected during one month in 2004 in a slum area on domiciliary visits every other day by one trained member of the research team and that lived in the area; this was the first study doing this in Brazil with this methodology in the reviewed literature. Two different validated questionnaires were employed: questionnaire 1 was used in domiciliary visits every other day to discover if children had had diarrhea on the day of the visit or on the previous day,

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whereas questionnaire 2 was applied on the last visit by the end of the observation period to assess informants' recall ability concerning the previous four weeks. The results provided by questionnaires 1 and 2 were compared to assess the reliability of the information provided by the informants.

## Results

During the observation period, we detected that 33 children (39.3%) had suffered diarrhea, and those constitute the population of the study. The mothers were the informants on 83.2% of the visits, while fathers, grandparents, aunts, uncles and siblings have also contributed with some information during the visits.

When the informants linked to the 33 children who had had diarrhea were asked nonspecifically about the occurrence of diseases over the preceding four weeks, 24 (72.7%) reported that their children had been ill, but only ten (30.3%) answered "yes" when inquired specifically about the occurrence of diarrhea over the same period, while other nine informants (27.3%) denied the occurrence of any disease during the observation period, as seen in Table 1.

Twenty out of 33 (60.6%) children who had had diarrhea suffered at least one episode in the two weeks prior to the visit, as seen in Table 2.

When 71 informants were inquired on the minimum number of unformed stools passed in a day necessary to define diarrhea, we found that 37 informants (52.1%) adopted the same definition used on this study (three or more dejections in a day), whereas 28 (39.5%) considered higher numbers to be the minimum, as seen in Table 3.

## Discussion

There is great variability on the methods employed to collect data for community-based studies addressing acute diarrhea in children, especially regarding the intervals allowed between the visits and the definition of diarrhea. It has already been noted that more frequent visits are associated with an increased number of diarrheal episodes [1,2] and that intervals longer than two days between visits may result in falsely decreased estimates of diarrheal episodes, which is possibly related to the informants' recall ability [7-9].

When we evaluated the recall ability of the informants linked to the 33 children who had had diarrhea over the preceding four weeks, we found that less than one-third of them reported the occurrence of diarrhea in their children. Interestingly, 42.4% of the informants reported that their children had been ill over that period but did not report diarrhea, suggesting that they did not consider diarrhea itself a disease. Other 27.3% mentioned neither disease nor diarrhea, even though we detected that their children had suffered diarrhea during that period, from which we conclude that they simply forgot about the episode or that the informant on the final visit was not the same who detected the episode of diarrhea and was unaware of its occurrence.

In large families, which are very common in poor regions of developing countries such as Nova Divinéia and Vila Balbino, it is interesting to note that older children or adolescents are frequently responsible for taking direct care of their younger siblings, even though their mother is at home. Therefore, mothers may not be the best informants about the health conditions of their younger children. Moreover, it has

**Table 1.** Parental information about the occurrence of diarrhea over the preceding 30 days compared to the findings of the research team

Diarrhea detected	Any disease reported	Diarrhea reported	N (%)
Yes	Yes	Yes	10 (30.3%)
Yes	Yes	No	14 (42.4%)
Yes	No	No	9 (27.3%)

**Table 2.** Week of diarrhea presentation as detected by the research team on visits performed every other day

Diarrhea was detected in	N (%)
First week	12 (36.4%)
Second week	1 (3.0%)
Third week	6 (18.2%)
Fourth week	11 (33.3%)
Last visit day	3 (9.1%)
Total	33 (100.0%)

**Table 3.** Minimum number of loose dejections in a day required to define diarrhea as reported by 71 informants

Minimum number of dejections	N (%)
Two dejections	5 (7.0%)
Three dejections	37 (52.1%)
Four dejections	17 (24.0%)
Five dejections	10 (14.1%)
Six dejections	1 (1.4%)
Did not answer the question	1 (1.4%)
Total	71 (100.0%)

already been noted that diarrhea is such a common event in children living on poor social and hygienic conditions that their caretakers frequently consider it a usual fact on children's life and do not report it unless it presents an unusual severity that impairs child's welfare [9,11]. Interestingly, 60.6% of the children who had diarrhea over the preceding four weeks had suffered the episode in the two weeks previous to the visit and more than one-third of them on the immediate week before the visit, suggesting that reducing the interval between the visits to two or even one week would not increase significantly the reliability of data.

The interval between interviews for data collection is crucial to the design of epidemiological studies on childhood diarrhea. Several groups have studied the impact of recall period on the estimates of the incidence of diarrhea and reported that intervals longer than one week between the visits may result in falsely decreased estimates and that the number of diarrheal episodes may be decreased up to one-third when an interval longer than two days is allowed [7-9]. As a consequence, studies based on parental ability to remember diarrheal episodes and similar specific events may report jeopardized results, reinforcing the importance of longitudinal studies with a short interval between the visits to avoid underreporting of cases.

The definition of the case is crucial to the accurate determination of the incidence of diarrhea, but it varies from one geographic zone to another and is strongly influenced by local culture [1,2,6]. In this study, diarrhea was defined by the passing of three or more loose stools in a 24-hour period as detected by the mother or the responsible caregiver, similar to what has been suggested by the WHO [12] and adopted in many studies [13-20], but contrasting to others who have defined diarrhea as at least four dejections per day [21-23] or according to parental definition [10,24-26]. Most recent studies consider that the passing of three or more unformed stools or any number with the presence of blood over a 24-hour period define diarrhea satisfactorily on adults and children older than two years, while to define an episode of diarrhea, the illness has to be preceded and followed by at least three days free of diarrhea [6,13,14,27-29].

Many definitions of diarrhea are found in literature and the most adequate may vary, though, depending on the design of the study. Maternal definitions appear to be more suitable to community-based studies, while those provided by the medical staff fit better in studies performed in medical settings [21]. In their analysis of 22 community-based studies on diarrhea morbidity and mortality in children, Snyder & Merson observed that the definition of diarrhea had been reported by only ten studies, two of which accepted maternal definition whereas the other eight had employed seven different combinations of frequency of evacuations and appearance of the stools to define diarrhea [1]. Ten years later, Bern et al. did not find the definition of diarrhea in only three out of 22 community-based studies analyzed [2]. Baqui et al. determined the incidence of diarrhea according to three different concepts

of diarrhea and observed that the incidence of diarrhea was underestimated in up to 30% when the informants considered that diarrhea was defined by the passing of at least four dejections per day [6].

We found that 52.1% of the informants inquired about the definition of diarrhea reported the same definition that was used in our study, whereas 39.5% only considered the occurrence of diarrhea if their children presented four or even more dejections in a day, possibly leading to an underestimation of the burden of the disease. Thus, if this study had been designed to address the incidence of diarrhea in this population, it would have to be considered that the real incidence could be even higher than the one detected. Assessing the informants' notion of diarrhea is important to validate the data reported, seeking to assure the reliability of the estimates presented as well as the association with risk factors. Furthermore, a comparison among different studies on the burden of the disease is only valid when a uniform definition of case has been employed by them.

In this report, we have demonstrated that parental recall ability is restricted and unreliable, which may jeopardize the results of studies based solely on that, providing a falsely decreased estimate of burden. Additionally, assessing the informants' definition of diarrhea is a significant contribution to the interpretation of the results, validating or shedding doubts in the data reported. As a conclusion, we stress that the use of diverse definitions of diarrhea, as well as discrepancies on the follow-up of patients, may lead to imprecise estimates of incidence of diarrhea, thus reducing the comparability among the reports, which is to be increased by the adoption of uniform definitions and methods.

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