

Twenty-four-hour recall, knowledge-attitude-practice questionnaires, and direct observations of sanitary practices: a comparative study

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Although responses to 24-hour recall and knowledge-attitude-practice questionnaires are commonly used in water-sanitation studies as surrogates for direct observation of behaviour, the validity of this approach is questionable. We therefore compared questionnaire data with those obtained by direct observation of practices related to water storage, handwashing, and defecation among 247 families in urban Dhaka, Bangladesh. Analysis of the results indicates that accord between the replies to the questionnaires and the data collected by direct observation was poor and that the responses to the two questionnaires were often contradictory. Significant disagreements between the results of questionnaires and observations arose usually because desirable practices were over-reported by the respondents. The results of the study suggest that in urban Bangladesh 24-hour recall and knowledge-attitude-practice questionnaires should not be used as proxies for direct observation of hygiene practices.

Efforts to establish an association between improved health and better water or sanitation facilities have resulted in a plethora of conflicting findings (1). Over the last few years increasing attention has therefore been focused on detecting methodological deficiencies in such studies to explain this confusion (2).^a As a result, it is now generally accepted that the introduction into a community of a new concept or technology is not synonymous with its use; for example, an innovation in waste disposal or water supply cannot, *per se*, improve health unless it is adopted (3).^b Several instruments for monitoring utilization of developments in water technology and sanitation have been devised. These include direct observation (3-7),^b knowledge-attitude-practice questionnaires (KAP) (8, 9), and recall questionnaires (3, 5, 6, 10).^{a, b}

However, it is widely suspected that the answers to the recall and KAP questionnaires may not corre-

spond to the results of direct observation (11-13),^b and Aziz et al. reported a discrepancy between the answers to KAP questionnaires and observations (7). To our knowledge, there has been no comparison until now of the three above-mentioned monitoring methods with respect to their ability to gather behavioural information about practices related to water usage and sanitation.

MATERIALS AND METHODS

The study, which was conducted between 15 October 1984 and 30 January 1985, was undertaken as part of the baseline observational phase of a larger intervention programme that involved 1900 families in 51 locations in Dhaka, Bangladesh (14).

Study design

Fifty-one communities, each consisting of 38 contiguous households, were identified in squatter and slum areas of Dhaka city. A household was defined as all persons who shared a cooking pot. Baseline socio-demographic information was obtained for each family at the beginning of the study. In each community five households (sentinel households) were randomly selected to also participate in in-depth behavioural monitoring and questioning, including a

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^b *Minimum evaluation procedure for water supply and sanitation projects*. Unpublished document (WHO/ETS/83.1).

knowledge-attitude-practice questionnaire about water usage and sanitation habits, a 24-hour sanitation recall questionnaire, and prolonged observation of actual sanitation practices. The results from these sentinel households formed the basis of the study.

A female volunteer health worker from the Dhaka Urban Volunteer Programme, who had received a 2-week training course at the International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B), in prevention and management of diarrhoea (15), was assigned to each community. These volunteers paid three visits per week to each household in their community to encourage participation and to identify any potential problems. They were not present at the subsequent interviews and were not informed about the aims of the study.

Monitoring instruments

All three monitoring instruments were administered by trained field officers or interviewers, who were neither briefed about the study hypothesis nor were aware of the responses of household members to other study enquiries. A separate person was responsible for administering each instrument. Instruments were developed by the collaborative efforts of a physician, an experienced anthropologist, and local Bangladeshi women with considerable field experience. The instruments were pre-tested for acceptability, comprehension, ease of administration, and replicability at ICDDR,B and then in the field using subjects whose environmental and cultural backgrounds were similar to those of the study population. The interviewers received extensive training and field practice with the instruments before using them in the study areas. Descriptions of particular practices were in the local Bengali vernacular, and were, as far as possible, consistent between the three instruments. Respondents were informed that the responses were strictly confidential and thus would not affect their social status in any way.

Knowledge-attitude-practice (KAP) questionnaire. This was administered to the primary caretaker of the children of all sentinel households at the time of enrolment to the study (caretakers included mothers, grandmothers, or aunts). Questions were directed at establishing the caretaker's practices and beliefs about handwashing and disposal of faeces. Respondents were not restricted to a limited number of answers or explanations to the questions, which were put open-endedly without indicating possible replies. Further questions about methods used to store water were then asked, for which the respondent was obligated to provide one answer only. The questionnaire required approximately 60 minutes to administer.

Twenty-four hour recall of hygiene practices questionnaire. This was administered by one of 13 trained interviewers to the primary caretaker of the children in all households 6-14 weeks after the KAP questionnaire. After the respondents had verbally asserted that no extraordinary event had occurred during the previous 24 hours, the interviewer questioned the caretaker about her hygiene practices during this period, paying particular attention to the handwashing and defecatory habits of the caretaker and children. If a specific type of activity had been repeated during the previous 24 hours, the caretaker was told to describe only the first episode. The questionnaire required approximately 15 minutes to administer.

On-site observation. Each sentinel household was observed for a prolonged period by one of five field officers 1-3 months after the KAP questionnaire and within 1 month of the 24-hour recall questionnaire on hygiene practices. Each observer was instructed to provide a brief explanation for her presence, not initiate conversation, pass no comment on the practices observed, not announce her visits in advance, and leave if her presence was felt to be unwelcome. Observations of the breakfast and the morning toilet routine (defecatory and handwashing practices of caretakers and children and methods of storing water) were made for 3-5 hours. The observations were recorded on precoded forms that contained structured categories, while at the same time allowing for qualifying comments.

Analysis

The three monitoring instruments probed several common areas in order to compare the information obtained. Comparisons were made only of responses that had been verified directly. For example, only if a child defecated in the living area during the observation period *and* the primary caretaker also reported such an event during the 24-hour recall questionnaire were stool disposal practices compared. This approach produced a different number of comparison pairs for the various analyses.

The degree of concordance of responses was evaluated by determining the kappa (κ) score (16), which provides a measure of observer agreement, after taking into consideration the extent of agreement that would be expected by chance alone. For example, if two observers each reported in 90% of observations that an event occurred, the proportion of concordant observations, on the basis of chance alone, would be 0.82 i.e., $0.9 \times 0.9 + 0.1 \times 0.1$. By convention, κ -scores less than zero indicate agreement that is worse than chance, values equal to zero indicate that is no better than chance, values of 0.01-0.39 poor agreement, of 0.40-0.75 good agree-

ment, and values of 0.76–1.0 excellent agreement. Standard tests were performed to evaluate the statistical significance of the κ -score (16).

The direction of observer disagreement was assessed using matched odds ratios, which express, for example, the number of times observer A recorded a positive result and observer B a negative, divided by the number of times observer A noted a negative result and observer B a positive. The ratio is therefore a measure of the two types of discordancies that can occur when pairs of observations are expressed in a 2×2 contingency table. An odds ratio of unity indicates that disagreements in one direction occur equally frequently as those in the opposite. Values of the ratio greater than or less than unity reflect the extent to which one type of disagreement is more common than the opposite. Since the assignment of disagreements in one particular direction to the numerator or the denominator is arbitrary, small odds ratios (<1.0) connote the same magnitude of unidirectional disagreement as their reciprocals.

For the analysis, the following observed or stated behaviours were arbitrarily taken as "correct": use of a covered water container; use of a narrow-necked container for water; storing water inside the house; removing faeces from the living area; and hand-washing after defecating, touching stools, tending an ill person, or before preparing or eating food. The opposite behaviour was taken as "incorrect" in each case. Furthermore, replies to the KAP questionnaire such as "it doesn't matter" or "it is of no importance" were also taken as "incorrect".

Table 1. Sociodemographic characteristics of the 247 households in the study population*

Characteristic	Value
Median number of persons per household	5.72–7.6 ^a
No. of males	727 (51)
No. of families who own current dwelling	68 (28)
No. of families who own land (rural or urban)	180 (73)
No. of families with one or more radios	71 (29)
No. of families owning one or more watches	133 (54)
No. of families with electricity in home	141 (57)
No. of families with tap or tubewell water	66 (27)
No. of houses with sanitary latrine	67 (27)
No. of houses with pit or hanging latrine	27 (11)
No. of houses with one room only	154 (62)
Median monthly salary of household, in Taka (1US\$ = 29 Taka)	1000.0–30 000 ^a
Median duration of maternal education (years)	0.0–16

* Total population = 1439

^a Figures in italics represent range of values

^b Figure represents percentage of total number of individuals. Other figures in parentheses represent percentages of number of households

RESULTS

Of the 255 families selected for the study, four migrated before the KAP questionnaire had been administered, and two refused to participate. Also, of the remaining 249 families who underwent the KAP questionnaire, two refused to participate in other aspects of the study, while 30 migrated out of the study area before the observational studies had been performed.

Sociodemographic profile of the participants

A sociodemographic profile of the study community has been reported previously (14), but a summary of its important characteristics is shown in Table 1. In general, the population was poor, uneducated, and the respondents were young (median age, 22 years).

KAP questionnaire versus on-site observations

Table 2 compares the answers to the KAP questionnaire with the observations reported during on-site visits to the households. Agreement between observed water-storage practices and the beliefs expressed by the interviewees about water storage was low (κ -score <0.20). Also, beliefs about appropriate handwashing and stool disposal practices of caretakers compared poorly with observations made by the investigators (κ <0.20 in all instances). Four of the practices exhibited significant discordant directionality, with two corresponding to correct beliefs but incorrect observed behaviour.

Twenty-four hour recall questionnaire versus on-site observations

In general, agreement was low (κ -score <0.10 for five of the seven comparisons) between observed handwashing and defecatory practices and those reported in the 24-hour recall questionnaire (Table 3). All three discordant factors that exhibited significant directionality resulted from statements of correct behaviour, but reports of incorrect behaviour by observers.

Twenty-four hour recall versus KAP questionnaires

The results shown in Table 4 indicate that the answers to the KAP questionnaire about defecation and handwashing practices were not consistent with those provided by the 24-hour recall questionnaire (κ -score <0.10).

DISCUSSION

The results of the study indicate that neither recall of sanitation practices nor a description of knowledge, attitudes, and professed sanitation practices are accurate proxies for observations of such practices in urban Bangladesh.

Table 2. Comparison of responses elicited by the knowledge-attitude-practice (KAP) questionnaire and the behaviour observed by field workers

Practice	No. of pairs	No. of discordancies	K-score	No. of instances of correct response to questionnaire but incorrect observation	Odds ratio ^a
<i>Type of drinking water container</i>					
Covered versus uncovered	161	64	0.05	5	0.09 ^b
Narrow versus wide neck	144	64	0.09	25	0.64
Kept indoors versus outdoors	154	8	0.17	5	1.67
<i>Defecatory and handwashing behaviour</i>					
Faeces removed from living area	58	21	0.03	20	20 ^b
Caretaker washes hands after defecation	95	37	0.01	6	0.19 ^b
Caretaker washes hands after touching infant's stool	67	17	0.11	7	0.70
Caretaker uses solvent after defecation	94	62	0.10	54	6.75 ^b

^a An odds ratio > 1 indicates a greater tendency for discordancies to reflect correct responses to the questionnaire but incorrect behaviour on observation, of 1, an equal distribution of discordant responses, and of < 1 a greater tendency for discordancies to reflect correct behaviour on observation but incorrect replies to the questionnaire. For definition of "correct" and "incorrect", see text.

^b $P < 0.001$.

Limitations of the study

Concordance between data obtained from the three instruments was evaluated using K -scores rather than measurements of sensitivity or specificity, since no independent standard values of the parameters studied are available. Although observation of "incorrect" behaviour is strong evidence of "incorrect" practice in a given household, the absence of observed "incorrect" practices does not imply that such practices do not occur. Furthermore, the object of the study was not to evaluate the three instruments but to compare the results obtained using them.

In the absence of any widely accepted or standardized KAP or 24-hour recall questionnaires for use in studies of sanitation practices, each instrument was developed by the collaborative efforts of a physician, an anthropologist, and experienced local field staff. The instruments were extensively tested for their acceptability, comprehension, and replicability. Also, the questionnaires were filled in during the interview or observational periods, thereby minimizing biases that may have arisen from post-observation completion.

The three instruments were not administered to

Table 3. Comparison of responses elicited by 24-hour recall questionnaire and the behaviour observed by field workers

Practice	No. of pairs	No. of discordancies	K-score	No. of instances of correct response to questionnaire but incorrect observation	Odds ratio ^a
<i>Defecatory behaviour</i>					
Faeces removed from living area	58	20	0	20	∞ ^b
<i>Handwashing behaviour</i>					
Caretakers wash hands after defecation	98	14	0.06	10	2.50
Caretakers wash hands after touching infant's stool	60	14	0.36	3	0.27
Caretakers use solvent to wash hands after defecation	98	55	0.04	52	17.33 ^b
Caretakers wash hands before preparing food	141	64	0.05	24	0.60
Caretakers wash hands after touching ill person	22	13	0.14	9	2.25
Children wash hands before eating	175	95	0.09	86	9.56 ^b

^a See footnote a to Table 2.

^b $P < 0.001$.

Table 4. Comparison of responses elicited by knowledge-attitude-practice (KAP) and 24-hour recall questionnaires

Practice	No of pairs	No of discordancies	K-score	No of instances of correct response to KAP but incorrect to 24-hour recall questionnaire	Odds ratio ^a
Caretakers wash hands after defecation	217	71	0	71	∞^b
Caretakers wash hands after touching child's stool	196	95	0.04	25	0.36 ^b
Removal of faeces from living area	170	24	0.05	2	0.09 ^b

^a An odds ratio > 1 indicates a greater tendency for discordancies to reflect correct responses to the KAP but incorrect responses to the 24-hour recall questionnaire, of 1, an equal distribution of discordant responses, and of < 1 a greater tendency for discordancies to reflect correct responses to the 24-hour recall but incorrect to the KAP questionnaire. For definition of "correct" and "incorrect", see text.

^b $P < 0.001$

households concurrently. However, to maximize representativeness before conducting the interview, the respondent was first asked whether anything extraordinary had occurred in the preceding 24 hours; if the answer was in the affirmative, the interview or observation was postponed until another day. Also, only the first episode of a particular observed activity was analysed, which would tend to minimize differences between stated and actual behaviours, since early in the observation period caretakers might have been more likely to indulge in feigned activities.

Another potential limitation of the study, that the study population was aware of the investigation's basic hypothesis, and modified its responses to the two verbal questionnaires accordingly, is untenable for the following reasons: neither the householders nor the field staff were informed of the underlying study hypothesis; the field staff were instructed not to correct answers or behaviours or to state or imply any value judgements during the interviews; and the field staff were well known to the communities. Also, deliberate falsification of replies by the interviewees would presumably have resulted in similar answers to the KAP and 24-hour recall questionnaires. As indi-

cated by the low κ -scores, however, this appeared not to be the case, although only three practices were compared. Finally, although the study population appears to be sociodemographically representative of urban Bangladesh (17), the results found may not apply to other geographical locations.

Implications of the findings

The results of the study confirm that, at least for practices related to sanitation and hygiene, the responses to questionnaires do not correlate with observed household practices. Although over-reporting of "correct" behaviour was frequently responsible for the discordancies in the study, the effect, for example, of poor recall or apathy on the part of caretakers cannot be disregarded.

These data suggest that the results of 24-hour recall and knowledge-attitude-practice questionnaires do not reflect the actual sanitation practices in urban Bangladesh. This may apply also to other geographical areas, and such questionnaires should therefore not be used as surrogates for direct observation of sanitation practices.

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RÉSUMÉ

QUESTIONNAIRE RÉTROSPECTIF SUR 24 HEURES, QUESTIONNAIRE SUR LES CONNAISSANCES, LES HABITUDES ET LES PRATIQUES ET OBSERVATION DIRECTE DU COMPORTEMENT SUR LE PLAN DE L'HYGIÈNE ÉTUDE COMPARÉE

L'introduction dans une communauté d'un concept nouveau ou d'une technologie nouvelle en matière de santé ne signifie pas nécessairement que ce concept ou cette

technologie seront adoptés. Pour étudier l'utilisation faite des innovations dans le domaine de l'eau et de l'assainissement, un certain nombre de méthodes ont été mises au

point, dont des questionnaires sur les connaissances, les attitudes et les pratiques (questionnaires CAP), des questionnaires rétrospectifs sur les 24 heures écoulées et des observations sur le terrain. Bien que les résultats obtenus par ces divers moyens aient été traités comme comparables, on estime souvent que les réponses données à ces deux types de questionnaires ne donnent pas une idée exacte de la situation.

D'octobre 1984 à janvier 1985, nous avons donc utilisé des questionnaires sur les connaissances, les attitudes et les pratiques afin d'arriver à mieux connaître les croyances en matière d'hygiène, ainsi que des questionnaires rétrospectifs concernant les 24 heures précédant l'entretien, et nous avons également soumis à une observation prolongée le comportement réel, en matière d'hygiène, de 247 familles de Dhaka, au Bangladesh. Chacun des instruments utilisés comportait un certain nombre de questions qui figuraient également dans les deux autres instruments ou dans l'un d'eux au moins. On a ensuite comparé les réponses aux questionnaires et les observations en déterminant la valeur de κ (kappa) ($0,75 \leq \kappa \leq 1$ indiquant une forte comparabilité; $0,40 \leq \kappa < 0,75$, une bonne comparabilité; et $\kappa < 0,40$ une comparabilité très médiocre). La mesure du risque relatif

apparié a été utilisée pour décrire l'orientation et le degré de divergence des réponses obtenues par deux instruments différents, tandis que le test du χ^2 McNemar a été employé pour déterminer dans quelle mesure les discordances étaient significativement unidirectionnelles.

Les chiffres obtenus pour κ étaient faibles dans toutes les comparaisons (questionnaire CAP et observations: $\kappa < 0,20$; observations et questionnaire rétrospectif: $\kappa < 0,37$; questionnaires CAP et rétrospectif: $\kappa < 0,05$) ce qui montrait la comparabilité très médiocre des informations obtenues au moyen de ces trois instruments. L'orientation des divergences entre les questions variait beaucoup, mais les discordances pour lesquelles l'orientation était significative résultaient plus fréquemment d'un excès de déclaration d'un comportement "correct" de la part des participants, par rapport au comportement réellement observé par les enquêteurs sur le terrain.

Dans les régions urbaines du Bangladesh, les questionnaires rétrospectifs et CAP ne devraient donc pas se substituer à l'observation directe des habitudes d'hygiène. Ces limitations peuvent être également valables dans d'autres régions géographiques.

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