Hygiene behaviour and hospitalized severe childhood diarrhoea: a case–control study

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The relationship between personal and domestic hygiene behaviour and hospitalized childhood diarrhoea was examined in a case–control study of 356 cases and 357 controls from low-income families in metropolitan Manila. Indices of hygiene behaviour were defined for overall cleanliness, kitchen hygiene, and living conditions. Only the indices for overall cleanliness and kitchen hygiene were significantly associated with diarrhoea. An increasing excess risk of hospitalization with severe diarrhoea was noted as the ratings for standards of hygiene became lower, and this excess risk persisted even after controlling for confounding variables. The implications of our findings for the control of diarrhoeal disease are discussed.

Introduction

Increasing attention has been focused on the promotion of hygiene as an intervention for the control of diarrhoeal diseases with an infectious etiology. Hygiene behaviour interventions can reduce the transmission of enteropathogens by the faecal–oral route. For example, provision of an improved water supply and sanitation reduced the incidence of diarrhoea among young children by 20–27% (1–2); however, a combination of a clean water supply and good personal and domestic hygiene produced a reduction of about 40% (3).

Although it is generally assumed that poor hygiene behaviour increases the risk of diarrhoeal disease, there is little rigorous quantitative evidence to support this premise. In 1984 a review of several studies on the role of behavioural factors in diarrhoeal disease epidemiology reported that the findings were inconclusive and did not firmly associate specific behaviours with particular levels of risk (4).

More recent studies have examined specific water-sanitation behaviours in relation to the occurrence of diarrhoea. Such behaviours have included, in Bangladesh, handwashing before food preparation, open defecation by ambulatory children, inattention to proper disposal of garbage and faeces, etc. (5); in Burma, the methods used by mothers to clean children after defecation (6); in the Philippines, the manner of disposing of the faeces of under-2-year-olds (7); and in Papua New Guinea, compound hygiene (8). The results of some of these studies were consistent with an association between a particular hygiene behaviour and an increased risk of diarrhoea.

This article describes an analysis of the relationship between personal and domestic hygiene behaviour and hospitalized severe childhood diarrhoea. The study was conducted in 1989 in metropolitan Manila (population, about 7.6 million) and consisted of two phases—the first, an ethnographic study and the second, a case–control study. The findings presented here relate to the latter phase.

Methods

Selection of cases and controls

A case was a child under 5 years of age who was a resident of metropolitan Manila, and who had been admitted to the free service of a government hospital with diarrhoea that began <7 days previously. A control was a child whose age matched that of a case (±6 months), who had not had diarrhoea within 30 days prior to recruitment into the study, who lived in the same neighbourhood as the case, and who used or would have used the free service of a government hospital for a serious diarrhoeal episode.

After discharge of a potential case from hospital, the child concerned was visited at home. The search for an eligible control started with the house located immediately to the right of that of the case and continued to the next house until a suitable individual was identified.
The study examined the relationship between hygiene behaviours and the incidence of severe diarrhoea among young children admitted to government hospital.
ment hospitals with acute diarrhoea. The exposure variable was measured using indices of hygiene behaviour that were based on the observable effects of such behaviour (J2). The data used to define these indices were readily obtained using the observation checklist. Since the indices were expressed as ratings of the observer's assessment of the hygiene-related attributes of the households, both the validity and reliability of the data collected were largely dependent on the observer's skills and the availability of suitable rating criteria.

Our findings indicate a strong association between the indices for overall cleanliness and kitchen hygiene and diarrhoea, however, potential sources of bias must be considered since there are alternative explanations.

The study compared hospital cases with neighbourhood controls, the selection of the latter being dictated by practical considerations. It was easier to locate an appropriate control in the neighbourhood where cases lived than in the hospitals from which the cases were recruited, since apart from diarrhoea, most of the children in the hospitals had infectious diseases, which could have been associated also with the exposure being studied. Use of neighbourhood controls, however, could have biased the results, since it is not uncommon that selection factors operate in the admission of patients to certain hospitals; the cases and controls might therefore not be comparable in terms of such selection factors. To address this, we compensated for possible selective admission of cases by including an item on hospitalization in the selection criteria for controls. Thus, the controls selected were comparable with the cases in terms of their potential utilization of hospital services.

The method of recruiting controls (one control from the neighbourhood of each case) resulted in neighbourhood matching. The cases and controls were also matched by age (±6 months), in as much as age is a strong risk factor for diarrhoeal disease. The age and neighbourhood matching were preserved in the analysis to avoid bias in the estimated effect measure.

Despite efforts to conceal the case or control status of subjects from the interviewers/observers, this status became clear during the home visit in most instances. This could have resulted in a differential assessment of information, including the exposure data in the two groups. From the data collected, however, there was no indication that cases and controls were consistently assigned more negative ratings than controls. For a few items on the checklist, controls were given poorer hygiene ratings than cases. Analysis of the data on the three dummy variables on the interview schedule (cigarette smoking, coffee drinking, and vegetable consumption) indicated that, however, that for these variables the distribution of cases and controls was very similar. Furthermore, the specific hypothesis under investigation was never discussed with the interviewers/observers. Thus, it is unlikely that observation bias could fully account for the observed association between the exposure and diarrhoea.

Inaccurate information about the disease and exposure status of the study subjects with respect to misclassification of the disease status concerned, the recruitment of cases from hospital admissions provided reasonable assurance that the child was really suffering from severe diarrhoea. The possibility of admitting a mild case of diarrhoea was remote, since the number of beds is limited and the clinical criteria for admission are strict. Clinical data on the diarrhoeal episode revealed that the cases admitted had at least two of the following signs while vomiting; diarrhoea; dehydration; three or more bowel movements per day (average, six); mucus or blood in the stools; fever; abdominal pain; and tenesmus. The controls were probably not misclassified since their mothers were asked only to recall an episode of diarrhoea within the previous 30 days.

The indices of hygiene behaviour were based on data collected by on-site observation, an approach that probably yields more accurate information than interviews. Nevertheless, it was possible that there was misclassification of the exposure factor for the cases. The latest episode of diarrhoea may have altered the hygiene practices of the mothers of cases, and the sanitary practices when the data were collected could have been better than those used when the episode of diarrhoea occurred. This, however, did not apply to the controls. Such differential misclassification could have underestimated the true strength of the observed association.

Potential confounders were identified and controlled both in the design and analysis phases of the study. Potential confounders were identified and controlled in the selection criteria for cases and controls. The index for overall cleanliness and kitchen hygiene was defined by variables related to socioeconomic status. The study was controlled both in the design and analysis phases of the study. The lower cost of a health education programme compared with that of other measures, such as improving housing facilities, makes interventions designed to promote hygiene behaviour more attractive. The next challenge therefore is to develop suitable interventions for the effective education of mothers and also of the general public on appropriate hygiene behaviour.

Acknowledgements

The study was funded by the WHO Diarrhoeal Diseases Control Programme. We gratefully acknowledge the assistance of Dr. R.R. French for comments on an earlier draft of the article; our research staff; and other individuals who facilitated the study.

Résumé

Habitudes d'hygiène et diarrhée sévère chez l'enfant: étude cas-témoins

La relation entre les indices d'hygiène personnelle et domestique et la diarrhée sévère chez l'enfant (exigeant une hospitalisation) a été examinée au cours d'une étude cas-témoins portant sur 356 cas et 357 témoins provenant de familles à faible revenu de l'agglomération de Manille. Était défini comme cas un enfant de moins de 5 ans admis dans un hôpital public gratuit pour une diarrhée ayant débuté moins de 7 jours auparavant qui résidait dans l'agglomération de Manille et dont l'adresse était connue. Le témoin était un enfant de même âge (± 6 mois), n'ayant pas souffert de diarrhée dans les 30 jours précédant son observation. Les habitudes d'hygiène ont été examinées par un intervieweur, lequel avait le même questionnaire que le cas, et qui a ou aurait été admis dans un service hospitalier public gratuit pour un épisode grave de diarrhée. Trois indices exprimant les habitudes d'hygiène personnelle et domestique, utilisées comme variables d'exposition, ont été...
The cost of the district hospital: a case study in Malawi

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Described is an analysis of the cost to the Ministry of Health of providing district health services in Malawi, with particular emphasis on the district hospital. District resource allocation patterns were assessed by carefully disaggregating district costs by level of care and hospital department. A strikingly low proportion of district recurrent costs was absorbed by salaries and wages (27–39%, depending on the district) and a surprisingly high proportion by medical supplies (24–37%). The most expensive cost centre in the hospital was the pharmacy. A total of 27–39% of total recurrent costs were spent outside the hospital and 61–73% on hospital services. The secondary care services absorbed 40–58% of district recurrent costs. Unit costs of hospital department varied considerably by district, with one hospital being consistently the most expensive and another the cheapest. A total of 3–10 new outpatients could be treated for the average cost of 1 inpatient-day, while 34–55 could be treated for the average cost of 1 inpatient. The efficiency of hospital operations, the scope for redistributing resources districtwide, and the costing methodology are discussed.

Introduction

Very few in-depth investigations have been carried out on the economics of hospitals in developing countries, despite their significance in terms of sector expenditure (1, 2). The present study reviewed the allocation of Ministry of Health resources within six districts in Malawi, with particular emphasis on the proportion absorbed by the hospital and on the unit costs for hospital departments. The objectives were to develop policies and guidelines to increase the efficiency of hospital operations and to improve the intrasectoral allocation of health sector resources.

Health care in the study districts was the responsibility of a district health officer (DHO), who held a budget that covered the non-salary expenditure of all government facilities. Ministry of Health services were largely provided free. The responsibility for the day-to-day running of the hospital was usually delegated to a chief or senior clinical officer and to the sister-in-charge and hospital secretary. A district health inspector was responsible for preventive activity, reporting both to the DHO and the regional health inspector. A number of staff based at the district hospital had districtwide responsibilities, most notably the DHO, district health inspector, maternal and child health (MCH) coordinators, and tuberculosis leprosy and ophthalmic assistants. The Ministry of Health services in all districts were complemented by mission facilities, ranging from general hospitals to simple dispensaries, and by district council units. These facilities were not examined in the present study but are important in planning the overall provision of district health services.

Materials and methods

Because of physical constraints, districts had to be purposively rather than randomly selected. The main aim of the selection process was to choose a group of districts containing hospitals that reflected the range of types of district hospital in Malawi in terms of size, services offered, staffing, age of buildings, and geographical location.

Total district costs were compiled from several sources, as described below.

Expenditure controlled at the district level

With the exception of salary costs, most of the recurrent expenditure of districts was identifiable at the level of the individual districts. A particular difficulty arose in calculating the costs of drugs and medical supplies, since annual expenditure was not necessarily a good reflection of the value of the drugs used (due to changes in stock levels and donated items). To overcome this, we estimated the cost of drugs according to hospital department, we examined a selection of both the duplicate books used by hospi-