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A Community-based Cluster Survey on Preferences for Treatment of Diarrhoea and Dysentery in Zhengding County, Hebei Province, China

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ABSTRACT

Passive surveillance on the burden of disease due to diarrhoea will underestimate the burden if families use healthcare providers outside the surveillance system. To study this issue, a community-based cluster survey was conducted duging October 2001 in the catchment area for a passive surveillance study in Zhengding county, a rural area of northern China. Interviews were conducted at 7 randomly-selected households in each of 39 study villages. The respondents indicated where they sought initial care for cases of diarrhoea or dysentery among children or adults. In the absence of diarrhoea and dysentery cases in the household in the preceding four weeks, the respondents were asked about healthcare use for a hypothetical case. Overall, 80% (95% confidence interval [CI] 67-93%) would chose the village clinic, 11% village pharmacy (95% CI 1-22%), 4% township hospital (95% CI -1-10%), 4% self-treatment (95% CI 1-8%), and 1% county hospital (95% CI 0-2%). Approximately, 84% of patients would seek treatment for diarrhoea and dysentery at centres participating in passive surveillance, suggesting that passive surveillance will provide a relatively accurate assessment of burden of diarrhoea in Zhengding county.

***Key words*:** Diarrhoea; Dysentery; Cluster survey; Passive surveillance; Healthcare-seeking behaviour; China

INTRODUCTION

Two surveillance methods are commonly used for assessing rates of diarrhoeal diseases. Passive, health facility-based surveillance makes use of the existing healthcare structures and detects episodes of diarrhoea which lead the patient or caretaker to a request for treatment. In contrast, during active, community-based surveillance, each eligible individual in the catchment population is asked at daily or weekly intervals, whether he or she had diarrhoea during the preceding interval. Diarrhoea rates estimated through active surveillance tend to be higher than rates detected by passive surveillance as many episodes of diarrhoea are not severe enough to require treatment or are treated outside the surveillance system. A recent study in Viet Nam found that the rate of incidence of diarrhoea in children aged less than five years detected by active surveillance was about twice as high as the rate detected by passive surveillance (1).

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The choice of surveillance method depends on the underlying scientific question, available resources, and the public-health objective. If the purpose of surveillance is to identify the total number of diarrhoea episodes in a given population, active community-based surveillance is likely to provide a more accurate answer (2). But high rates of diarrhoea detected during active surveillance do not necessarily reflect the burden on the healthcare system. Passive health facility-based surveillance may be more appropriate to inform health policy-makers about the burden of diagnosing and treating diarrhoeal diseases at health facilities (3).

While the passive surveillance may be more appropriate to estimate the disease burden faced by the healthcare system serving a population, it is possible that a significant number of diarrhoea patients will seek care outside the healthcare system participating in the surveillance. The number of patients who treat themselves, purchase drugs over-the-counter, and seek treatment from traditional healers or other healthcare providers not included in the surveillance is usually not known. To increase the accuracy of disease-burden estimates based on passive surveillance, it is necessary to assess the proportion of patients missed by passive surveillance. In preparation for large passive surveillance studies for diarrhoeal diseases in six Asian countries, the International Vaccine Institute has developed a rapid community-based survey to estimate the proportion of diarrhoea and dysentery patients in the catchment area who could be missed. It was designed to address several hypotheses: first, we hypothesized that the use of the healthcare system would differ between adults and children; second, we hypothesized that the use of the healthcare system would differ between individuals with diarrhoea and individuals with dysentery. The survey was recently tested in rural China, during the initiation of a two-year passive surveillance study for shigellosis which is based on a previously-published generic protocol (4).

MATERIALS AND METHODS

Study population

The catchment area of the passive surveillance study consists of 39 villages in five townships in Zhengding county, Hebei province, China. The study villages are rural in character, and residents depend mostly on agriculture for income. The national census of 2000 showed that the total population in the catchment area was 95,703, of which 2,074 (2%) children were aged less than 60 months (5). The residents live in 23,621 households (mean household size 4.0 persons).

The rural healthcare system available to the residents of Zhengding county shares important characteristics with the system available in most of rural China where approximately 80% of the population live (6). Individuals living in the surveillance area have access to three levels of biomedical care. The lowest level is the village clinic, the middle level is the township hospital, and the highest level is the county hospital. The village clinic was formerly staffed by so-called 'barefoot doctors' who had minimal biomedical training. The barefoot doctors were created following a directive issued by Chairman Mao Zedong in September 1965 which shifted the emphasis of health and medical work to rural areas (7). Today, a village doctor requires a minimum of two years of medical training to obtain approval from the local bureau of public health. The village clinic can diagnose and treat a large proportion of patients. Patients who require more specialized care tend to be referred directly to the county hospital, bypassing the township hospital. Thus, township hospitals, which are also staffed by medical school graduates, are becoming increasingly redundant as primary healthcare providers. The ownership of village clinics is rapidly changing as more and more village clinics are privatized. Under Chairman Mao Zedong's rule, agricultural collectives paid the salaries of their barefoot doctors and put money into the Rural Medical Cooperative System, with collective welfare funds for drugs and treatment. Patients paid modest premiums and a nominal fee for consultations and medicines. The local government also contributed to the welfare funds. During reforms instituted by Deng Xiaoping, the agricultural collectives were dismantled (8). Between 1979 and 1984, the coverage of rural residents by the Rural Medical Cooperative System fell from 90% to below 10% (9). Today, village health workers have to support themselves through fees for consultations, charging for services, such as injections and infusions, and sales of pharmaceuticals (6).

In the catchment area, there are 189 village clinics, 5 township hospitals, and 5 county hospitals. The county hospitals include a general "people's" hospital, a mother and newborn hospital, a traditional Chinese medicine hospital, an army hospital, and a private hospital. All village clinics and township hospitals, but

not the county hospitals, are included in the ongoing shigellosis surveillance. Pharmaceuticals are sold by all village doctors, while 10 villages also have pharmacies. Therefore, patients who treat themselves, purchase drugs from the pharmacies without medical consultation, seek care from traditional healers, or are treated at the county hospitals without referral from village clinics or township hospitals escape the *Shigella* surveillance system.

Survey method

A simplified 2-stage cluster-sampling method was used (10). In each of the 39 villages, 7 households were selected in a random fashion based on a recent census using a computer-generated list of random numbers. A household was defined as the group of people which make use of one kitchen. Either the household head or their representative was interviewed in each household.

Questionnaire

The survey questionnaire (Appendix) was designed to address several hypotheses: first, we hypothesized that the use of the healthcare system would differ between adults and children; second, we hypothesized that the use of the healthcare system would differ between individuals with diarrhoea and individuals with dysentery. A case of diarrhoea was defined as an individual with three or more loose bowel movements during a 24-hour period. A case of dysentery was defined as an individual with any loose bowel movements containing visible blood. To test our hypotheses, the same questions regarding the sequence of healthcare were asked for a child with diarrhoea, an adult with diarrhoea, a child with dysentery, and an adult with dysentery (Appendix). A very large number of respondents would have to be interviewed to identify an adequate number of recent cases. Therefore, in the absence of an actual diarrhoea case in the household in the previous four weeks, the respondent was asked about their potential behaviour for a child with diarrhoea or dysentery and an adult with diarrhoea or dysentery. The respondent was asked to rank their preferred healthcare providers and to suggest the reason for their preferred treatment option.

All interviewers were employees of the Zhengding Antiepidemic Station. The interviewers attended a one-day training course during the week preceding the field survey. The survey took place between 11 and 21 October 2001.

Analysis

Survey data were double-entered into FoxPro (Microsoft, USA), and the data were cleaned. For each response, the mean percentage was calculated by village. The village means were weighted for population size, and 95% confidence intervals of the weighted means were calculated using the methods recommended by Bennett *et al*. (11). Stata 7 (Stata Corporation, USA) and Excel (Microsoft, USA) spreadsheets were used for data analysis.

Ethics

Verbal consent was obtained from each participant following an explanation of the purpose of the study. The study received approval from the Ethics Committee, Fudan University, Shanghai, China, and the Secretariat Committee for Research Involving Human Subjects, World Health Organization (WHO), Geneva, Switzerland.

RESULTS

In total, 273 household heads or their representatives approached agreed to answer the study questions. Of the respondents, 115 (42%) were household heads, 103 (38%) were spouses of household heads, 43 (16%) were parents of household heads, and 12 (4%) were adult residents in households but not related to household heads. Women constituted 40% (n=108) of the respondents. The average age of the respondents was 46 (range 23-80) years.

The treatment choices of the respondents are shown in Table 1. Overall, 80% of the respondents or their household members would attend village clinics, followed by pharmacies (11%), township hospital (4%), self-treatment (4%), and county hospital (1%). A passive surveillance system which includes all village clinics and hospitals will, therefore, detect 84% of all shigellosis cases. The reported healthcare choices for children and adults and for dysentery and diarrhoea were nearly identical (Table 2). Of 273 respondents, 256 (94%; 95% CI 91-97%) indicated that the distance from home to healthcare provider was the most important reason for their choice. The responses did not differ significantly whether the respondent was the household head or another adult in the household.

In 34 (87%) of the 39 study villages, nearly all respondents indicated that they would attend the village clinic for the treatment of diarrhoea or dysentery.

In 3 (8%) of the 39 villages where there were large pharmacies, 20 (95%) of 21 respondents indicated that they would seek treatment at the local pharmacy before they went to the village clinic. In two villages (5%) where there were township hospitals, 12 (86%) of 14 respondents indicated that they would prefer to attend the township hospital. The differences in healthcare-seeking behaviour between villages resulted in an intra-village correlation of rho=0.7 and a design effect of 5.0 (not weighted). Consequently, the weighted 95% confidence intervals are wide. The differences in healthcare use among the 5 study townships are summarized in Table 2. The mean population per village clinic was 523 (range 400-572). No significant correlation was found between the population per village clinics or population per pharmacy and their relative use by children or adults with diarrhoea or children or adults with dysentery (Spearman's rho <0.2 and >-0.2; p>0.10). There was no statistically significant difference in treatment choices between male and female respondents.

In the four weeks preceding the interview at the 273 households, 7 (3%) households reported a child with diarrhoea, 29 (11%) households reported an adult with diarrhoea, and 2 (1%) households reported an adult with dysentery (Table 3). There was no statistically significant difference for the responses from households with actual diarrhoea cases (Table 3) compared to responses from households with hypothetical diarrhoea cases (Table 4).

Table 1. First choice of treatment for children or adults with dysentery or diarrhoea as reported in a community-based cluster survey (n=273 households) conducted in 39 villages, Zhengding, Hebei province, China, October 2001 (weighted averages are presented)

Choice of treatment option	Diarrhoea				Dysentery			
	Children		Adults		Children		Adults	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Village clinic	80	67-93	80	67-92	80	68-92	80	68-92
Pharmacy	11	1-20	11	1-20	12	2-22	11	1-20
Town hospital	4	-1-10	4	-1-10	4	-1-10	4	-1-10
Own treatment	4	1-8	4	2-8	4	1-7	4	1-7
Country hospital	1	0-2	1	0-2	1	0-2	1	0-2

CI=Confidence interval

Table 2. Differences between townships

Township	Nan-Niu	Nan-Gang	Quan-Cheng	Wu-Xing	Yong-An	Total/mean
Number of villages	9	9	7	6	8	39
Population	20,812	17,170	18,582	18,039	21,100	95,703
Number of village doctors	52	30	33	36	38	189
Population/village doctor (mean)	400	572	563	501	555	506
Number of pharmacies	4	1	1	3	1	10
Population/pharmacy (mean)	5,203	17,170	18,582	6,013	21,100	9,570
Number of township hospitals	1	1	1	1	1	5
Preferred healthcare provider for a child with diarrhoea (%)						
Own treatment	8	3	2	0	5	
Pharmacy	11	10	0	0	14	
Village clinic	76	67	98	100	77	
Township clinic	3	19	0	0	2	
County hospital	2	0	0	0	4	

DISCUSSION

We have observed that, in rural China, diarrhoea and dysentery patients are frequently treated with antibiotics. Once a patient has taken appropriate antibiotics, a microbiologic diagnosis of shigellosis becomes less likely. While *Shigella* strains resistant to ampicillin, co-trimoxazole, and tetracycline have been observed in north-eastern China, little or no resistance against nalidixic acid, ciprofloxacin, and cephalosporins has been reported (12). To detect all cases of shigellosis, it is, therefore,

important to understand where patients seek care first. This survey found that the large majority of the respondents would initially seek care from the village clinic or township hospital, healthcare providers participating in the surveillance. Overall, only about 16% of the respondents would first seek treatment from outside the surveillance system, e.g. a pharmacy, drugs already kept at home, county hospital, or a traditional medical healer. However, a sub-analysis shows a preference for large pharmacies, where one exists nearby. A disease-burden study capturing diarrhoea and dysentery patients through passive surveillance in this part of China will underestimate the true incidence of these conditions by approximately 16%. Because some patients visit multiple healthcare providers, the passive surveillance system may eventually capture a higher percentage of diarrhoea and dysentery patients although a microbiological detection of *Shigella* spp. may no longer be possible due to pre-medication. The observed variability in healthcare use between villages could be a further limitation in the case of a trial to evaluate an intervention against enteric diseases that assigns the intervention by cluster. In villages which make preferentially use of healthcare providers not participating in the surveillance system, such as pharmacies, spuriously low rates of incidence will be observed. This will increase the coefficient of intra-village variation resulting in an increased design effect and ultimately in the requirement for a larger sample size.

Table 3. Real cases—health service selected within the past four weeks for treatment of diarrhoea or dysentery of children aged less than 60 months or adults aged 15 years or older

Choice of treatment option	Diarrhoea						Dysentery					
	Children (n=7)			Adults (n=29)			Children (n=0)			Adults (n=2)		
	No.	%	95% CI	No.	%	95% CI	No.	%	95% CI	No.	%	95% CI
Village clinic	6	86	42-100	24	83	64-94	0	0	NA	2	100	16-100
Pharmacy	1	14	3-58	0	0	0-12	0	0	NA	0	0	0-84
Town hospital	0	0	0-41	1	3	1-18	0	0	NA	0	0	0-84
Own treatment	0	0	0-41	4	14	4-32	0	0	NA	0	0	0-84
Country hospital	0	0	0-41	0	0	0-12	0	0	NA	0	0	0-84

CI=Confidence interval
NA=Not applicable

Table 4. Hypothetical cases—healthcare service that would be chosen for a hypothetical case of diarrhoea or dysentery in a child aged less than 60 months or an adult aged 15 years or older

Choice of treatment option	Diarrhoea						Dysentery					
	Children (n=266)			Adults (n=243)			Children (n=273)			Adults (n=272)		
	No.	%	95% CI	No.	%	95% CI	No.	%	95% CI	No.	%	95% CI
Village clinic	217	82	76-86	196	81	75-85	224	82	77-86	221	82	76-86
Pharmacy	20	8	5-11	21	9	55-13	21	8	5-12	23	9	6-13
Town hospital	15	6	3-9	13	5	3-9	14	5	3-9	14	5	3-9
Own treatment	11	4	1-7	10	4	2-7	11	4	2-7	11	4	2-7
Country hospital	3	1	0-3	3	1	0-4	3	1	0-3	3	1	0-3

CI=Confidence interval

Our findings agree with previously-published descriptions of healthcare use in rural China (13-15). The report of the national health services from 1998 conducted by the Ministry of Health indicated a preferential use of village doctors, followed by use of township hospitals and county hospitals (15). Similarly, Xing *et al*. found that patients of enteric and other diseases in a rural area of Zhejiang first made use of village doctors (14). Because of the ease of access, flexible services, and prompt treatment, most uncomplicated diseases in rural China were treated in village clinics (16-18). Several authors suggested that a decisive factor in healthcare choices is the cost of treatment. Fees were the highest in county hospitals and the lowest in village clinics, and the cost of treatment in township hospital tended to be somewhere in between (13,19,20).

We hypothesized that treatment-seeking behaviour would be different for a patient with diarrhoea compared

to a patient with dysentery since dysentery carries higher morbidity and mortality than uncomplicated diarrhoea (21). However, the responses for dysentery and diarrhoea were nearly identical in this survey. Similarly, there was no difference in the responses for children aged less than 60 months compared to individuals aged 15 years or older. In the study area, the choice of healthcare providers appeared to be mostly influenced by the ease of access. There are 189 village clinics in the study area, an average of one clinic per 506 residents. It is unlikely that any patient has to walk for more than 10 minutes to consult a village doctor.

The age group between 60 months and 15 years was purposefully ignored in this study which was interested in general behavioural patterns. As we did not detect any difference between young children and adults, it seems unlikely that the behaviour in these age groups will differ from the younger children or adults.

We compared the responses to hypothetical scenarios with responses to actual diarrhoea and dysentery cases. It is reassuring that the reported healthcare use for hypothetical diarrhoea cases was within the 95% confidence limits of healthcare use for real cases. A limitation of the study is the absence of a sufficient number of responses from households with actual dysentery cases to make any conclusions regarding the healthcare use for dysentery. Our survey identified only two dysentery cases in adults and none in children during the four weeks preceding the survey. In this setting, detecting a sample of 100 cases of dysentery in adults would have required interviews at 13,650 households, or more than half of the households in the entire study population.

We are presently conducting qualitative and quantitative studies in Zhengding county to understand better the perceptions and attitudes of the villagers towards diarrhoeal diseases. Other groups conducting hospital-based passive surveillance for diarrhoeal diseases in children are planning similar types of community-based cluster surveys to assess healthcare use in several Asian settings. In addition, the Department of Vaccines and Biologicals of WHO has recently issued a survey protocol which includes methods to estimate healthcare-seeking behaviour (22). We hope these combined efforts will provide a better understanding of healthcare use in Asia.

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Appendix: The Study Instrument

Health Care Utilization questionnaire (HUQ)

1. Data form:	2. Form Sl #:_____
3. Household ID	_____
Identifying Information of the household	
4. Name of Respondent: _____	
5. Name of Head of Household: _____	
6. Sex of the Household Head	1=M 2=F
7. Today's Date (dd/mm/yy)	_____|_____|_____
8. Respondent's relation to Head of Household	1=Self 2=Parents 3=Sibling 4=Aunt/Uncle 5=Parents in law 6=Grandparents 7=Uncle/Aunt 8=Other relation
9. Address of the Household (needs local adaptation) _____ _____ _____	

Health Care Utilization

Questions	a. Diarrhoea		b. Dysentery	
	1. Age<60 mos	2. Age≥15 yrs	1. Age<60 mos	2. Age≥15 yrs
10. Did anybody have the disease in the last 4 weeks?.....	1= Y 2=N 9=DK	1= Y 2=N 9=DK	1= Y 2=N 9=DK	1= Y 2=N 9=DK
11. # Persons affected	_____	_____	_____	_____
Please give the following information for the most recent case				
12. Name (first 8 initials).....	_____	_____	_____	_____
13. Sex	1=M 2=F	1=M 2=F	1=M 2=F	1=M 2=F
14. Date of birth (dd/mm/yyyy).....	__|__|____	__|__|____	__|__|____	__|__|____
15. Age (yrs/mos)	____|____	____|____	____|____	____|____
16. Days ago episode started	_____	_____	_____	_____
17. Duration of the episode (days)....	_____	_____	_____	_____
18. # stools over a 24 hour perod?...	_____	_____	_____	_____
19. Was there blood in the stools?...	1= Y 2=N 9=DK	1= Y 2=N 9=DK	1= Y 2=N 9=DK	1= Y 2=N 9=DK

Questions	a. Diarrhoea		b. Dysentery	
	1. Age<60mos	2. Age≥60 yrs	1. Age<60mos	2. Age≥60 yrs
20. Was care received?	1=Y 2=N 3=NC	1=Y 2=N 3=NC	1=Y 2=N 3=NC	1=Y 2=N 3=NC
Please rank the following if cares are received *(if no case or no such persons are available in the household, rank the cares would have sought if such cases were present)*	***(NC=No Case)***	***(NC=No Case)***	***(NC=No Case)***	***(NC=No Case)***
21. Own treatment	_____ rank	_____ rank	_____ rank	_____ rank
22. Pharmacy/drugstore	_____ rank	_____ rank	_____ rank	_____ rank
23. Village clinic (VC)	_____ rank	_____ rank	_____ rank	_____ rank
24. Township Hospital (TH)	_____ rank	_____ rank	_____ rank	_____ rank
25. County Hospital (CH).....	_____ rank	_____ rank	_____ rank	_____ rank
If you rank the questions above, please fill the corresponding questions below:				
26. Name of the pharmacy	_____	_____	_____	_____
27. Name of the drug/s bought	_____	_____	_____	_____
28. Name of the VC	_____	_____	_____	_____
29. Name of the TH:.....	_____	_____	_____	_____
30. Name of the CH:.....	_____	_____	_____	_____

31. If the STC is not the 1st choice, please explain *why not*.....	1=Distance 2= Cost 3=Not aware 4=Not time 5=Bad reputation 6=Other
a) If other reason, please specify: _____	_____
32. Interviewed by:_____	_____