THE IMPACT OF A COMMUNITY BASED HEALTH EDUCATION PROGRAM ON THE INCIDENCE OF DIARRHEAL DISEASE IN SOUTHERN THAILAND

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Abstract. This study has demonstrated that additional training of service providers [village health volunteers (VHVs), village health communicators (VHCs)] in combination with the mobilization of village leaders and influentials to promote selective preventive health behavior, can have a marked impact upon the effectice practive of these behaviors and diarrheal incidence. Further, this impact can be achieved through the existing staff structure, ie, VHV/VHCs of the national health program. For example, increased contact between these service providers and mothers of children under 5 years through home visits and attendance at meetings held by the service providers, contributed positively to the practice of selected preventive behaviors. If the national program provided similar training inputs on the promotion of selected preventive behaviors and increased service provider contacts, the program's impact upon diarrheal disease would be enhanced.

INTRODUCTION

Diarrheal diseases are major community health problems in Thailand. The Ministry of Public Health reported in 1986 that diarrhea was the leading cause of morbidity for all ages and the second most important cause of death among children under 5 years of age. Diarrheal morbidity more than doubled in this group between 1980 and 1983, declined slightly during 1984 and 1985 but increased in 1986 to the highest level in this decade (Family Health Division, 1988).

In 1980 the Ministry of Public Health introduced a National Control of Diarrheal Diseases Program that featured as one of its major activities the promotion of oral rehydration therapy (ORT) and distribution of oral rehydration salts (ORS). Implementation of the program at the field level is carried out by village health communicators (VHCs) and village health volunteers (VHVs). VHCs are selected by local village councils in cooperation with public health officials. Following training and a work period of three or four months in the village (each VHC is responsible for about 10 households), public health officials select the most effective VHC to become the VHV for the village. The VHV is primarily responsible for health service delivery, eg, distribution of ORS and contraceptives and administration of immunization. The VHCs are responsible for promoting health care and referring villagers for the health services.

Despite these efforts a recent experimental study of an ORS intervention program in southern Thailand found that less than one-third of the children under 5 years who had an episode of diarrhea were treated with ORS and that the incidence rate for diarrhea among these children was almost 50% (Jintaganont and Butaras, 1987). The intervention program raised the proportions of children with diarrhea being treated with ORS from 31% to 82% in experimental areas. However, the incidence of diarrhea among children under 5 years showed little change. The present study evaluates an intervention intended to reduce the incidence of diarrhea in these areas.

METHODOLOGY

Program intervention

The approach utilized for the program interven-

tion was identical to the one used so successfully in an earlier experimental study on ORS in Southern Thailand (Jintaganont *et al,* 1988). A two day training program was conducted for VHVs, VHCs, local regligious leaders (ie Imams in Muslim villages only) and village heads within tambons (clusters of villages) selected to receive the public health education program. The content of the training included : the objectives of the intervention program; an introduction to general health care and hygiene; symptoms and causes of diarrhea; common local misperceptions about diarrhea; the role of service providers in promoting preventive health behavior, including the conduct of home visits; preventive health behavior regarding water, food, and the use and care of latrines; and role playing with local villagers on how to motivate them to adopt preventive health behaviors in the context of a home visit.

After the training program was completed, meetings were held in each of the villages with the tambon council, provincial, district and local health officers, Imams, VHVs, VHCs, and about 30-40 residents from the villages. The meetings were conducted by local health officers trained by project staff, and introduced the new content of the public health education campaign conducted by the service providers.

The health education intervention was implemented after the meetings and continued for approximately 6 months. During the intervention period, meetings were held monthly in all villages receiving the intervention with the same health officers and service providers, and tambon councils who participated in the introductory meeting. Generally 30-40 women from each village were recruited by the VHV/VHCs to attend these meetings, the purpose of which was to promote appropriate preventive health behaviors regarding diarrhea.

Research design

This study utilizes a quasi-experimental research design characterized by five sets of interrelated activities : focus groups to develop interview schedules; an intervention of six months in experimental areas; and baseline surveys, follow-up surveys and monitoring of diarrheal episodes among children under 5 years in experimental and control areas.

The study was conducted in two districts of Pattani Province, Kok Pho and Nong Chik. Two Muslim tambons were randomly selected from Nong Chik District and three Buddhist tambons randomly selected from Kok Pho District. One tambon from Nong Chik district and two tambons from Kok Pho District were randomly assigned as experimental areas and the other two tambons randomly assigned as control areas. All villages from the Muslim and Buddhist tambons were included in the study.

July-September and October-December were selected as the periods to assess changes in diarrheal incidence between the experimental and control areas. The period for the health program intervention was the six months beginning July 1 and ending December 31. The incidence of diarrhea was monitored concurrently during this period. Because of cost and time constraints it was not possible to monitor diarrhea before and after the intervention which would have provided pre and post program diarrheal incidence that could be compared between the experimental and control areas. Therefore, we focused on the changes in diarrheal incidence during the program period. The first three months represent the period when the program was beginning and had minimal impact on diarrheal incidence, while the remaining three months represent the period where maximum impact should have occurred. It should be noted that dividing the period for analysis in this manner increases the risk of underestimating program impact if it succeeded in reducing incidence during the first three months. That is, incidence may already have decreased which would be reflected in a reduced rate of change in the experimental area between the two periods.

Data collection

A baseline survey of mothers of children under 5 years of age was conducted during May-June 1988. Information was collected on socioeconomic factors; maternal beliefs and attitudes, and preventive and curative behaviors related to diarrhea; availability and accessibility of health services; and contacts with health care providers.

The follow-up survey was conducted in experimental and control areas during January-February 1989. Comparable data to the baseline data were collected as well as information on preventive

behavior promoted by health care providers. These data were matched with the baseline data to obtain the panel of respondents (N = 743) who were in the experimental and control areas for the entire period of the study.

Monitoring of diarrhea was conducted by village teachers among children under 5 years (N = 904) every two weeks for six months, beginning one month after initiation of the intervention and ending with the initiation of the follow-up survey. The monitors received intensive training for two weeks which focused upon the identification, recording and checking of diarrheal events and extensive practice with the diarrhea monitoring form in the village setting.

Problems that could contribute to undermining the reliability of the diarrheal data were reduced through the training, and the rather low number of households assigned to each staff for monitoring. That is, each monitor was responsible for only 10-13 households. Further, every two weeks monitors were visited by a supervisor who prepared a summary of the data collected, and verified through reinterview the diarrheal cases reported and their duration; and randomly checked households for any additional cases which were unreported.

A diarrheal episode was defined as three or more loose stools during a 24 hour period; a maximum number of three days without symptoms was defined as the period necessary to separate different episodes.

RESULTS AND DISCUSSION

As seen in Table 1 diarrheal incidence among children under 5 years in experimental areas declined by about two thirds between July-September and October-December compared to slightly over one third among children in the control area. The decline in the experimental area among children 1-24 months and 25-60 months was about 40 points and 28 points greater, respectively, than the decline in the control area.

The pattern of greater decline in diarrheal incidence in the experimental area than in the control area persists among selected age groups of children after controlling for religious affiliation and maternal education. The largest differences in the decline occur among Buddhist children aged 25-60 months, and among children aged 1-24 months whose mothers have a class 4 education or less (Table 1).

The greater declines in diarrheal incidence among children in the experimental area than in the control area, irrespective of their mothers religious affiliation and education, clearly demonstrate the impact of the intervention program upon diarrheal disease. However, further investigation is necessary to identify the maternal preventive behavior through which the program contributed to the decline in diarrhea in the experimental area. First, the preventive behavior related to diarrheal disease and increased by the intervention program were identified. The second part of the investigation determined if this preventive behavior was associated with the decline of diarrheal incidence in the experimental area.

Table 2 presents the mean number of diarrheal episodes occurring in children in relation to mothers' preventive health behavior during the period July-December of 1988. Practice during the period was difined as "regular", "irregular" and "never" and was based upon the consistency of responses by mothers to the same questions on practice in the baseline and follow-up surveys. The following table illustrates how these definitions were determined :

Practice during July-December 1988		Response at Baseline survey	Response at follow-up survey
Regular	=	always	always
Irregular	=	always	sometimes
		always	never
		sometimes	always
		sometimes	sometimes
		sometimes	never
		never	always
		never	sometimes
Never	=	never	never

The risk of contracting diarrhea was lowest among children whose mothers "regularly" practice the preventive behaviors, highest among children whose mothers "never" practice and intermediate among children whose mothers practice "irregularly". The "regular warming of food before giving to children" was associated with the

Table 1

Diarrheal incidence rate for children per 1,000 person months of exposure (PME) and percent change between July-September and October-December, 1988 by maternal religion and education, age of children and area.

Maternal religion and education, age of children and area	July-September		October-December		Percent change
	Rate	PME	Rate	PME	
Total					
Experimental	155.3	(1,552)	52.5	(1,506)	-66.2
Control	187.1	(1,160)	122.8	(1,116)	-34.4
Religion					
Buddhist					
Age 1-24 months					
Experimental	82.9	(205)	5.7	(176)	-93.1
Control	153.8	(143)	52.2	(115)	-66.1
Age 25-60 months					
Experimental	40.9	(318)	3.1	(319)	-92.4
Control	94.1	(255)	47.3	(275)	-49.4
Muslim					
Age 1-24 months					
Experimental	240.9	(411)	98.4	(366)	-59.2
Control	212.6	(301)	189.7	(253)	-22.9
Age 25-60 months					
Experimental	181.2	(618)	63.6	(645)	-64.9
Control	232.1	(461)	148.0	(473)	-36.2
Maternal education					
Class 4 or less					
Age 1-24 months					
Experimental	216.7	(420)	78.6	(369)	-63.7
Control	171.0	(310)	150.8	(252)	-11.8
Age 25-60 months					
Experimental	153.7	(657)	51.6	(678)	-66.4
Control	201.0	(577)	121.5	(601)	-39.6
Class 5 or more					
Age 1-24 months					
Experimental	127.6	(196)	46.2	(173)	-63.8
Control	246.3	(134)	137.9	(116)	-44.0
Age 25-60 months					
Experimental	86.0	(279)	24.5	(286)	-71.5
Control	107.9	(139)	68.0	(147)	-37.0

Table 2

Diarrheal incidence rates for children aged less than 5 years per 1,000 person months of exposure (PME) for the period July-December, 1988 by selected maternal preventive health behaviors practiced during the period.

Preventive health behaviors	Practice					
	Regular		Irregular		Never	
	Rate	PME	Rate	PME	Rate	PME
1. Boiling of drinking water	103.5	(1,496)	130.6	(1,994)	133.9	(1,844)
2. Handwashing with soap	100.0	(310)	104.2	(1,497)	138.0	(3,521)
3. Handwashing with soap before eating	82.0	(394)	124.4	(4,519)	188.1	(421)
4. Warm food before giving to children	50.4	(278)	119.4	(3,508)	155.7	(1,548)
5. Wash clothes of children with diarrhea separately	112.2	(3,236)	141.7	(1,630)	175.4	(456)

lowest incidence of diarrhea among all preventive behavior. "Never washing hands with soap before eating" and "never washing clothes of children with diarrhoea separately" was associated with the highest incidence (Table 2).

The incidence of diarrhea also varied with the "method of disposal of diarrheal feces". Incidence was lowest among children whose mothers disposed of diarrheal feces in the "toilet only" (62/1,000 person months of exposure), intermediate among children whose mothers disposed of feces "underground only" (112/1,000 person months of exposure), and highest among children whose mothers dispose of feces "on the ground without burying" (207/1,000 person months of exposure).

Table 3 displays those preventive behaviors which exhibited a substantially greater increase in the proportion in the experimental than in the control area. These were the boiling of drinking water and handwashing with soap among Buddhist women; hand-washing with soap before eating and disposal of diarrheal feces underground among Muslim women.

As seen in Table 4 the decline in diarrheal incidence was considerably higher in the experimental than in the control area among children of Buddhist mothers who boiled their drinking water "regularly" and "irregularly"; and among children of Muslim mothers who "irregularly" washed their hands with soap before eating and who "regularly" disposed of diarrheal feces "underground". It would appear therefore, that the impact of the intervention program upon the decline in diarrheal incidence occurred through its effect upon raising the proportions of women who practiced these three preventive behaviors. However, the program may have had an additional effect by contributing to an increase in the effectiveness of the practice of preventive behavior among (1) women who were already practicing at the time of the intervention program, and who continued to practice "regularly" through the program period; and (2) women who practiced "irregularly" during the program period. If this is the case then the children of these women in the experimental area should exhibit a greater decline in diarrheal incidence than the children of these women in the control area.

Table 3

Proportions of mothers with children under 5 years in experimental and control areas practicing selected preventive health behaviors by religion and survey round.

Religion, health behaviors and survey round	Experimental area	Control area
Buddhist		
Boiling of drinking water		
Baseline	51.6	38.3
Follow-up	60.6	32.0
Percent Change	17.4	-16.4
Handwashing with soap		
Baseline	61.1	82.8
Follow-up	75.3	85.7
Percent change	23.2	3.5
Muslim		
Handwashing with soap before eating		
Baseline	19.0	15.3
Follow-up	27.3	18.5
Percent change	43.7	20.9
Underground disposal of diarrheal feces		
Baseline	46.8	57.9
Follow-up	61.6	66.5
Percent change	31.6	14.9

The changes in diarrheal incidence among children of mothers practicing selected preventive behaviors that did not show a greater increase in proportions in the experimental than in the control area are also shown in Table 4. The decline in diarrheal incidence among children of mothers who practiced these behaviors was consistently greater in the experimental area. This finding supports the assertion that the impact of the intervention program upon diarrheal disease occurred in part through the program's ability to maintain and improve the effectiveness of preventive behaviors that were already being practiced; and to increase the effectiveness of preventive behaviors practiced irregularily during the intervention program.

The analysis thus far has demonstrated that the intervention program affected diarrheal disease indirectly through its effect upon selected preventive health behavior. In order to gain additional understanding of how this occurred it is necessary to investigate the program dynamics which may have contributed to this effect. The dynamics include the changes in service provider activities and the differences in activities between the experimental and control areas.

Table 5 provides information on two indicators of program dynamics, home visits by VHV/VHCs and attendance by mothers at meetings held by VHV/VHCs during the intervention program. The increase in the proportions of mothers who were visited by VHV/VHCs four or more times in the experimental area reached over 70 points while among mothers in the control area the proportions declined by more than 20 points. The proportion of Buddhist mothers visited four or more times by VHV/VHCs increased by almost 80 points in the experimental area compared to an increase of slightly over 5 points in the control area. Muslim mothers in the experimental area exhibited an increase in visits by almost 20 points compared to a decline in the control area by over

Table 4

Diarrheal incidence rates for children under 5 years per 1,000 person months of exposure (PME) and percent chang between July-September and October-December, 1988 by religion, selected maternal preventive health behaviors and area.

Religion, health behaviors and area	July-September		October-December		Percent change
	Rate	PME	Rate	PME	
Buddhist					
Regular boiling of drinking water					
Experimental	54.3	(184)	5.7	(174)	-89.5
Control	114.9	(87)	46.0	(87)	-60.0
Irregular boiling of drinking water					
Experimental	76.4	(157)	0.0	(148)	-100.0
Control	112.2	(98)	63.2	(95)	-43.7
Irregular handwashing with soap before eating					
Experimental	47.6	(399)	5.3	(378)	-88.9
Control	113.6	(352)	52.2	(345)	-54.0
Irregular warming of foods before giving to children					
Experimental	47.9	(355)	3.0	(338)	-93.8
Control	100.4	(259)	31.5	(254)	-68.6
Regular washing of clothes of childen with diarrhoea separately					
Experimental	57.1	(385)	5.6	(360)	-90.3
Control	120.3	(291)	66.4	(286)	-44.8
Muslim					
Irregular handwashing with soap before eating					
Experimental	195.0	(882)	70.2	(869)	-64.0
Control	223.7	(657)	162.6	(621)	-27.3
Regular disposal of diarrheal feces underground					
Experimental	168.2	(321)	67.5	(311)	-59.9
Control	185.4	(302)	136.2	(279)	-26.6
Irregular boiling of drinking water					
Experimental	187.5	(384)	74.3	(377)	-60.4
Control	257.4	(202)	208.1	(197)	-19.2
Irregular warming of foods before giving to children					
Experimental	200.9	(702)	63.8	(690)	-68.3
Control	221.5	(465)	177.5	(445)	-20.0
Regular washing of clothes of children with diarrhea separately					
Experimental	179.9	(528)	66.5	(526)	-63.0
Control	198.6	(443)	160.7	(417)	-19.1

Table 5

Proportions of mothers with children under 5 years in experimental and control areas visited four or more times by VHV/VHCs and who attended three or more meetings held by VHV/VHCs, by survey round and religion.

Program indicators and survey round	Total		Buddhist		Muslim	
	Experimental area	Control area	Experimental area	Control area	Experimental area	Control area
Four or more visits by VHV/VHCs						
Baseline	14.6	19.1	12.3	14.8	16.0	21.8
Follow-up	25.1	15.1	21.9	15.6	27.0	14.7
Percent change	71.9	-20.9	78.0	5.4	68.8	-32.6
Attended three or more meetings conducted by VHV/VHCs						
Baseline	17.4	3.0	15.5	2.4	18.6	3.5
Follow-up	49.8	18.1	46.4	11.7	51.7	22.3
EPC*	39.2	15.6	36.6	9.5	40.7	19.5

*EPC = Effective percent change

$$EPC = \frac{P_2 - P_1}{100 - P_1} \times 100$$

Table 6

Regression coefficients for selected preventive health behaviors practiced in the experimental area during July-December; 1988, regressed on religion, education and intervention program indicators.

Independent variables	Boiling of drinking water	Handwashing with soap	Handwashing with soap before eating	Warm food before giving to children	Wash clothes of children with diarrhea separately	Method of disposal diarrheal feces
Religion	0.010 (- 0.006)	0.019 (0.016)	0.275 (0.091)	0.180 (0.163*)	0.880 (- 0.395*)	0.130 (0.100)
Ecucation	0.057 (0.284*)	0.030 (0.198*)	0.058 (0.156*)	0.014 (0.010)	0.080 (0.290*)	0.026 (0.160*)
Number of visits by VHV/VHCs	0.020 (0.035)	0.024 (0.056)	0.076 (0.072)	0.099 (0.026)	0.002 (0.002)	0.061 (0.131*)
Number of meetings attended conducted by VHV/VHCs	0.064 (0.134*)	0.040 (0.113*)	0.140 (0.157*)	0.014 (0.043)	0.033 (0.051)	0.015 (0.038)
R^2	0.092	0.046	0.065	0.032	0.360	0.076
N =	(418)	(418)	(418)	(418)	(418)	(148)

*Significant at $p < 0.01$

30 points.

The effective percent change (EPC) in proportions of mothers in the experimental area who attended three or more meetings conducted by VHV/VHCs was more than two times higher than the EPC among mothers in the control area. Among Buddhist and Muslim women in the experimental area the EPC was more than three and two times greater, respectively, than the EPC in the control area.

Clearly the intervention program contributed to a greater increase in service provider activities compared to the control area. Hence, the remaining step in the investigation was an assessment of the relative importance of these program indicators for the practice of preventive health behavior. This was accomplished through a multiple regression analysis in which each of the preventive behaviors for the period July-December, 1988 in the experimental area is regressed on religious affiliation, maternal education and two program indicators, "visits by VHV/VHCs" and "number of meetings attended conducted by VHV/VHCs".

As seen in Table 6 attendance at meetings conducted by VHV/VHCs showed a significant relationship with the effects of the remaining predictors with "boiling of drinking water", "handwashing with soap" and "handwashing with soap before eating", while the "number of visits by VHV/VHCs" showed a significant relationship with "method of disposal of diarrheal feces" Hence, among the multitude of possible program dynamics which may have affected preventive health behavior, this analysis has shown that mothers attendance at meetings held by VHV/VHCs, and visits by VHV/VHCs exerted some effect upon their practice of selected preventive behaviors.

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