ORIGINAL ARTICLE

EFFECTIVENESS OF COMMUNITY-BASED HEALTH EDUCATION ON PREPAREDNESS FOR FLOOD-RELATED COMMUNICABLE DISEASES IN KELANTAN

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ABSTRACT

The flood disaster in Kelantan in 2014 had resulted in substantial health implications including increased cases of communicable diseases. There was a lack of community preparedness including customized health educations in the prevention and control of flood-related communicable diseases in the affected areas. The research was aimed to evaluate the effectiveness of community-based health education modules on flood-related communicable diseases among communities in Kelantan. Health education modules focusing on major food-related diseases were developed. A non-randomized community-controlled trial using the modules were conducted. Outcomes were assessed on knowledge, attitude and preventive practice scores to flood-related communicable diseases using a pre-validated questionnaire. Independent t test was used to compare mean scores between the intervention community (Tumpat) and the control community (Bachok) at 1-month post intervention. One-way independent ANOVA test was done to compare score differences at baseline (pre), post 1-month and post 2-month from repeated surveys among random samples within the intervention community. There were significant improvements in all knowledge components from 9.4% to 52.6% with 10% increment in attitude scores toward preventing behaviours on flood-related communicable diseases. When compared against the control community at one-month post-intervention, there were significantly higher knowledge on types of diseases, symptoms and risk factors as well as practice scores of drinking safe water and protective habits. This research demonstrated that community-based health education is effective in improving relevant knowledge, attitude and preventive practices among affected communities as part of their preparedness toward communicable diseases related to flood.

Keywords: *flood, communicable diseases, knowledge, attitude, community trial.*

INTRODUCTION

Floods are associated with numerous outbreaks of a wide range of infectious diseases[1]. The pattern of prevalence of waterborne diseases such as typhoid fever, cholera, leptospirosis, diarrheal diseases, and hepatitis appears to have changed after the flood[2-4]. The prevalence of waterborne diseases and vector-borne diseases such as malaria and dengue fever were found to increase after the flood[5]. An association between gastrointestinal symptoms and contact with floodwater was even observed in a western country such as the United States[6]. Identified hazards and risk factors of the disease transmission that were highly present during and after flood include contacts with contaminated flood water, poor sanitation and self-hygiene practices, overcrowding, increase vector breeding sites, animal displacements as well as presence of dust or molds at post flood.

Flood disaster occurs on annual basis in Kelantan, a north-eastern state in Peninsular Malaysia, especially during monsoon season between November and February. The infamous 'Yellow Flood' disaster in Kelantan at the end of 2014 resulted in massive damages to the basic infrastructures thus affecting the daily lives of more than 100 000 people; around 2000 families became homeless while thousands more were displaced[7]. The trend of communicable diseases such as leptospirosis, respiratory tract infections and acute gastroenteritis also increased after the flood, many of which were reported from the flood-affected districts in Kelantan[8].

Specific health advice related to flooding although important, was often ignored. For instance, information on the prevention of leptospirosis, was rarely given to travellers in Thailand[9]. Mondal *et al*. emphasized the necessity for both community education for proper water use behaviour and personal hygiene along with ensuring the availability of safe water and sanitation facilities of flood affected communities[10]. Haggerty *et al*. on the other hand, suggested that community-based hygiene education can be an effective approach to reduce the incidence and duration of diarrhoeal episode following flood disaster[11].

There are research gaps in determining the public knowledge and attitude in flood-related health

hazards and their preventive practices in reducing health implications of flood disaster, especially in local settings. Limited availability of customized health educations on flood-related communicable diseases in the communities are also a great concern. The aims of this research are to describe the situational analysis on the related issues and to evaluate the effectiveness of a community-based health education intervention in improving knowledge, attitude and preventive practices on flood-related communicable diseases among affected communities in Kelantan.

METHODS

This research project involved two phases. In phase 1 (between August and October 2015), we conducted a situational analysis to assess and explore the baseline knowledge, attitude and preventive practices (KAP) on communicable diseases related to flood among the affected communities. In phase 2 (between November 2015 and February 2016), health education modules and materials were developed and evaluated through a community intervention to determine its effectiveness

Baseline community surveys

Mixed-method assessments were conducted in phase 1. Prior to the community survey, a KAP questionnaires was developed and validated. Guided interview surveys were conducted among 300 villagers. Raw total scores from each section of KAP were converted to percentage scales for ease of interpretation and comparison across domains and sections. In the qualitative inquiry, four focus group discussions (FGD) were performed to explore the coping mechanism and experiences of the villagers pertaining to the 2014 flood disaster. There were three female groups and only one male group, with each group consisting of between six to 10 participants. Thematic analysis was used to analyse the data.

Validation of research tool

A questionnaire on flood-related communicable diseases diseases was prepared by a panel of experts that comprised of an infectious disease specialist, microbiologists, epidemiologists and a medical statistician[12]. The sections included respondent profile, knowledge, attitude, practice and general opinion on health information. The knowledge section has five subsections on the different aspects of knowledge with response options such as “Yes”, “No” and “Do not know”. The attitude and general opinion sections were given response options of “Strongly disagree”, “Disagree”, “Neutral”, “Agree” and “Strongly agree” while for practice section response options were “Never”, “Seldom”, “Often” and “Always”. The questionnaire was pre-tested among 100 and 200 villagers respectively in exploratory and confirmatory stages of validation using interviewer guided self-administration method. Results showed that psychometric properties of each domains were valid and reliable, and the results were described elsewhere in an unpublished report.

Development of health education modules

In phase 2, a series of workshop was conducted involving the research team and Kelantan health district offices. The accuracy of the contents and completeness of the information, as well as comprehensibility of the messages were checked. The workshop activities included revising existing health education materials, creating new materials tailored to the community and obtaining feedback from stakeholders (local government health staff, community leaders and representatives). Customized modules that focus on major flood-related communicable diseases and printed materials and audio-visual information kits were eventually developed. These materials include: Two series of flip charts (pre, during and post).Two series of PowerPoint slides for health talk by trained personnel .Three series of health education flyers (pre, during and post flood). A 10-minute video, with captioned messages on flood-health hazards, diseases and prevention.Public health information packages e.g posters, Friday-prayer sermon texts and health information

Community trial

A non-randomized community-controlled trial was conducted. Inclusion criteria were respondents in the intervention community who lived in Tumpat and affected by the 2014 flood, aged above 18 years, consented and able to attend the intervention activities. Eligible villagers in a sub-district in Bachok who did not experience the flood disaster were selected as the control group.

The delivery channels of the health modules were conducted at least two weeks before the forecasted flood seasons in that year.Two strategies were applied: targeted small group health education sessions which comprised 20-25 persons each, and mass dissemination of public information health education materials. For the small group sessions, the details were as follows: Target groups: local government health staff, health clinic support groups, community leaders (including from Kelab Rukun Tetangga, KRT) and village volunteers. Session: 2-3-hour session at selected premises (health clinic, KRT premise, penghulu office). Content: video show, two health topic talks, hand-hygiene demonstration and question-answer session, feedback, posttest evaluation. Health talk topics: before, during and after flood related diseases, risk and prevention using standard PowerPoint slides and audio-visual materials. Personnel: research team members and trained health staff

For mass education materials dissemination in the community, customized flood-related health risk and diseases flyers/pamphlets were distributed to households and public places while Friday-prayer sermon text for 2 weeks including health information sheets were provided to local mosques.

Statistical analysis

Sample size was based on the ability to demonstrate a between group difference of medium effect size (Cohen's effect size = 0.5). Using two-mean formula for independent samples, taking a 90% power, a critical level of significance of 0.05 and detectable difference of 1.0, the study would require 244 (2 x 122) participants after considering 30% drop-out. In order to measure the effectiveness of the modules, intervention and controlled community at 1-month post intervention were compared in parallel based on logistical convenience to control for any secular trends. Repeated cross-sectional surveys for post evaluation measurements on the KAP domains were done at 1-month and 2-month post intervention.

The pre-validated questionnaire on KAP was used to assess the outcomes in knowledge, attitude and practices within intervention community and between controlled community. Independent t-test was used to compare the mean scores of knowledge, attitude and practices between intervention and control at 1-month post intervention, while one-way (independent) ANOVA was used to compare the mean scores of knowledge and attitude within the intervention community at baseline (pre-intervention), 1-month and 2-month post interventions. Brown Forsythe modified F-test was used when the assumption of homogeneity of variance is violated. Data entry and analysis were done using SPSS version 22.0.

RESULTS

Baseline community survey

Three hundreds repondents were recruited with a mean age of 45.1 years (SD=17.34) and majority of secondary school education (55.3%). The baseline levels of KAP domains are presented in Table 1.

Table 1: Baseline mean levels (in percentage) of knowledge, attitude and practice among community in selected flood affected villages in Tumpat, Kelantan (n=300)

Sections/Domains		Mean % (SD)
Knowledge	Types of communicable diseases related to flood	54.1 (24.1)
	Common symptoms	64.1 (30.8)
	Methods of transmission	78.3 (28.5)
	Susceptibility and risk groups	65.8 (30.4)
	Danger signs and symptoms	89.6 (25.5)
Attitude towards communicable diseases prevention		63.6 (23.3)
Practice on communicable diseases prevention	Hand washing	84.5 (23.2)
	Drinking water	77.5 (27.2)
	Sanitation	81.7 (22.9)
	Protective habit	54.7 (29.5)

The survey also detected between 90.7 to 96.3% of them agreed that they were more likely to practice the preventive measures if given proper information and personal protective tools (e.g soap, hand sanitizer, face mask etc) and if being encouraged by friends. About 90% have received information from brochures and advertisements on television and radio, however lower percent (49.8% to 56.2%) received information from websites (official/unofficial). Between 72.2 - 95.3% agreed that current materials of health education on flood related diseases were useful but interactive small group discussions and demonstrations were also suggested by them.

In the qualitative inquiry, analysis of the focus group discussions revealed several important findings. Apparently, transmission of communicable diseases during flood was not considered a priority. When discussing about *priority and concern,* having a safe place and adequate food supplies were identified as the top two most important considerations during flooding. On *hygiene and sanitation practices*, using flood water was acceptable as it was considered 'clean' from a religious perspective that is, it was flowing water and the amount was adequate for ablution. With diminishing source of clean water, the remaining supply was reserved only for washing milk bottles and preparing infant formulas. Hence flood victims had to resort to using the flood water in food preparation and

cooking. They also mentioned about s*tructural inadequacy* especially on sanitation issues and poor coordination of solid waste disposal in flood centers and at homes. Almost all respondents agreed that '*unpreparedness'* was the highlight of the problem. Even though the communities have been experiencing some level of flood events in the past, the massive nature of the 2014 flood disaster had caught them unguarded while over sighting communicable disease risks.

Community trial

There were 129 and 101 respondents from the intervention community who participated in the repeated surveys at 1-month and 2-month post intervention respectively. The KAP assessments of 125 respondents from the control community were done at 1-month post intervention. Baseline sociodemographic characteristic between both communities showed no significant differences (Table 2). Table 3 shows statistically significant improvements in all knowledge components (type of diseases, common symptoms, methods of transmission, susceptible and risk factors, and danger signs) from 9.4% to 52.6% (P<0.001) with a 10% increment (P<0.001) in attitude scores towards preventing behaviours on flood-related communicable diseases in the intervention community. There was a slight reduction in most domains at 1-month post intervention; however, all mean scores were still higher than at the baseline pre intervention stage.

When compared to the control community at post-1-month, significant higher knowledge scores on types of diseases, common symptoms and susceptible/ risk factors domains were shown in the intervention community between 15.4% and 35.4%. These differences were also found to be statistically significant when adjusted with the baseline sociodemographic differences between the two communities (results not shown). There were also significant improvements in the practice domains at post 1-month such as drinking safe water and protective habits (P<0.001 and P<0.006 respectively) (Figure 1).

Table 2: Baseline characteristics between intervention and control communities (at post 1-month)

Characteristics	Intervention Community, n (%) (n= 129)	Control Community, n (%) (n = 125)	*P*-value
Age (years), mean (SD)	49.0 (14.67)	43.8 (16.66)	0.010[a]
Sex			0.044[b]
Male	56 (43%)	38 (30%)	
Female	73 (57%)	87 (70%)	
Ethnicity			0.060[c]
Malays	124 (96%)	125 (100%)	
Others	5 (3.9%)	0 (0%)	
Marital status			0.056[c]
Single	13 (10%)	19 (15%)	
Married	109 (84%)	105 (84%)	
Widow/Widower/Divorcee	7 (5.4%)	1 (0.8%)	
Occupational groups			0.015[b]
Student	10 (7.8%)	13 (10%)	
Government/Private	20 (16.5%)	5 (4.0%)	
Housewife/Retired	57 (44.2%)	68 (54%)	
Self-employed	42 (32.6%)	39 (30.8%)	
Educational status			0.018[b]
University/Colleges	13 (10%)	5 (4.0%)	
Secondary school	26 (20%)	41 (33%)	
Primary school	76 (59%)	73 (58%)	
Not schooling	14 (10%)	6 (4.8%)	

[a]Independent t test, [b]chi-square test, [c]Fisher exact test

Table 3: Changes and comparison on mean scores on knowledge and attitude domains in the intervention and controlled community

Domains on knowledge and attitude (maximum scores)	Intervention			F-stat* (df1, df2)	*P*-value**	Control	*P*-value*** (intervention vs-control at post 1-month)
	mean (SD)					mean (SD)	
	Baseline or Pre (n=300)	Post 1-month (n=129)	Post 2-month (n=101)			Post 1-month (n = 125)	
Types of disease (7.0)	3.8 (2.09)	5.8 (1.52)	4.2 (2.03)	51.24 (2,330.4)	<0.001[a]	4.5 (1.70)	<0.001
Common symptoms (10.0)	6.4 (3.1)	8.9 (1.54)	6.8 (2.68)	48.71 (2,330.2)	<0.001[b]	6.5 (2.71)	<0.001
Methods of transmission (14.0)	10.9 (4.02)	13.0 (2.26)	12.2 (3.06)	23.61 (2,397.7)	<0.001[c]	13.1 (2.89)	0.733
Risk factor (11.0)	7.3 (3.27)	9.0 (1.95)	8.0 (2.58)	20.44 (2,390.3)	<0.001[d]	7.8 (3.44)	0.001
Danger signs & symptoms (6.0)	5.3 (1.6)	5.8 (0.55)	5.7 (0.89)	12.39 (2,454.3)	<0.001[e]	5.8 (1.08)	0.660
Attitude on prevention (33.0)	25 (5.15)	27.4 (5.01)	25.9 (4.92)	11.31 (2,353.3)	<0.001[f]	26.5 (5.18)	0.125

*Brown-Forsythe Modified F test of was applied due to violation of homogeneity of variance assumption. Dunnett's T3 was applied for post-hoc multiple comparisons; [a,b,d]Pre vs Post 1-month and Post 1-month vs Post 2-month were significant, [c,e]Pre vs Post 1-month and Pre vs Post 2-month were significant, [f]Pre vs Post 1-month was significant.
**One-way independent ANOVA test; ***Independent t test

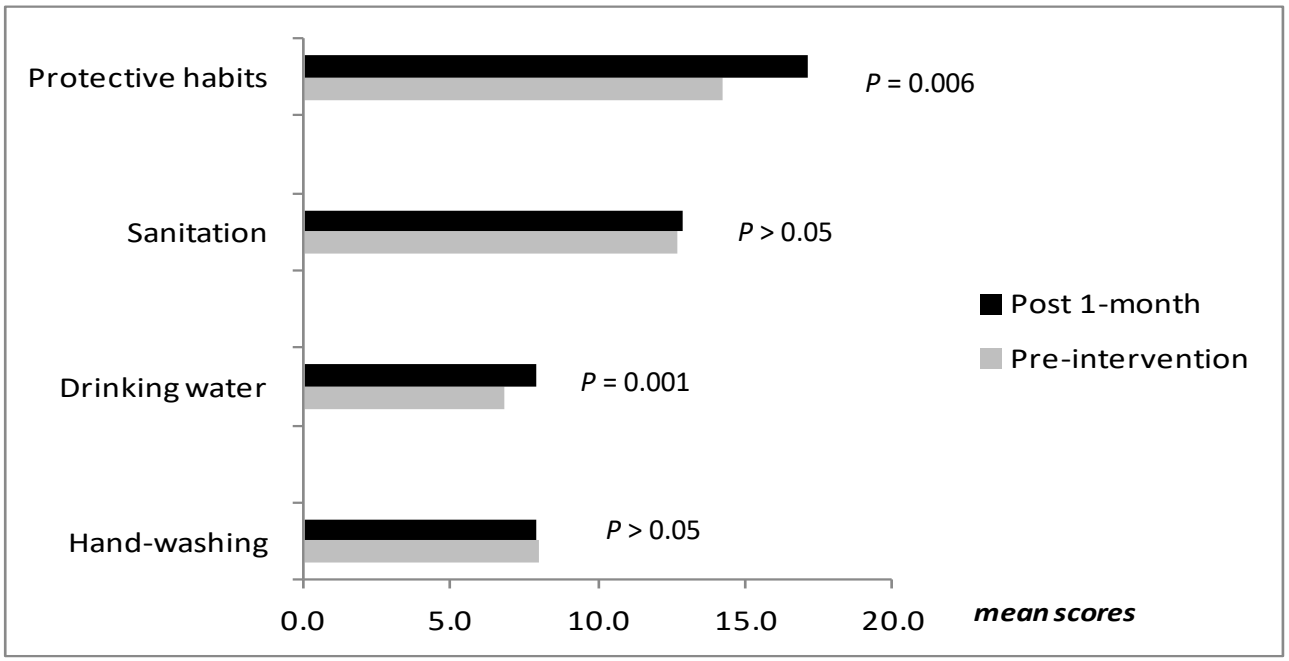

Figure 1: Mean scores in preventive practices items between baseline (pre) and post 1-month (independent t test) in the intervention community.

DISCUSSION

The baseline survey has shown the general concerns on inadequacy of local community's knowledge and attitude in flood-related health hazards and their preventive practices in reducing health implications of flood disaster. Awareness regarding types of communicable diseases, symptoms, susceptibility as well as correct attitude and certain preventive practices needs further attention. Thus, development of effective community-based, and at household and personal levels are important and timely needed in communicable disease preparedness in the community.

Even though in term of percentage scores the increments were as low as about 10%, we believe that this research has succeeded in promoting important public health messages at community level. Rose stated that an intervention that resulted in small population changes is important for public health and the overall health status of that population[13]. In fact, most behavior change specialists believe that a sequence of small or moderate successes is the best way to build morale, self-efficacy and commitment for future goals among the public[14].

However, there appeared to be non-improvement in the practice domains on hand-washing and sanitation which could be explained by the qualitative findings. Respondents in the FGDs claimed that transmission of disease was not a matter of importance during flood disasters. As mirrored by a study in Taiwan, flood and landslides victims were mostly concerned about the different potential hazards that might affect their residential area. The same study also reported that previously experienced disasters are good predictors of victims' attitudes toward natural disasters [15]. Respondents in our study were used to flood disasters, having lived most of their lives in flood-prone areas, hence it is only natural that the utmost priority is survivalism. As human cannot survive without water, it is an important commodity during emergencies and should not be wasted on not-so-important activity such as washing their hands. Water scarcity is also linked to water insecurity. A study of water insecurity in Bolivia after the historic flood in 2014, found 89% of the adults reported medium or high water insecurity[16]. These findings may lend some credence to the low practice of hand-washing among flood victims.

It is also worth discussing that improvements shown by the intervention community may not necessarily lead to relevant preventive behaviours and reduction in disease incidences following real flood disaster, as described by studies in Thailand[17] and Zaire[11]. Thus, we recommend that future studies are conducted on changes in practices and behaviours, episodes of disease symptoms and incidence rates of related diseases through surveillances, especially at post-flood.

Additionally, barriers, perception and beliefs about flood should also be studied to improve community preparedness during disaster[18]. A study in Thailand on flood preparedness behaviour among older people with chronic diseases showed association with perception regarding flood threat, flood coping ability and physical ability to fend for themselves during flood[19]. In Nigeria, a study found that most community members do not have coping strategies but regarded flood disaster as an act of God that is beyond their control[20]. Religious belief and risk perceptions have the potential of motivating and shaping preventive behaviour, especially on the application of protective health measures[21].

In this study, we have analysed the repeated cross-sectional datasets using comparative analyses for independent samples instead of paired analysis. By using a cross-sectional sampling approach rather than repeatedly sampling the same respondents in the community, our study will enable to measure changes in knowledge, attitude and preventive practices at community level over time. There is small probability that even though some respondents will be re-sampled during the repeated surveys, the aggregate-level analysis to determine quantitative changes over time for representative population groups are acceptable[22].

CONCLUSIONS

Community preparedness and risk reduction strategies are typically low-cost efforts that can be readily implemented at personal, household and community level, as compared to high-cost disaster relief operations and flood mitigation projects. Reducing flood risk and averting its health consequences among communities in flood-prone areas require empowering and supporting those living in these areas with ability to initiate long-term adaptation measures and creating awareness about future risks[23].

In summary, the study findings demonstrated that the community-based health education is effective in improving relevant knowledge, attitude and preventive practices at the community level among affected populations. We hope that the customized health education modules developed from this research project will be able to enhance the knowledge and attitudes regarding flood-related diseases, modify risk-related practices and behaviour of people exposed to these hazards and promote community participation in flood hazard mitigation.

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