Rapid Health Needs Assessment after Typhoons Bolaven and Tembin Using the Public Health Assessment for Emergency Response Toolkit in Paju and Jeju, Korea 2012

Ki Jeong Hong,[1] Kyoung Jun Song,[2]
Sang Do Shin,[2] Sung Wook Song,[3]
Young Sun Ro,[4] Joo Jeong,[5]
Tae Han Kim,[2] Yu Jin Lee,[6]
Minsook Kim,[7] Soo-Nam Jo,[8]
and Min Young Kim[9]

[1]Department of Emergency Medicine, Seoul Metropolitan Government-Seoul National University Boramae Medical Center, Seoul, Korea; [2]Department of Emergency Medicine, Seoul National University College of Medicine and Hospital, Seoul, Korea; [3]Department of Emergency Medicine, Jeju National University School of Medicine, Jeju, Korea; [4]Laboratory of Emergency Medical Services, Seoul National University Hospital Biomedical Research Institute, Seoul, Korea; [5]Department of Emergency Medicine, Seoul National University Bundang Hospital, Seongnam, Korea; [6]Department of Emergency Medicine, National Medical Center, Seoul, Korea; [7]Gangbuk-gu Community Health Center, Seoul, Korea; [8]Gyeonggi Infectious Disease Control Center, Seongnam, Korea; [9]Jeju National University College of Nursing, Jeju, Korea

Address for Correspondence:
Kyoung Jun Song, MD, PhD
Department of Emergency Medicine, Seoul National University College of Medicine and Hospital, 101 Daehak-ro, Jongno-gu, Seoul 03080, Korea
E-mail: skciva@gmail.com

Following natural disasters, rapid health needs assessments are required to quickly assess health status and help decision making during the recovery phase. The Korean Centers for Disease Control and Prevention (KCDC) developed the Public Health Assessment for Emergency Response (PHASER) Toolkit which was optimized for a weather disaster in Korea. The goal of this study is to assess public health needs following the 2012 typhoons Bolaven and Tembin in both urban and rural areas in Korea. We conducted pilot trials using the PHASER toolkit to assess health needs following typhoons Bolaven and Tembin in Paju and Jeju during summer 2012. We sampled 400 households in Jeju and 200 households in Paju using a multistage cluster sampling design method. We used a standardized household tracking sheet and household survey sheet to collect data on the availability of resource for daily life, required health needs, clinical results and accessibility of medical services. The primary outcomes were clinical results and accessibility of medical service after the typhoons. We completed surveys for 190 households in Paju and 386 households in Jeju. Sleeping disorders were identified in 6.8% (95% confidence interval [CI], 2.8%–10.8%) surveyed in Paju and 17.4% (95% CI, 12.8%–22.0%) in Jeju. We used the PHASER toolkit to assess healthcare needs rapidly after 2 typhoons in Korea. Sleeping disorders were frequently identified in both Paju and Jeju following the 2 typhoons.

Keywords: Disaster; Needs Assessment; Typhoon; Mental Health Services

INTRODUCTION

Tropical storms including hurricanes, typhoons and cyclones significantly impact human populations and result in public health consequence including storm related mortality, injury and psychosocial effects (1). Rapid health needs assessment tools have been used to assess resources required for decision making during the disaster recovery phase (2-8). Based on information from rapid health and need assessments after disasters, policy makers and stakeholders can identify the public health status of damaged areas and support optimal health care interventions to the affected victims.

The United States' Centers for Disease Control and Prevention (CDC) developed a rapid needs assessment tool named the Community Assessment for Public Health Emergency Response (CASPER) (9-13). This tool has been used 53 times from 2003 to 2012 to assess needs following disasters (12). CASPER suggests multistage cluster sampling to select households to interview and recommends a standardized survey process within 72 hours. CASPER samples households based on a system of addresses which is not feasible to other nations. Furthermore, both different types of structures and types of disasters could be barriers to implement rapid need assessment tools developed from advanced countries.

The Korean Centers for Disaster Control and Prevention (KCDC) developed a rapid need assessment toolkit optimized to addresses and characteristics of administrations, infrastructure and disaster response systems in Korea. We benchmarked the advantages of previously developed toolkits from advanced countries and modified these to

the disaster response system of Korea. The KCDC conducted pilot trials using the Public Health Assessment for Emergency Response (PHASER) toolkit after 2 different typhoons struck Korea during summer 2012.

In this study, we developed the rapid health need assessment toolkit optimized for weather related disasters in Korea. The goal of this study was to assess the public health needs following typhoons in both urban and rural areas in Korea, 2012.

MATERIALS AND METHODS

Study design

This was a prospective observational study that used the PHASER toolkit developed by the KCDC. We conducted pilot trials using the PHASER toolkit to assess health needs following typhoons in Paju and Jeju during the summer of 2012.

Development of PHASER protocol

The KCDC developed the PHASER toolkit. The PHASER toolkit focused on a rapid health needs assessment after weather related disasters including but not limited to typhoons, floods, heat waves, and freezing temperatures. We developed the formal process of PHASER; decision to initiate survey, administrative collaboration, education for interviewers, data collection and statistical analysis, and feedback to stakeholders. We used question banks optimized for weather related disasters and standardized survey registry, tracking sheets, and informed consent forms. We also developed methodology to sample interviewees following the disasters using methods for expanded programs on immunization.

According to the PHASER protocol, the administrative headquarters in a region affected by a disaster requests activation of the PHASER survey from the KCDC. The KCDC will then dispatch a specialized PHASER survey team to the disaster area. The PHASER team will define the regional area affected by the disaster and sample the households to survey. The PHASER protocol recommends to survey 400 households at the province level and 200 household at the county level. The PHASER team will then recruit and educate the surveyors. After completing the survey, the PHASER team determine appropriate weighted values and analyze the results. Finally, within 72 hours from initiation of the survey, reports from the PHASER survey are presented to the headquarters of the damaged areas and the agencies concerned.

Selection of participants: preparation of PHASER

We studied Paju and Jeju for the use of PHASER surveys following typhoons to these areas in June and September 2012. In May 2012, meetings were conducted between the KCDC and disaster preparedness administrators in Korea. We utilized the enumeration areas developed by the Statistics Korea for the Korea census survey as the first step of the multistage cluster sampling method.

Following the disasters and according to PHASER protocol, 200 households in Paju and 400 households were surveyed on Jeju. If adults at the selected household was unavailable at the time of the PHASER survey, the household was excluded from the survey. All households excluded from the survey were replaced by a similar household based on a previously prepared list of substitute households.

Method of measurement

In June and again in September 2012, the KCDC activated the PHASER survey following typhoons in Paju and Jeju. After each typhoon, both the KCDC and the study authors visited the damaged regions and initiated the surveys.

We used 2 standardized survey forms including both a household tracking sheet and a household survey sheet. The tracking sheets included information on the number of households sampled or substituted, reasons to substitute a sampled household, types of household structure (e.g., apartment or house). The household survey forms included questionnaires on the number of individuals living in the house (including the number of children under 2 years of age and over 65 years of age), and the damage and the structural safety of the actual house. We additionally surveyed the availability of resource for daily life including toilet, telephone (landline and mobile capacity), gas, electrical power, elevator functionality, water availability, and garbage removal. We additionally evaluated resources required to satisfy basic health needs including food, medical service, transportation, and physical or financial support to restore destructed resources. We surveyed the clinical results of the disaster in the sampled household including the occurrence of either disease or injury, requirement for medical services, and the presence of psychiatric symptoms occurring after the disaster (e.g., attention disorder, sleeping disorder, etc.). Finally, we assessed the accessibility of medical services and prescription drug to use for 3 to 7 days after the typhoon.

All surveyors completed a 4-hour survey training course before initiating the PHASER survey. Surveyors in Paju were nurses and officers working at public health center. On the other hand, surveyors in Jeju were nursing school students. After finishing their assigned surveys, each interviewer returned to the command center. At that time, all tracking sheets and survey forms were reviewed by KCDC and the researchers for checking the accuracy of their visiting to the sampled households and the correctness of their substitution.

Outcome measurement

The primary outcomes were the clinical results (the occurrence of either disease or injury, requirement for medical services, and the presence of psychiatric symptoms occurring after the disas-

ter) and accessibility of medical services after typhoon. The secondary outcomes were the resources required to satisfy the health needs for daily life. We assessed the outcomes descriptively and also calculated the weighted value of each question to evaluate estimated overall damage of each region affected by the typhoon.

Statistical analysis

Households were sampled for each affected region. The PHASER sampling methodology included a multistage cluster design. In the initial stage, we selected 40 enumeration districts for a county (Paju city) and 80 enumeration districts for a province (Jeju island). In the first sampling stage, the selection of enumeration districts reflects the proportion of types of houses in the damaged areas. In the second stage, we selected 5 households in each enumeration districts. Thus, 200 households were selected from the county region (Paju) and 400 households from the province (Jeju).

Descriptive statistics were used to assess performance and operation of PHASER. We measured the response rate defined as the number of households responded to surveyors divided by the number of households visited to interview. We additionally measured the cooperation rate as the number of households that completed the PHASER survey divided by number of households visited to interview.

We conducted a descriptive analysis for all surveyed items. We additionally calculated the weighted value for each questionnaire based on the sampling criteria of each region. We assessed the number and percentage of each question and present with 95% confidence intervals (CIs).

RESULTS

From August 26 to 28 2012, typhoon Bolaven impacted to Paju and Jeju. Maximal wind velocity for 10 minutes was 45 meter per second (100 miles per hour) and the central minimum pressure was 910 hectopascal.

On August 30, 2012, Paju and Jeju were again struck by a typhoon. Typhoon Tembin had a maximal wind velocity for 10 minutes was 45 meter and a central minimum pressure of 945 hectopascal.

Operation of PHASER for Paju and Jeju

PHASER research team and KCDC visited Paju on August 31, 2012. Initially, we conducted the surveyor training program. We recruited 20 surveyors and created 10 survey teams composed of 2 surveyors each. Each survey team was assigned 20 households to survey. Following training completion, the PHASER

Table 1. Performance and operation of PHASER for Paju and Jeju

Parameters	Paju		Jeju	
	No.	%	No.	%
No. of sampled households	200	-	400	-
No. of total households visited to interview	812	-	1,237	-
No. of households attempted face to face interview	238	-	436	-
No. of households completed PHASER survey	190	-	386	-
Response rate*	238/812	29.3	436/1,237	35.2
Cooperation rate[†]	190/238	79.8	386/436	88.5

PHASER = Public Health Assessment for Emergency Response.
*Response rate = (No. of households attempted face to face interview/No. of total households visited to interview) × 100; [†]Cooperation rate = (No. of households completed PHASER survey/No. of households attempted face to face interview) × 100.

Table 2. Unavailable resources for daily life in Paju and Jeju

Variables	Paju					Jeju				
	Survey (n = 190)	Weighted value*				Survey (n = 386)	Weighted value*			
	No.	No.	95% CI	%	95% CI	No.	No.	95% CI	%	95% CI
Functioning toilet	1	120	0–359	0.4	0–1.3	4	1,119	57–2,181	0.5	0.1–2.0
Landline telephone	2	289	0–687	1.0	0–2.4	38	10,550	5,697–15,403	9.5	5.1–13.8
Natural gas	1	144	0–435	0.5	0–1.5	25	7,020	3,149–10,890	6.3	2.8–9.8
Electrical power	0	0	0	0	0	84	24,097	16,383–31,811	21.6	14.7–28.6
Functioning elevator	9	1,180	0–2,573	4.2	0–9.2	56	15,550	10,178–20,922	14.0	9.1–18.8
Mobile phone	0	0	0	0	0	21	5,901	2,794–9,007	5.3	2.5–8.1
Waterworks	0	0	0	0	0	23	6,739	3,056–10,422	6.1	2.8–9.4
Removal of garbage	2	289	0–870	1.0	0–3.1	24	6,815	3,541–10,089	6.1	3.2–9.1

CI = confidence interval.
*We calculated the weighted value for each questionnaire based on the 2 stage sampling criteria of each region.

survey began at 1:00 pm, and all surveyors finished surveying at 6:00 pm on August 31. In Paju, interviewers visited 812 households (Table 1), 238 households had surveys attempted (response rate 29.3%) and 190 households successfully completed the survey (cooperation rate 79.8%).

Jeju was surveyed on September 1, 2012. Similar to Paju, we recruited 50 surveyors and created 25 survey teams each composed of 2 interviewers. We designated these survey teams to 400 households. After a similar morning training program, the survey teams visited the sampled households and completed survey by 9:00 pm on September 1, 2012. On Jeju, interviewers visited 1,237 households, attempted to interview 436 house-

holds (response rate 35.2%) and completed surveys at 386 households (cooperation rate 88.5%).

Available resources and health needs for daily life
In Paju, most resources for daily life functioned well except elevator (4.2% were unavailable). In contrast, the proportion of answer unavailability for electrical power was 21.6% (95% CI, 14.7%–28.6%) and elevator was 14.0% (95% CI, 9.1%–18.8%) in Jeju (Table 2).

Survey results for the required resources to satisfy health needs for daily life are presented in Table 3. In Paju, 10.0% (95% CI, 4.6%–15.4%) of house lacked electrical power indicating 2,805

Table 3. Required resources to satisfy health need for daily life in Paju and Jeju

Resources	Paju					Jeju				
	Survey (n = 190)	Weighted value*				Survey (n = 386)	Weighted value*			
	No.	No.	95% CI	%	95% CI	No.	No.	95% CI	%	95% CI
Nothing needed	112	16,482	13,047–19,916	58.6	46.3–70.9	303	86,560	80,101–93,018	77.8	72.4–83.2
Food	14	2,227	1,016–3,438	7.9	3.7–12.1	13	4,857	1,543–8,171	4.4	1.4–7.3
Electrical power	18	2,805	1,276–4,334	10.0	4.6–15.4	19	5,496	2,240–8,752	4.9	2.0–7.8
Water	19	2,673	1,344–4,002	9.5	4.7–14.3	5	1,384	0–2,805	1.2	0–2.5
Medical services	3	433	0–926	1.5	0–3.3	4	1,182	36–2,327	1.1	0–2.1
Medications	5	722	128–1,317	2.6	0.5–4.7	1	227	0–675	0.2	0–0.6
Transportation	6	867	88–1,646	3.1	0.3–5.8	1	280	0–825	0.3	0–0.7
Physical support to remove garbage and restore	5	795	114–1,475	2.8	4.3–5.2	13	3,622	1,512–5,732	3.3	1.4–5.2
Financial support to remove garbage and restore	4	530	16–1,044	1.9	0–3.7	16	4,587	2,552–6,621	4.1	2.3–6.0

CI = confidence interval.
*We calculated the weighted value for each questionnaire based on the 2 stage sampling criteria of each region.

Table 4. Clinical outcomes affected by the typhoon in Paju and Jeju

Outcomes	Paju					Jeju				
	Survey (n = 190)	Weighted value*				Survey (n = 386)	Weighted value*			
	No.	No.	95% CI	%	95% CI	No.	No.	95% CI	%	95% CI
Injury	1	145	0–435	0.5	0–1.5	6	1,671	378–2,964	1.5	0.3–2.7
Disease	1	145	0–435	0.5	0–1.5	16	4,671	1,716–7,626	4.2	1.5–6.9
Mortality	0	0	0	0	0	0	0	0	0	0
Victims requiring medical services	0	0	0	0	0	11	3,048	1,188–4,908	2.7	1.1–4.4
Psychiatric symptom due to disaster										
None	164	24,054	22,146–25,963	85.6	78.7–92.4	291	83,578	77,562–89,594	75.1	70.3–80.0
Attention disorder	1	145	0–431	0.5	0–1.5	4	1,112	39–2,184	1.0	0–2.0
Sleeping disorder	12	1,914	768–3,061	6.8	2.8–10.8	66	19,338	14,228–24,449	17.4	12.8–22.0
Decreased appetite	2	265	0–631	0.9	0–2.2	10	2,860	1,207–4,513	2.6	1.1–4.1
Palpitations	0	0	0	0	0	1	466	0–1,376	0.4	0–1.2
Anxiety	11	1,794	1,004–2,583	6.3	2.8–9.3	40	11,548	7,764–15,332	10.4	7.0–13.8
Suicide	0	0	0	0	0	0	0	0	0	0
Alcohol or drug intoxication	0	0	0	0	0	0	0	0	0	0
Violence	0	0	0	0	0	0	0	0	0	0
Cognitive disorders	25	3,612	1,411–5,813	12.8	5.0–20.7	4	1,112	39–2,184	1.0	0–2.0
Others	8	1,228	317–2,139	4.4	1.2–7.6	17	4,804	2,130–7,478	4.3	1.9–6.7

CI = confidence interval.
*We calculated the weighted value for each questionnaire based on the 2 stage sampling criteria of each region.

Table 5. Accessibility of medical service in Paju and Jeju

Accessibilities	Paju					Jeju				
	Survey (n = 190)	Weighted value*				Survey (n = 386)	Weighted value*			
	No.	No.	95% CI	%	95% CI	No.	No.	95% CI	%	95% CI
Accessibility to medical services										
Non-available	23	3,359	1,545–5,245	12.1	5.6–18.6	46	14,287	9,178–19,397	12.8	8.3–17.4
Prescriptive drugs available to use from 3 to 7 days										
Non-available	51	7,922	5,362–10,481	28.2	19.2–37.1	96	27,151	21,052–33,251	24.4	18.8–30.0

CI = confidence interval.
*We calculated the weighted value for each questionnaire based on the 2 stage sampling criteria of each region.

households (95% CI, 1,276–4,334) required electrical power. In Paju, 9.5% needed water supply and 2.6% required medicines. In Jeju 4.9% of surveyed households lacked electrical power indicating 5,496 (95% CI, 2,240–8,752) households were without electrical power. Food was lacking in 4.4% households indicating 4,857 (95% CI, 1,543–8,171) households in the surveyed area were without food.

Clinical results and accessibility of medical services

Injured patients were identified in 0.5% (95% CI, 0.0%–1.5%) of households in Paju and 1.5% (95% CI, 0.3%–2.7%) of households in Jeju (Table 4). No mortality was detected. A need for medical services was identified in 2.7% (95% CI, 1.1%–4.4%) in Jeju, indicating 3,048 (95% CI, 1,188–4,908) households required medical care. In Paju, cognitive disorders were identified in 12.8% (95% CI, 5.0%–20.7%) and sleeping disorders in 6.8% (95% CI, 2.8%–10.8%) of households. In Jeju, sleeping disorder were identified in 17.4% of households indicating 19,338 (95% CI, 14,228–24,449) households with sleeping disorders. In Paju, 12.1% of interviewees had a barrier to medical service and 12.8% of Jeju interviewees had a barrier to medical service access (Table 5).

DISCUSSION

We conducted a pilot trial of a rapid need and health assessment tool following a weather-related disaster using the PHASER toolkit developed by the KCDC. In summer 2012, Korea was struck by 2 typhoons, Bolaven and Tembin, within almost a week. We demonstrated the ability to complete PHASER surveys in both Paju and Jeju immediately after the typhoons. Both Paju and Jeju were identified as having a substantial electrical power requirement. No mortality was identified and both disease and injury occurrences were rare. In relatively advanced countries with well-developed social infrastructures and structurally sound buildings, injuries or worsening of disease status is likely rare.

Sleeping disorders, however, were identified in 6.8% of households in Paju and 17.4% of households in Jeju. Thus, psychiatric support to relieve psychiatric problems was necessary in both region after the typhoons.

Previous investigations also report psychiatric problems following natural disasters (6,14). After hurricane Ivan, the United States CDC conducted a rapid need assessment and the most common self-reported health problem was sleep disturbances in 54% of respondents (6). As natural disasters can result in psychiatric stresses, preparation for such problems is needed following natural disasters. To reduce mental health problems after a disaster, several reports recommend development and application of the psychological first aid program (15-17). The PHASER survey clearly demonstrated that support of mental health services was necessary for both regions.

We utilized a multistage cluster sampling method based on the World Health Organization's expanded immunization program which is still used for immunization programs in developing countries (18-20). The CASPER toolkit uses a system of country level addresses and recommends selecting 30 census blocks and 7 households. In Korea, a different system of addresses and a high proportion of high rise structures are barriers to implementation of the CASPER toolkit. Korean administrative officers, the KCDC, disaster medicine researchers, epidemiologists, and a statistician reviewed and benchmarked the concept of a 2 stage cluster sampling method based on the World Health Organization's expanded immunization program (18-20). And we modified the sampling method using enumeration area units from the Statistics Korea as a sampling unit to implement the toolkit efficiently into disaster response system and address systems of Korea. The development of the rapid need assessment tools optimized for specific country nuances would best assess disaster response needs. In Korea, 24 tropical cyclones and 5 local windstorms were reported from 2000 to 2009 (21). At the report, 264 victims and 26 mortality cases were observed. PHASER toolkit optimized for disaster response system in Korea could useful to assessed medical resource need during such meteorological disasters.

During PHASER survey, securing recent geographic information and accessing enumeration area unit database was difficult. Acquisition of accurate recent information about change of roads or reconstruction of apartments is crucial to sample appropriate households to interview. And enumeration area

unit data was managed by the Statistics Korea to take a census. Therefore, unofficial access and use of the enumeration area unit data was not permitted for layperson. To perform a 2 stage cluster sampling and assign the sampled households to interviewers efficiently, rapid acquisition of accurate geographic information and enumeration area unit data is important. To overcome this barrier, collaboration of PHASER survey team, KCDC and local administrative was helpful. The KCDC coordinated the official access to the enumeration area unit database. And then, we conducted a 2 stage sampling and selected households. After the process, the local administrative and local surveyors confirmed the appropriateness of selected households based on their recent geographic information such as apartments complex redevelopment.

This study has certain limitations. Measurements of health status by the PHASER survey is based on the self-report of the interviewee. Detailed assessment and diagnosis by medical professionals was not performed and accuracy of health status by the self-report method is a limitation. We recruited nursing students to serve as surveyors in Jeju. In Paju, nurses and community health center administrative officers were recruited. We trained the surveyors, but skill between reviewers may not have been consistent. Finally, this trial was pilot to implement the PHASER survey tool. Although we collected appropriate data, the results were not connected to community interventions to improve recovery after the typhoons.

In conclusion, we performed a pilot assessment of the PHASER toolkit to rapidly assess the needs of citizens for Paju and Jeju following typhoons Bolaven and Tembin in 2012. A substantial number of households had sleep disorders.

ACKNOWLEDGMENT

DISCLOSURE

The authors have no potential conflicts of interest to disclose.

AUTHOR CONTRIBUTION

Conceptualization: Hong KJ, Song KJ, Shin SD, Cho SN. Formal analysis: Song SW, Ro YS. Investigation: Hong KJ, Song KJ, Jo SN, Jeong J, Kim TH, Lee YJ, Kim M, Kim MY. Writing - original draft: Hong KJ, Song KJ.

ORCID

Ki Jeong Hong https://orcid.org/0000-0003-3334-817X
Kyoung Jun Song https://orcid.org/0000-0002-0027-6352
Sang Do Shin https://orcid.org/0000-0003-4953-2916
Sung Wook Song https://orcid.org/0000-0002-7056-6179
Young Sun Ro https://orcid.org/0000-0003-3634-9573
Joo Jeong https://orcid.org/0000-0002-7747-3987
Tae Han Kim https://orcid.org/0000-0003-3855-081X
Yu Jin Lee https://orcid.org/0000-0002-6301-1175
Minsook Kim https://orcid.org/0000-0001-8539-0682
Soo-Nam Jo https://orcid.org/0000-0003-1797-7152
Min Young Kim https://orcid.org/0000-0001-6024-1111

REFERENCES

1. Shultz JM, Russell J, Espinel Z. Epidemiology of tropical cyclones: the dynamics of disaster, disease, and development. *Epidemiol Rev* 2005; 27: 21-35.
2. Korteweg HA, van Bokhoven I, Yzermans CJ, Grievink L. Rapid health and needs assessments after disasters: a systematic review. *BMC Public Health* 2010; 10: 295.
3. Quinlisk P, Jones MJ, Bostick NA, Walsh LE, Curtiss R, Walker R, Mercer S, Subbarao I. Results of rapid needs assessments in rural and urban Iowa following large-scale flooding events in 2008. *Disaster Med Public Health Prep* 2011; 5: 287-92.
4. Babaie J, Moslehi S, Ardalan A. Rapid health needs assessment experience in 11 August 2012 East Azerbaijan earthquakes: a qualitative study. *PLoS Curr* 2014; 6: ecurrents.dis.308f6140d54f78fd1680e2b9e6460ae3.
5. Centers for Disease Control and Prevention (CDC). Tropical Storm Allison rapid needs assessment--Houston, Texas, June 2001. *MMWR Morb Mortal Wkly Rep* 2002; 51: 365-9.
6. Bayleyegn T, Wolkin A, Oberst K, Young S, Sanchez C, Phelps A, Schulte J, Rubin C, Batts D. Rapid assessment of the needs and health status in Santa Rosa and Escambia counties, Florida, after Hurricane Ivan, September 2004. *Disaster Manag Response* 2006; 4: 12-8.
7. Centers for Disease Control and Prevention (CDC). Rapid community needs assessment after Hurricane Katrina--Hancock County, Mississippi, September 14–15, 2005. *MMWR Morb Mortal Wkly Rep* 2006; 55: 234-6.
8. Güereña-Burgueño F, Jongsakul K, Smith BL, Ittiverakul M, Chiravaratanond O. Rapid assessment of health needs and medical response after the tsunami in Thailand, 2004–2005. *Mil Med* 2006; 171: 8-11.
9. Centers for Disease Control and Prevention (CDC). Assessment of household preparedness through training exercises--two metropolitan counties, Tennessee, 2011. *MMWR Morb Mortal Wkly Rep* 2012; 61: 720-2.
10. Horney J, Davis MK, Davis SE, Fleischauer A. An evaluation of community assessment for public health emergency response (CASPER) in North Carolina, 2003–2010. *Prehosp Disaster Med* 2013; 28: 94-8.
11. Nyaku MK, Wolkin AF, McFadden J, Collins J, Murti M, Schnall A, Bies S, Stanbury M, Beggs J, Bayleyegn TM. Assessing radiation emergency preparedness planning by using community assessment for public health emergency response (CASPER) methodology. *Prehosp Disaster Med* 2014; 29: 262-9.

12. Bayleyegn TM, Schnall AH, Ballou SG, Zane DF, Burrer SL, Noe RS, Wolkin AF. Use of community assessments for public health emergency response (CASPERs) to rapidly assess public health issues - United States, 2003–2012. *Prehosp Disaster Med* 2015; 30: 374-81.

13. Ylitalo KR, Umstattd Meyer MR, Stone K, Doyle EI, Curtis R. Using the community assessment for public health emergency response (CASPER) to assess barriers to healthy eating and active living in a low-income community. *Eval Program Plann* 2016; 59: 41-6.

14. Shultz JM, Marcelin LH, Madanes SB, Espinel Z, Neria Y. The "Trauma Signature:" understanding the psychological consequences of the 2010 Haiti earthquake. *Prehosp Disaster Med* 2011; 26: 353-66.

15. North CS, Pfefferbaum B, Hong BA, Gordon MR, Kim YS, Lind L, Pollio DE. Workplace response of companies exposed to the 9/11 World Trade Center attack: a focus-group study. *Disasters* 2013; 37: 101-18.

16. Munir K, Ergene T, Tunaligil V, Erol N. A window of opportunity for the transformation of national mental health policy in Turkey following two major earthquakes. *Harv Rev Psychiatry* 2004; 12: 238-51.

17. Everly GS Jr, Barnett DJ, Links JM. The Johns Hopkins model of psychological first aid (RAPID-PFA): curriculum development and content vali-

dation. *Int J Emerg Ment Health* 2012; 14: 95-103.

18. Wang PC, Mwango A, Moberley S, Brockman BJ, Connor AL, Kalesha-Masumbu P, Mutembo S, Bweupe M, Chanda-Kapata P, Biemba G, et al. A cluster randomised trial on the impact of integrating early infant HIV diagnosis with the expanded programme on immunization on immunization and hiv testing rates in rural health facilities in Southern Zambia. *PLoS One* 2015; 10: e0141455.

19. Muloiwa R, Kagina BM, Engel ME, Hussey GD. The burden of pertussis in low- and middle-income countries since the inception of the Expanded Programme on Immunization (EPI) in 1974: a systematic review protocol. *Syst Rev* 2015; 4: 62.

20. Machingaidze S, Wiysonge CS, Hussey GD. Strengthening the expanded programme on immunization in Africa: looking beyond 2015. *PLoS Med* 2013; 10: e1001405.

21. Kim SJ, Kim CH, Shin SD, Lee SC, Park JO, Sung J. Incidence and mortality rates of disasters and mass casualty incidents in Korea: a population-based cross-sectional study, 2000–2009. *J Korean Med Sci* 2013; 28: 658-66.