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# STATE OF THE USE OF MOBILE TECHNOLOGIES FOR DISASTER PREPAREDNESS IN SOUTH EAST ASIA

Report to Global Disaster Preparedness Center, American Red Cross

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## Table of Contents

Executive Summary .....	1
1. Methodology .....	4
1.1 Indonesia .....	5
1.2 Myanmar .....	6
1.3 Philippines .....	7
1.4 Vietnam.....	8
2. Findings.....	9
2.1 General technology use .....	9
2.2 Cell phone use.....	12
2.2.1 Use of smartphones.....	15
2.2.2 Use of traditional cell phone functions.....	18
2.2.3 Use of “smart” functions.....	19
2.3 Social networks, social support, and local attachment.....	22
2.3.1 How people communicate.....	23
2.3.2 Extent of the availability of practical and financial support .....	24
2.3.3 Extent of the availability of emotional and information support.....	27
2.3.4 Participation in local groups.....	28
2.4 Risk experience and risk info seeking.....	31
2.4.1 Seeking/collecting information.....	31
2.4.2 Communicating disaster information to relatives/friends.....	36
2.5 Past preparedness measures.....	38
2.6 Risk perception.....	40
2.6.1 Perception on different sources of information .....	42
2.7 Demographics.....	45
2.7.1 Male-female composition of sample .....	45
2.7.2 Age distribution of sample .....	46
2.7.3 Longevity of stay in present community .....	46
2.7.4 Literacy rates.....	47
2.7.5 Education levels.....	48
2.7.6 Employment status .....	49
2.7.7 Monthly income (USD per person per month) .....	50
3. Recommendations.....	51
4. Inter-institutional collaboration and community engagement .....	61
Annex: Photos of the sampled areas	

## LIST of FIGURES

Figure 1: Internet and cell phone penetration in the four target countries (2013).....	4
Figure 2.1(a): General technology use: computer.....	9
Figure 2.1(b): General technology use: Internet.....	10
Figure 2.1(c): General technology use: Sample frequency counts on Internet access locations.....	11
Figure 2.1(d): General technology use: Cell phone.....	12
Figure 2.2(a): Cell phone ownership.....	13
Figure 2.2(b): Cell phone use: Sharing.....	13
Figure 2.2(c): Cell phone use: The number of people the phone is shared with.....	14
Figure 2.2(d): Cell phone use: Number of SIM cards per cell phone.....	15
Figure 2.2(e): Cell phone use: Percentage of smartphone users.....	16
Figure 2.2(f): Cell phone use: Apps, Internet, and WiFi.....	17
Figure 2.2(g): Cell phone use: Apps.....	17
Figure 2.2(h): Percentage of participants using the Internet whilst moving.....	19
Figure 2.2(i): Cell phone use: Smart functions.....	21
Figure 2.3(a): Communication means with close relatives.....	22
Figure 2.3(b): Availability of practical and financial support: Demonstrate.....	24
Figure 2.3(c): Availability of practical and financial support: Offer shelter.....	25
Figure 2.3(d): Availability of practical and financial support: Offer presents.....	26
Figure 2.3(e): Availability of practical and financial support: Prepare for natural disasters.....	27
Figure 2.3(f): Availability of emotional and information support: Count on someone.....	28
Figure 2.3(g): Participation in local groups: Voluntary groups.....	29
Figure 2.3(h): Participation in local groups: Places of worship.....	29
Figure 2.3(i): Participation in local groups: Charitable organizations.....	30
Figure 2.4: Personally experienced floods/cyclone/typhoon.....	31
Figure 2.4(a): Collecting information on impending floods/cyclones: Cell phone app.....	32
Figure 2.4(b): Collecting information on impending floods/cyclones: Local print newspaper.....	33
Figure 2.4(c): Collecting information on impending floods/cyclones: Local television news broadcast...34	
Figure 2.4(d): Collecting information on impending floods/cyclones: Local radio broadcast.....	35

Figure 2.4(e): Collecting information on impending floods/cyclones: Website of local newspaper.....	35
Figure 2.4(f): Collecting information on impending floods/cyclones: Word of mouth, relatives.....	36
Figure 2.4(g): Means of communicating information on impending floods/cyclones to close relatives...	37
Figure 2.5(a): Disaster preparedness measures: Built an emergency kit.....	38
Figure 2.5(b): Disaster preparedness measures: Plan to secure own property.....	39
Figure 2.5(c): Disaster preparedness measures: Knew the surroundings.....	40
Figure 2.6(a): Personal risk perception towards flooding hazards.....	41
Figure 2.6(b): Risks posed increasing/decreasing.....	42
Figure 2.6(c): Perception on information with the local government as the source.....	43
Figure 2.6(d): Perception on information with the community organization as the source.....	44
Figure 2.6(e): Perception on information with the radio/television news as the source.....	45
Figure 2.7(a): Male-female distribution.....	45
Figure 2.7(b): Age distribution of sample.....	46
Figure 2.7(c): Longevity of stay in the present community.....	47
Figure 2.7(d): Percentage that can read, write, and understand a simple sentence.....	47
Figure 2.7(e): Distribution of education level.....	48
Figure 2.7(f): Employment status.....	49
Figure 2.7(g): Salary distribution.....	50
Figure 3: Road map of the action plan.....	58

## LIST OF TABLES

Table 1: Survey sample in four countries.....	5
Table 2.1: Internet use: Percentage of “whilst moving” users.....	16
Table 2.2: Percentage using smart functions at least once a day via the Internet whilst moving.....	20
Table 2.3: Literacy rates.....	48
Table 3: Overview of recommendations by country.....	57

## LIST OF BOXES

Box 2.7(a): State of education levels in four countries.....	49
Box 2.2(b): State of employment status in four countries.....	50

## Executive Summary

This project is conducted in response to Global Disaster Preparedness Center's (GDPC) initiative of developing flood hazard preparedness mobile apps in the four target countries (Indonesia, Myanmar, the Philippines, and Vietnam). In particular, this project aims to accomplish the following objectives:

1. Establish effective ways of using mobile technologies to raise public awareness, especially reaching vulnerable population groups, about disaster risks and preparedness, both in terms of the delivery mechanisms and the content of the messages;
2. Identify mechanisms of how to effectively incorporate mobile technologies in disseminating early warnings of impending danger, especially to vulnerable groups, both in terms of the delivery and the content of the messages;
3. Provide solutions on how to use mobile technologies to build an integrated and open-access system which allows the public, especially the vulnerable groups, to engage in protective behaviors such as obtaining information about location and availability of preparedness services;
4. Develop community-specific and country-specific parameters in designing and implementing mobile-enabled awareness and preparedness programs;
5. Inform the feasible approaches and strategies for the humanitarian sector to develop and leverage the flood hazard preparedness apps in Indonesia, Myanmar, the Philippines, and Vietnam.

Incorporating different dimensions of vulnerability based on geographical and demographic variations, this study selected two vulnerable population groups for data collection: individuals living in the relatively remote rural areas and individuals living in the highly populated urban areas. A multi-country survey was conducted with a purposive sample of approximately 200 people from each type of vulnerable groups in each of the target countries (see Table 1 for details). The results identified the current state of mobile technology use and information behaviors related to disaster preparedness in these four countries.

### Technology use in four countries

Portable Internet use has become a common trend across our countries and smartphone use is gaining ground. Almost half of the surveyed participants across four countries use a smartphone and 41% of the surveyed participants use apps on their smartphone. Country-

wise, the Philippines and Myanmar fall into the two extremes of mobile technology use and Vietnam and Indonesia are positioned in between. The Philippines exhibits matured uses of traditional (e.g., voice, texting) and smartphone functions (e.g., apps) while Myanmar shows budding uses of smartphone features and slow adoption of texting. Together, these different results confirm the opportunity to use mobile platforms to disseminate weather risk alert message while identifying the need to consider the variation of usage by country.

### **Information seeking and sharing about risks**

Variations exist in terms of the ways individuals receive and share information about risk-related messages, the perceptions about risks, and engagement of preparedness behaviors among these four countries. Despite the growing level of app adoption, there is little use of mobile apps for getting information about disaster warning. Not surprisingly, traditional media such as local television news broadcasts and local radio stations are still the popular ways of receiving information about impending disasters across four countries. Word of mouth from close relatives and close friends through face-to-face communication is the most common interpersonal means of receiving and sharing risk-related information across four countries. Country-wise, in addition to face-to-face, phone calls are popular for such interpersonal information exchange in Vietnam, Myanmar, and Indonesia, whereas texting is common in the Philippines and Indonesia. Online media (e.g., email or social networking services) is mostly observable in the Philippines for risk-related information exchange among one's social contacts.

### **Risk perceptions and sources of risk messages**

Except for the Philippines, which showed a relatively consistent engagement in disaster preparedness behaviors, participants in other countries reported varied levels of performance of preparedness measures. Moreover, risk perceptions differ in rural and urban areas. In Indonesia and Vietnam, the rural participants tend to perceive a higher level of weather-related risks (e.g., typhoon, flood) than their urban counterparts. The Philippines presents an interesting case because even with a high level of reported preparedness behaviors, participants reported varied levels of risk perception. In contrast, participants in Myanmar generally reported a low perception of risks arising from floods and a low level of disaster preparedness behavior. Local governments are considered a highly trustworthy source in Vietnam, while a moderately trustworthy one in Indonesia and the Philippines. Community

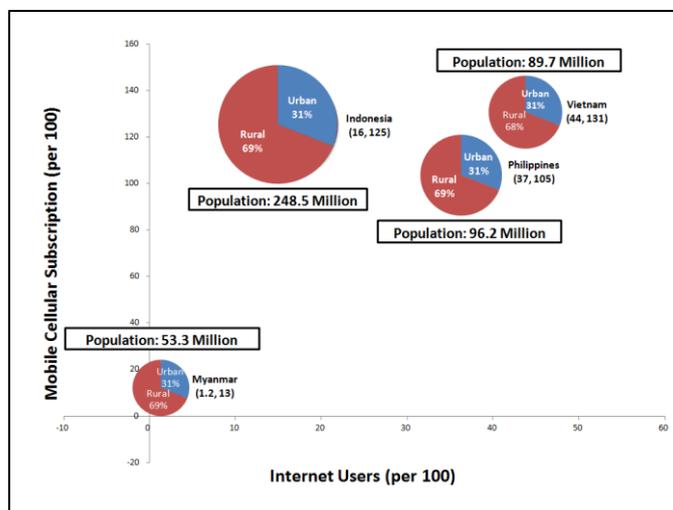
organizations are seen trustworthy as a source of risk information in Indonesia, Vietnam, and Myanmar. Radio and TV news are considered a reliable source across four countries.

## Recommendations

	Indonesia	Myanmar	Philippines	Vietnam
Recommendation 1 <i>Mobile delivery of alert messages</i>	A combination of texting and mobile apps	A combination of mobile apps and mobile messaging	A combination of texting and mobile apps	A combination of texting and mobile apps, along with mobile messaging
	Use of mobile social networking for booster messages	-	Use of mobile email and social networking for booster messages	Use of mobile email and social networking for booster messages
Recommendation 2 <i>Supplementary delivery of alert messages</i>	Develop media package and include local television stations	Develop media package and include local television stations	Develop media package and include local television stations, websites of local newspapers, and local radio stations	Develop media package and include local television stations, websites of local newspapers, and local radio stations
	Supplement the electronic means with door-to-door flyers and community meetings	-	-	Supplement the electronic means with door-to-door flyers and community meetings
Recommendation 3 <i>Enhancing design and delivery weather-related risk messages</i>	Disseminate the message during off-work hours and weekend	Disseminate the message during off-work hours and weekend	Disseminate the message during off-work hours and weekend	Disseminate the message during off-work hours and weekend
	Message interface to be compatible between mobile apps and cell phone's contact list	-	Messages to be adaptable and compatible across face-to-face, texting, online media, and mobile apps	Message interface to be compatible between mobile apps and cell phone's contact list
Recommendation 4 <i>Design of weather-related risk messages</i>	Risk messages promotes enhanced knowledge about risk levels and expected outcomes of preparedness	Risk messages tailored to first-timers, emphasizing the basics about disaster preparedness	Risk messages promotes a wider range of risks and social influence of more people for awareness building and preparedness	Risk messages promote enhanced knowledge about risk levels and expected outcomes of preparedness
	Emphasize the imperative of risk awareness in the urban area	-	-	Emphasize the imperative of risk awareness in the urban area
Recommendation 5 <i>Institutional delivery of weather-related risk messages</i>	Risk messages sent in cooperation with community religious organizations	Risk messages sent in cooperation with community charitable organizations	Risk messages sent in cooperation with local public agencies	Risk messages sent in cooperation with local public agencies

## 1. Methodology

### COUNTRY SNAPSHOT



**Figure 1 –Internet and cell phone penetration in the four target countries (2013)**

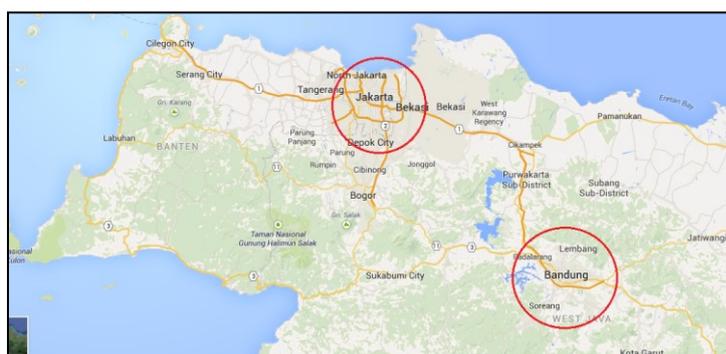
This section summarizes the methodology adopted in each of the four countries. Due to the scope of this research focusing on mobile technology use and preparedness for weather-related risks, purposive sampling was implemented to locate sampled areas that met the selection criteria related to the study variables. Specifically, the selection criteria were based on whether participants exhibited a certain level of mobile technology use and experience with flood-related risks. In each country, data were collected from individuals living in the relatively remote rural (peri-urban) areas and individuals living in the highly populated urban areas. Note that to be consistent with the selection criteria implemented in this research, the differentiation between urban and rural areas is defined on a relative term with the aim of capturing the influence of relative geographical remoteness and lower levels of access to technology on the study outcomes. As the goal of this project is to provide a systematic and cross-country comparative understanding of the role of mobile technology in preparedness for weather-related risks, we deem the moderate sample size in each country sufficient to accomplish this goal. To offer a visual connection with the areas where the survey responses were collected, a series of photos taken by the interviewers on the field is attached at the end of this report (see Annex).

	Urban sample	Rural sample	Total
<b>Indonesia</b>	201	201	<b>402</b>
<b>Myanmar</b>	200	200	<b>400</b>
<b>Philippines</b>	201	200	<b>401</b>
<b>Vietnam</b>	200	200	<b>400</b>
			<b>1603</b>

**Table 1 – Survey sample in four countries**

## 1.1 Indonesia

The survey was conducted on ten days in the time period spanning December 2014 to February 2015 across seven locations including both rural and urban areas of the Bandung and Jakarta regions. Data for rural areas were collected from Cingcing Permata Indah and Dayeuh Kolot and for the urban areas the data were collected from Cinambo and Antapani in Bandung, Bukit Duri in Jakarta, Kelapa Gading and from Pulo Mas. A total of 10 interviewers administered the survey questionnaire to 410 participants, out of which data pertaining to 402 participants, split equally across rural and urban regions, were used for the final analysis. A combination of purposive and cluster sampling method was adopted for data collection. For the rural areas, the Bandung Regency was considered as a representative area as it is located far from the urban areas on the outskirts of Bandung City. For urban areas, both Bandung and Jakarta locations were included whilst conducting the survey. The relevance of these areas for the study is owed to the fact that they are susceptible to floods, which is the focus of this project. The survey was translated into Indonesian keeping in mind the local vernacular for the ease of understanding.

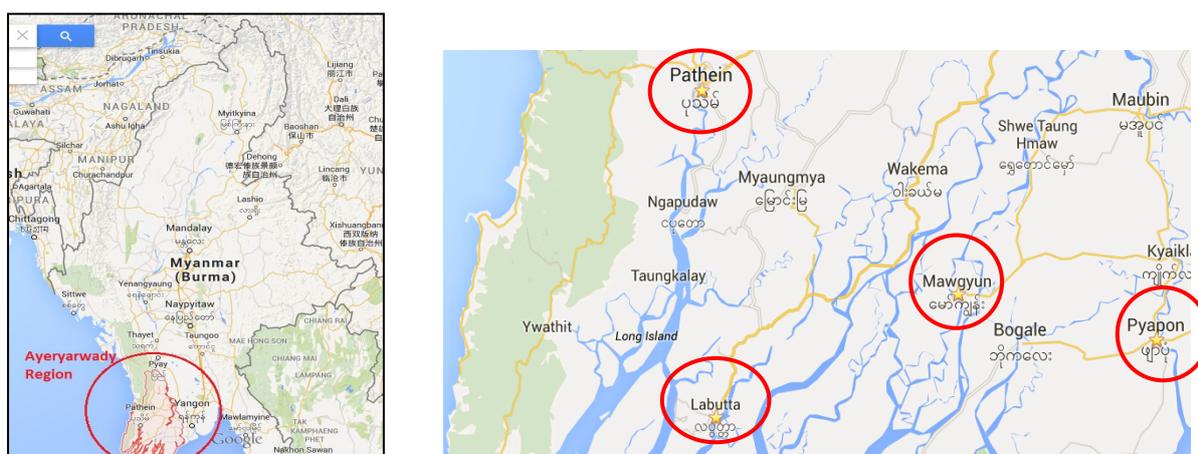




**Locations where the survey was conducted in Indonesia**

## 1.2 Myanmar

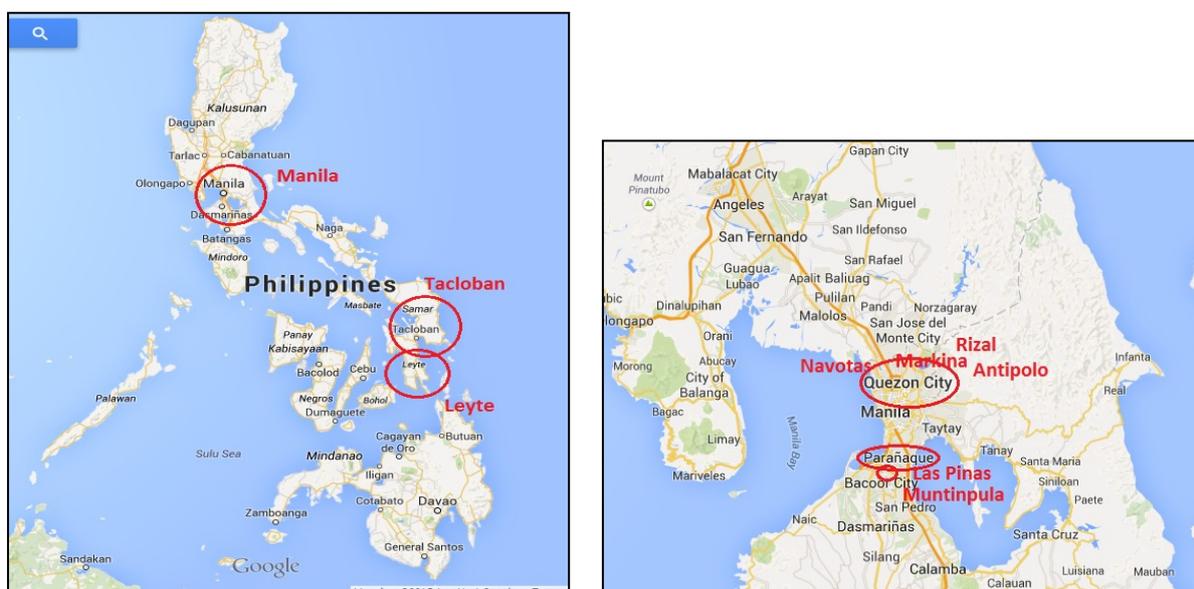
The survey was conducted from February 1 to February 13 in 2015. The study area spanned four townships located in the Ayeyarwady Region of Myanmar-- Pyapon, Mawlamyinegyun, Labutta, and Pathein. Four hundred participants were recruited from within the four selected townships. The inclusion criteria needed the participants living in the areas under study to be 18 years or older, and willing to provide informed consent to participate in this study. Purposive sampling was followed for the selection of an adequately sized sample of rural and urban participants. A total of 400 responses, 200 each from rural and urban areas, were collected. The survey was conducted by a total of six local interviewers under the aegis of two supervisors who were all trained at the local MPR office. The survey was translated into Burmese keeping in mind the local vernacular for the ease of understanding.



**Region where the survey was conducted in Myanmar**

### 1.3 Philippines

The survey was conducted in two locations in the Philippines from December 2014 to January 2015. For the rural area, the survey was administered in the island of Leyte in the eastern part of the Philippines. Specifically, the sites selected were three barangays in Tacloban - the city that was worse hit during Typhoon Haiyan in 2013. For the urban areas, the surveys were administered in eight cities in the Metro Manila area, including Rizal, Antipolo, Marikina, Quezon City, Las Pinas, Navotas, Paranaque, and Muntinlupa. These areas were selected to represent various socio-economic levels. Purposive sampling was utilized in both rural and urban areas. A total of 401 responses, 200 from rural and 201 from urban areas, were collected. Interviewers were required to select respondents above 20 years old, select only one respondent per household.

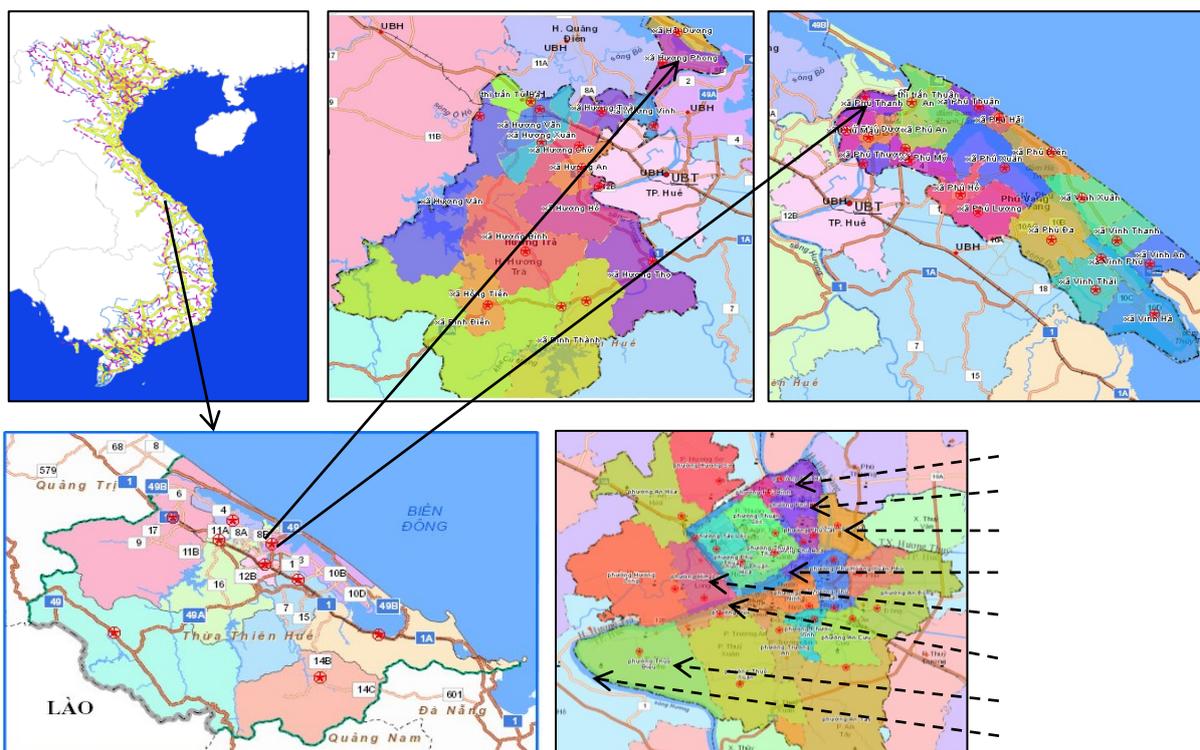


**Locations where the survey was conducted in Philippines**

### 1.4 Vietnam

The survey was conducted in Vietnam from December 2014 to January 2015. For the rural sample, 200 households from two communes, Phu Thanh in Phu Vang district and Huong Phong in Huong Tra district were interviewed. These two areas are located with a high risk of flooding and storms. For the urban sample, 200 households from Hue city were interviewed. Specifically, these households were selected from seven wards along the river where flooding occurs. The surveyed households were randomly selected according to each village in the

commune and ward in city. The survey was translated into Vietnamese. The locations of surveyed areas are shown below.

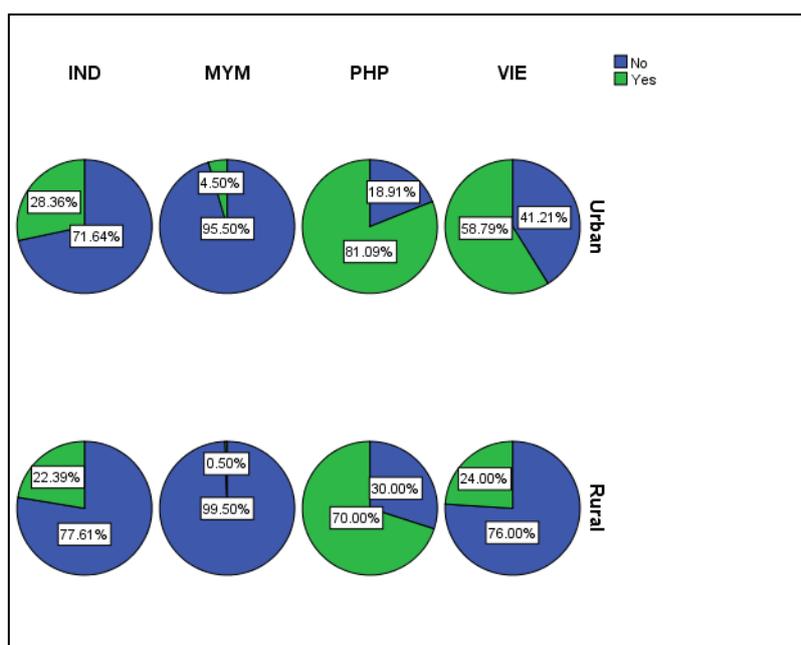


## 2. Findings

This section presents the analysis of the survey data collected across the rural and urban regions of Indonesia (IND), Myanmar (MYM), the Philippines (PHP) and Vietnam (VIE). The sample size for each country was 400 people with an equal split between the rural and urban regions, i.e. 200 participants each.

### 2.1 General technology use

Prior to studying the extent of the use of mobile technologies in the countries under study the survey was designed to understand the present extent on the use of general technology such as a computer and the Internet apart from the use of a cell phone. This helps us get a sense of the state of basic technology use in each country.

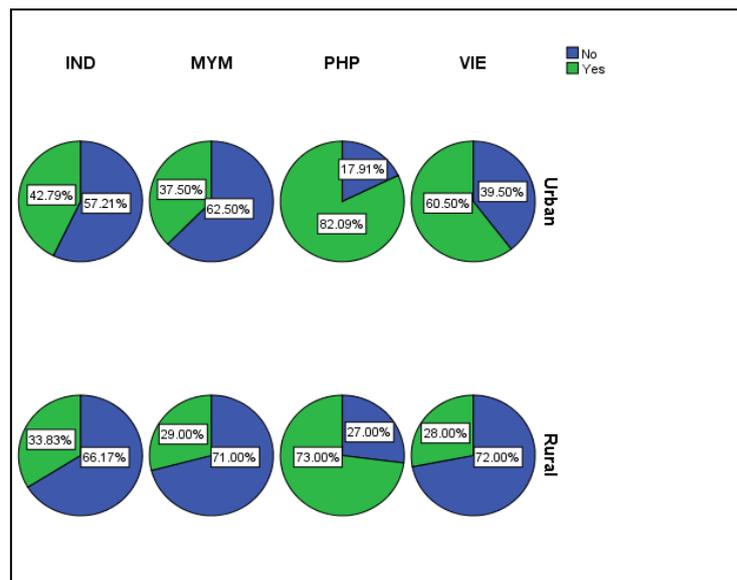


**Figure 2.1(a) – General technology use: Computer**

Based on the responses to the use of a computer (personal or otherwise) [see Figure 2.1(a)] we divided the countries into three categories, the first (“low usage of computers across areas”) are the cases of Indonesia and Myanmar where a majority of the participants, both rural and urban, had not used a computer over the past three months. In Indonesia over 70% of the urban participants had not used a computer; the corresponding proportion for Myanmar was a massive 95.5%. The situation was even more meagre in the rural areas where close to no one in Myanmar having used a computer over the past three months. Although rural

Vietnam recorded behavior similar to the first category, 59% of the urban participants responded in the affirmative when asked whether they had used a computer. Vietnam presented a case for the existence of a rural-urban digital divide and thus forms part of the second category (“rural– urban disparity in usage of computers”). Philippines may be categorized into the third category (“high usage of computers across areas”). Participants show a very high usage of computers with 70% and 81% of the rural and urban responding in the affirmative.

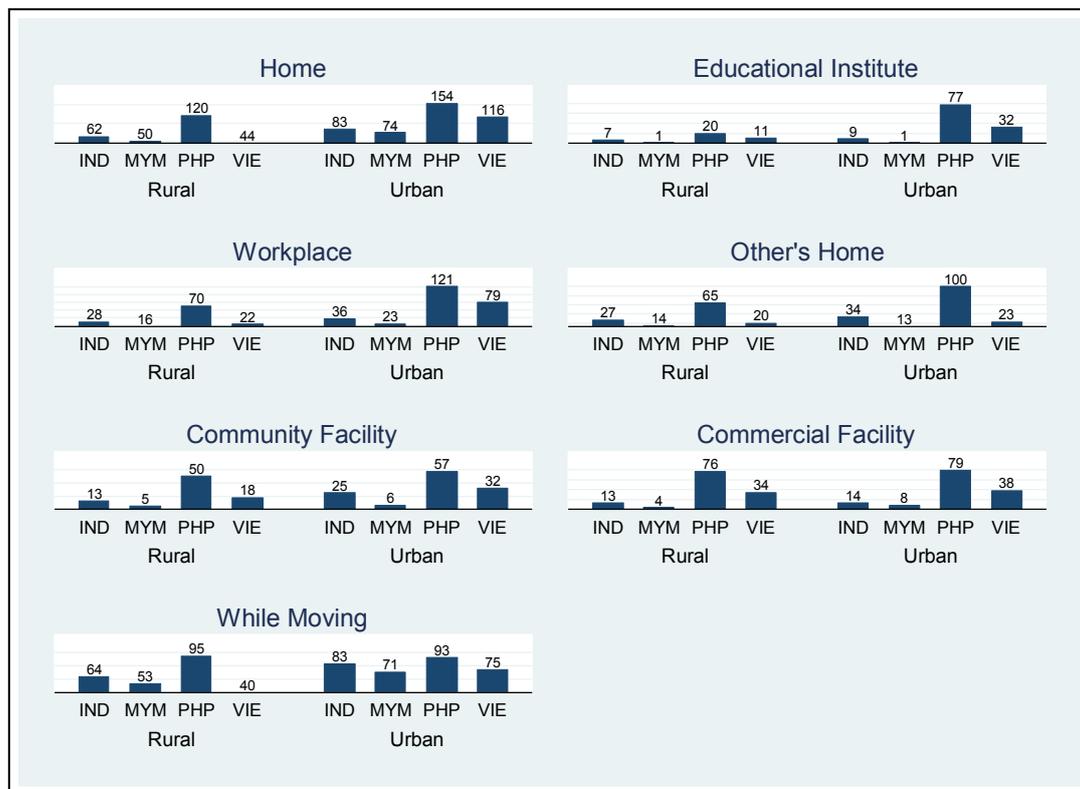
The same categorization can be followed for the use of the Internet [see Figure 2.1 (b)] as in the case of computer usage, i.e. Indonesia and Myanmar form part of the “low usage of the Internet,” Philippines depicts the case of “high usage of the Internet” and Vietnam forms part of the category “urban – rural disparity in internet usage.” This is further corroborated with the 2013 Internet users (per hundred) figures as shown in the first illustration (Figure 1).



**Figure 2.1(b) – General technology use: Internet**

One interesting observation is that the proportion of participants who have used the Internet over the past three months is higher than the proportion that has used a computer across the board. For example, in Myanmar where a negligible lot have used a computer, 29% and 37.5% of the rural and urban participants have used the Internet, respectively. This goes to hint at the presence of other modes, apart from computers, that make the Internet available for use. This elicits further investigation.

The matrix of responses [Figure 2.1(c)] below shows the frequency counts of the various locations from where the participants accessed the Internet over the past three months.

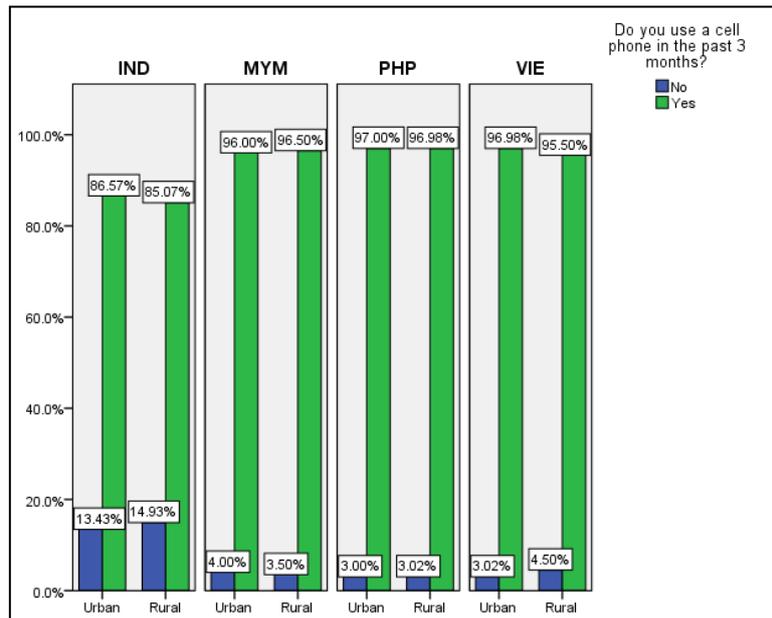


**Figure 2.1(c) – General technology use: Sample frequency counts on Internet access locations**

The Philippines “outshines” the pack by recording the highest numbers across access locations in both rural and urban areas. Myanmar, on the other end of the spectrum, draws a poor picture of levels of Internet usage, possibly because of low access/penetration; a lowly one participant each across rural and urban areas recorded having used the Internet in an educational institute. Speaking of use at educational institutes, this particular location suffers from the highest difference in usage in urban vis-a-vis rural areas. For example in the Philippines, even though there is a rural-urban disparity in numbers, for usage in educational institutes the rural number is over 70% less than the urban number. More evidence on the higher use of Internet in urban Indonesia and Myanmar [as was seen in Figure 2.1(b)] can be seen here as well.

Interestingly “Whilst Moving” records numbers in close proximity to that of the “Home” category. This hints at a high usage of portable Internet access and as seen from the preceding observations hinting on the use of means apart from personal computers, it makes sense to

study the use of cell phones in general and the use of Internet on cell phones in specific.



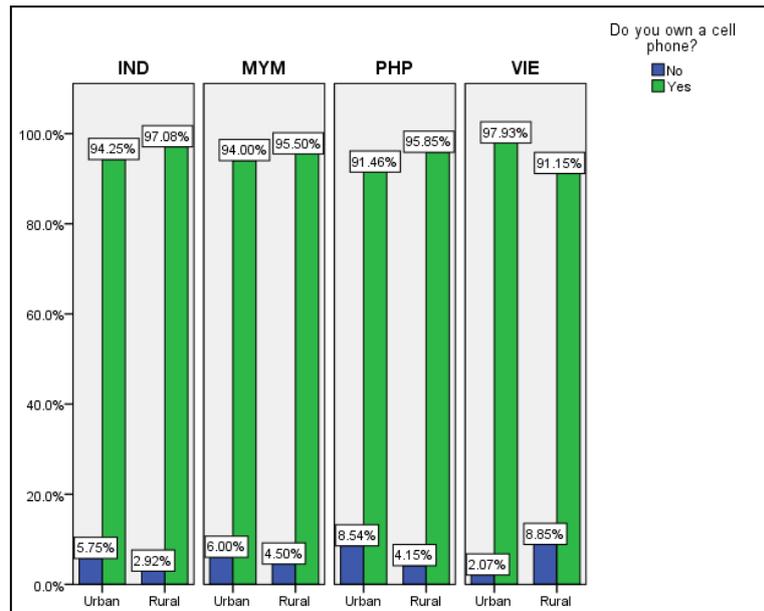
**Figure 2.1(d) – General technology use: Cell phone**

The cell phone subscription per 100 people in Indonesia, Philippines and Vietnam is over a 100 (2013 World Bank estimates). The high proportion of participants, as seen in Figure 2.1(d), responding positively to the use of cell phones is thus intuitive. Myanmar with a cell phone subscription rate of 13<sup>1</sup> per 100 people records over a 95% usage of cell phones. We first present the findings on the use of cell phones across the four countries.

## 2.2 Cell phone use

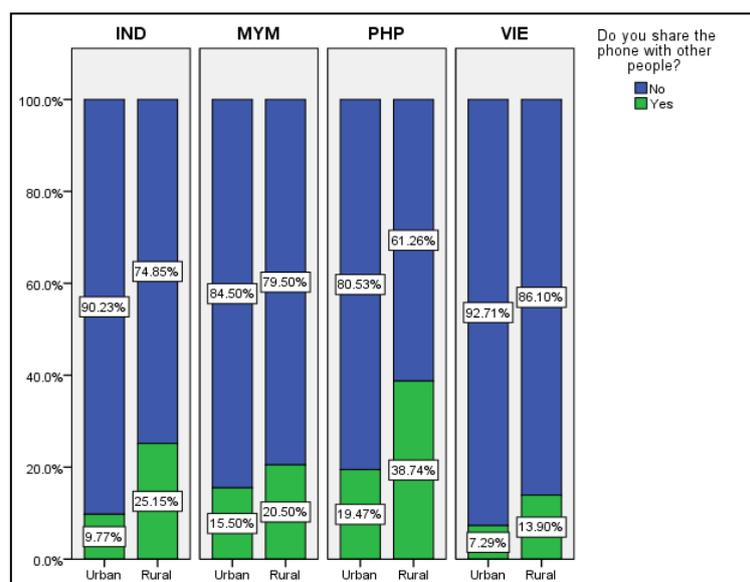
The high proportion of the participants using a cell phone is due to the high ownership of cell phones. As can be seen in Figure 2.2(a), at least nine out of every ten participants own a cell phone across the countries both in the rural and urban regions. However the Myanmar caveat given the low subscription base remains.

<sup>1</sup> Mobile Cellular Subscription (per 100 people), The World Bank.  
[www.data.worldbank.org/indicator/IT.CEL.SETS.P2](http://www.data.worldbank.org/indicator/IT.CEL.SETS.P2) (accessed March 19, 2015)



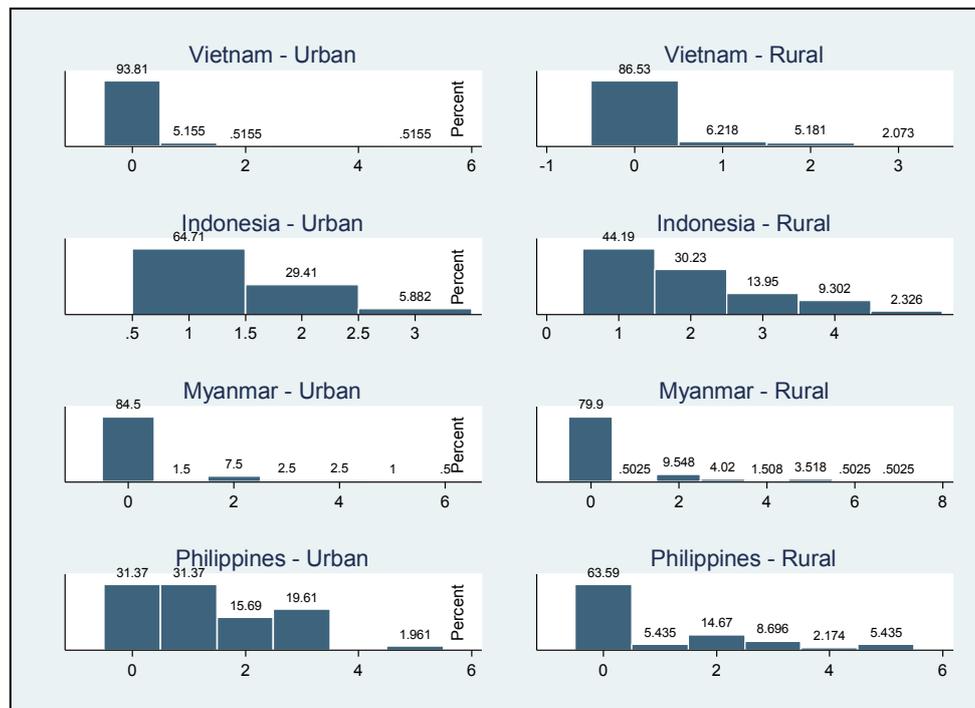
**Figure 2.2(a) – Cell phone ownership**

To understand the usage we first tried to study whether a cell phone was a shared resource. Whilst an overwhelming majority does not share a cell phone with other people [Figure 2.2(b)], possibly because of the fact that cell phone ownership is very close to the 100% mark, an interesting aspect however is the higher proportion of people sharing their phones in rural areas of Myanmar, Philippines, and Indonesia, suggesting some level of community-based usage of technological resources. This made us focus on the potential of disseminating risk-related information in the rural area from a community hub and then to the residents, which we will delve into in the later section.



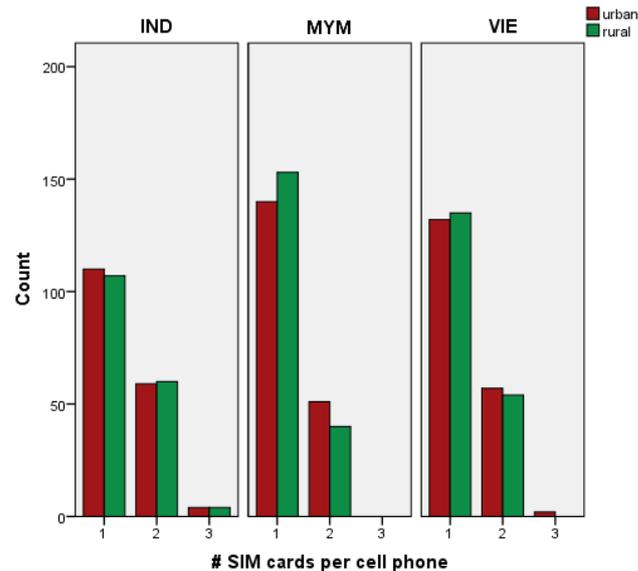
**Figure 2.2(b) – Cell phone use: Sharing**

Amongst the people using a cell phone as a shared resource it was observed across the countries that the cumulative percentage of people sharing their phones with more than 4 people is close to negligible [see Figure 2.2(c)]. Assuming an average household size of - 5 people it can be safe to assume that by and large the phone is being shared within the household.



**Figure 2.2(c) – Cell phone use: The number of people the phone is shared with**

In addition a clear majority of participants using cell phones use only a single SIM or connection on their cell phones [see Figure 2.2(d)]. The use of dual SIM functionality is also evident across demographics of the countries under study. The high proportion of single connection users suggest that the correction required in the cell phone subscription per 100 will not be very large in order to arrive at a unique user base. The encouraging thing to notice here is the significant base of cell phone users in the countries.

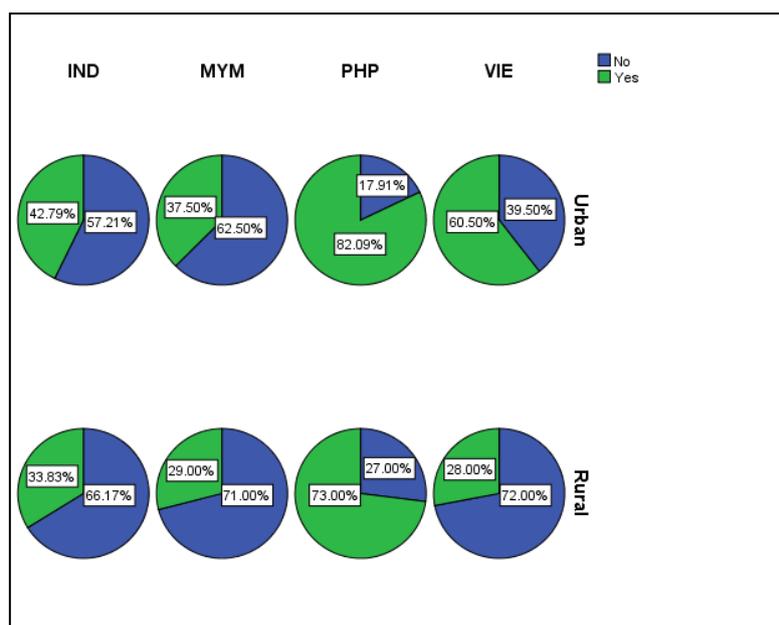


**Figure 2.2(d) – Cell phone use: Number of SIM cards per cell phone**

The next step was to study the extent of the use of smartphones. Smartphones in the hands of the vulnerable population is the necessary technological base required for most disaster management tools under consideration today, be it applications (or apps) disseminating information on spreading awareness on the steps taken by the authorities towards disaster preparedness or as part of early warning systems, as accessing the Internet is now possible only via smartphones.

### 2.2.1 Use of smartphones

In the overall sample, only 52% of the participants report using a smartphone. The highest usage was reported from urban Philippines where over 82% of users use a smartphone [see Figure 2.2(e)]. We analyzed the participants who reported using the Internet whilst moving (Table 2.1 provides a summary of such users) to understand the extent of the use of apps.

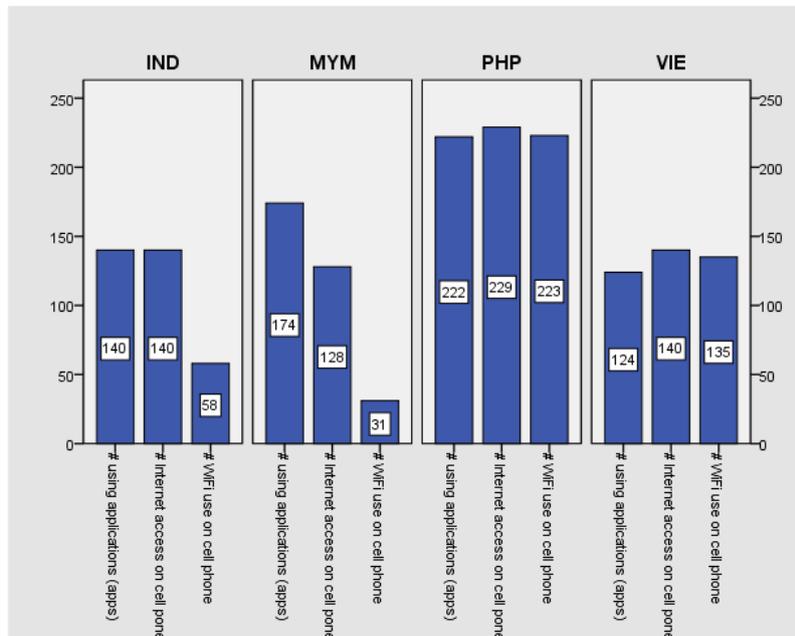


**Figure 2.2(e) – Cell phone use: Percentage of smart phone users**

<b>Region</b> (Participants per country)	<b>Indonesia</b>	<b>Myanmar</b>	<b>The Philippines</b>	<b>Vietnam</b>
Rural (200)	64 (32.0%)	53 (26.5 %)	95 (47.5%)	40 (20.0%)
Urban (200)	83 (41.5%)	71 (35.5%)	117 (58.5%)	75 (37.5%)

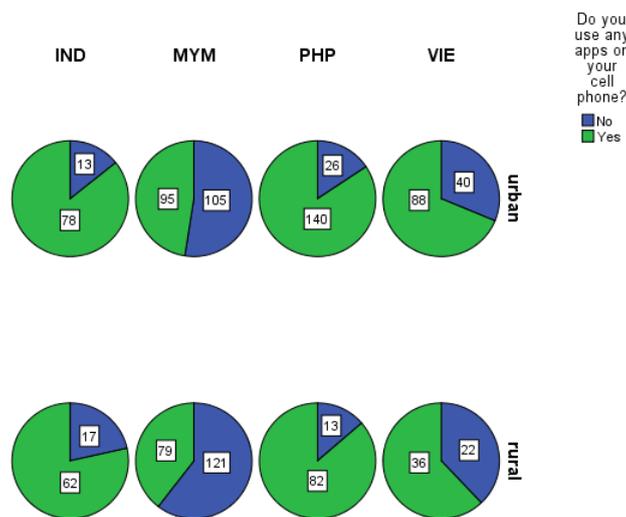
**Table 2.1 – Internet use: Percentage of “whilst moving” users**

Figure 2.2(f) summarizes the number of participants in the sample who use apps, Internet and WiFi on cell phones in each of the countries. Only Philippines records a more than 50% usage of all three cell phone functionalities. In Indonesia and Myanmar the use of WiFi is rather low with less than 15% and 8% of the participants in the countries respectively. In all other cases, at least 30% of the users are making use of the three functionalities. This can be attributed to the fact that these can be used only if the user owns a smartphone, and as seen in the preceding question the smartphone penetration is still evolving in these economies.



**Figure 2.2(f) – Cell phone use: Apps, Internet and WiFi**

The trends of usage of the Internet and WiFi are predominantly similar to the use of apps [Figure 2.2(g)]. The higher adoption of these three functions in urban areas is observed across four countries.



**Figure 2.2(g) – Cell phone use: Apps**

More often than not the effective use of apps depends on the Internet quality (mainly bandwidth affecting speed) and if the technological base of telecommunications providers limits them to provide Internet over 2G/EDGE technology, the efficacy of the apps will come under question. Myanmar too draws a very grim picture of the state of wireless infrastructure

in the country. Given the low percentage of smartphones we then focused our attention towards the use of traditional cell phone functions.<sup>2</sup> In addition we also studied what additional functions as provided by a smartphone were being used by the participants.

### **2.2.2 Use of traditional cell phone functions**

Although the use of traditional functions varies across countries, the intra-country rural-urban trends almost mirror each other in majority of the cases. Mention of some of the major observations pertaining to traditional uses of functions is deemed relevant, for example, more than 70% of users making calls at least once a day. This figure goes up to 80% if the case of rural Philippines is ignored.

When it comes to sending or receiving text messages, Myanmar is the odd man out with only about 28% sending/receiving at least one text message in a day, with close to 50% never sending/receiving a text message (this may be owed to the high prices of texting in the country). In other countries, barring rural Vietnam, at least 78% send at least one text message each day. The rural-urban technology divide is highlighted yet again in the case of Vietnam.

In Indonesia almost 40% of the participants do not use the feature of listening to radio or music on cell phones; this use in Vietnam is even lower. The Philippines leads the pack with this feature being used at least once a day by close to 50% of the participants.

Using cell phones for multimedia<sup>3</sup> transmission is not widespread. This particular feature requires a higher bandwidth that usually comes at a high expense, especially in developing economies. Vietnam is at the bottom of the table with 85% of the participants having used this feature at most once a week with more than 80% of this proportion never having used this feature. In Indonesia and Philippines this feature is used at least once a day by at least 37% of the participants.

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<sup>2</sup> Traditional cell phone functions – making/receiving calls, SMS text messages, listening to radio/music, taking/sending pictures and videos, using the alarm clock.

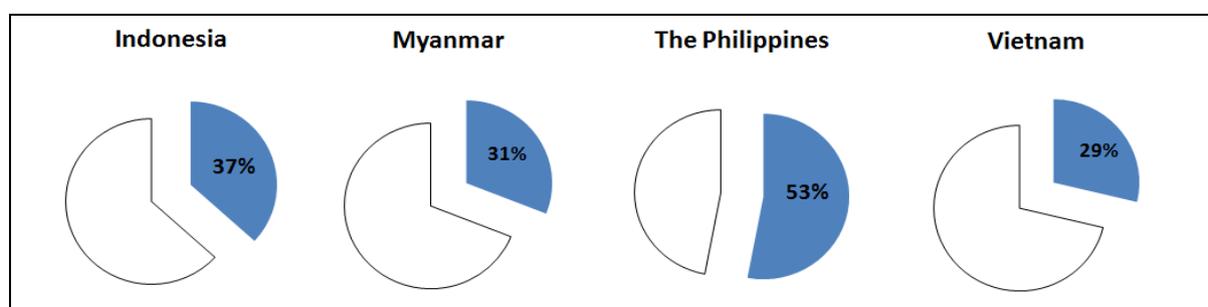
Smartphone functions – email, mobile messaging, obtaining information of goods and services, reading/downloading online newspapers/magazines, obtaining information on local traffic/public transportation, whether reports, using location maps, accessing social networking websites, mobile banking, listening to web radio, downloading multimedia, making goods and services transactions, downloading games and music.

<sup>3</sup> Downloading videos, movies, games, music.

Last we asked the participants about a basic feature, using an alarm clock on their cell phones. It is surprising to see that this feature is hardly in use in Myanmar, with over 75% of non-users. In other countries over 50% of the participants make use of this feature. The rural user lags behind across the board; this could be attributed to the fact that the rural user is not well versed with the basic functions provided by a cell phone.

### 2.2.3 Use of “smart” functions

Only the sub-sample of respondents who reported the use of the Internet whilst moving [Figure 2.2(h)] was used to elicit response over the use of these functions. Here again the use varied across countries [Table 2.2] but the intra-country rural-urban trends almost mirror each other in majority of the cases.



**Figure 2.2(h) – Percentage of participants using the Internet whilst moving**

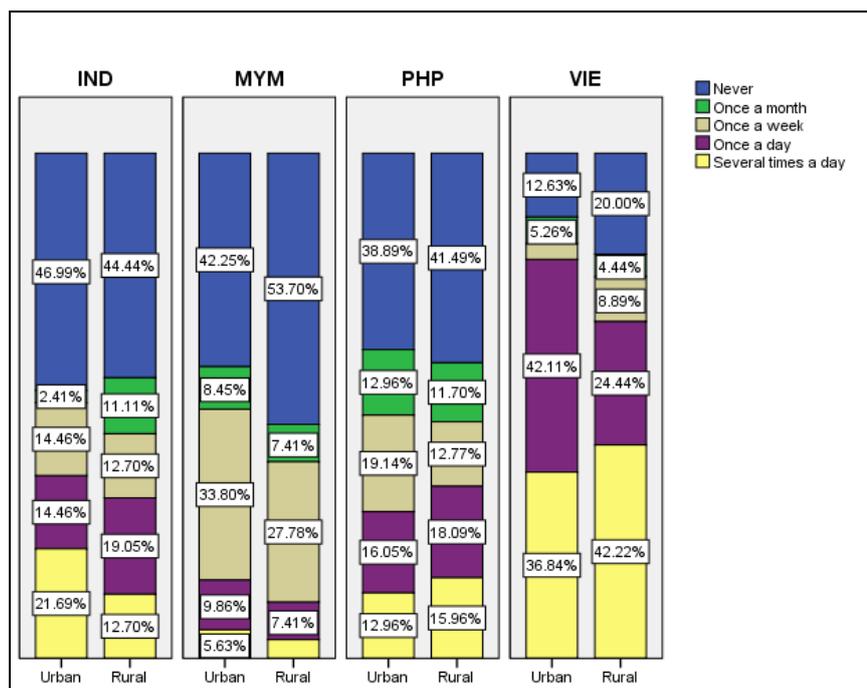
Smart Functions	IND	MYM	PHP	VIE
Send or read email on your cell phone	23.13%	26.61%	55.19%	59.13%
Mobile messaging	45.58%	63.71%	94.81%	99.13%
Get information about goods or services on your phone	28.57%	5.65%	58.96%	34.78%
Read or download online newspapers or magazines, electronic books	34.01%	13.71%	37.26%	91.30%
Go online for no particular reason, just for fun or to pass the time	63.27%	50.00%	75.47%	84.35%
Get information about local traffic or public transportation	19.73%	0.81%	31.60%	12.17%
Get local weather reports	22.45%	4.84%	43.40%	38.26%
Use location maps	19.73%	0.81%	25.94%	17.39%
Access social networking websites	76.19%	44.35%	87.74%	89.57%
Mobile banking	12.93%	0.00%	13.21%	3.48%
Listen to web radio	5.44%	0.81%	18.87%	22.61%
Watch/download videos, television programs, or movies	27.89%	1.61%	40.57%	64.35%
Purchase or order goods or services	8.16%	0.81%	10.85%	7.83%
Sell goods or services	6.80%	0.00%	7.55%	3.48%
Play or download games	27.89%	0.00%	41.51%	43.48%
Play or download music	40.82%	2.42%	45.75%	51.30%

**Table 2.2 – Percentage using smart functions at least once a day via the Internet whilst moving**

Fifty-nine percent of Vietnamese mobile Internet users use a cell phone to send/read at least one mail a day. This number is close to 60% in urban areas. Philippines lags a bit with 55% sending/reading at least one mail a day. At the other end of the spectrum Indonesia and Myanmar record over 75% of non-users. The Myanmar case is of particular concern as it was seen earlier that the number of Internet users is low, and the high proportion of non-users within this is a point of concern.

The trend of mobile messaging poses a more encouraging picture for Myanmar, when compared with SMS text messaging. Where the proportion of users of at least once a day was 28% for SMS text messaging, it is more than 60% in the case of mobile messaging in Myanmar. Pricing for SMS was taken as the main point of concern; this is subverted here as messaging using the Internet does not come with any added cost (generally). In Indonesia the use is relatively low that can be attributed to weak infrastructure of the wireless technology in the country, which was a reason arrived at for the rather low use of WiFi amongst the participants. Vietnam leads the pack with more than 80% of urban Internet users using mobile messaging at least once a day. Intuitively, the extent of mobile messaging is highly positively correlated with the level of Internet access.

In the space of using a cell phone for reading or downloading newspapers/magazines/e-books, Vietnam is far ahead when compared to other countries [Figure 2.2(i)]. Vietnam registers 37% of urban and 42% of rural users of this feature several times a day, the next best is urban Indonesia at 22% of users.



**Figure 2.2(i) – Cell phone use: Smart functions (reading/downloading newspapers/magazines/ebooks)**

The extent of watching/downloading videos depends on the availability of high speed Internet being provided by telecommunications companies either over the network or through broadband technology. Over 40% of the users in Vietnam watch/download multimedia at least once a day, hinting at a certain level of technology in place to provide high speed Internet. Urban Indonesia (34%) lags behind urban Philippines by almost 35%. The cases of playing/downloading games and music are similar to that of videos.

When it comes to seeking information on goods or services on cell phones, only the Philippines makes a case of this feature being used extensively with over 50% of Internet users using this feature in rural areas. Myanmar has a long way to go to make any sort of headway in this space. Here it makes sense to mention the level of purchase and sale of goods and services being made via cell phones. The numbers are far less than the proportions seen in the information seeking on goods or services. Even though 50% of the users in the Philippines seek information less than 10% actually make transactions over the Internet via cell phone. This just hints at the lack of a virtual market place as is seen in most developed and semi-developed countries.

The next function we studied was seeking of information about local traffic or public transportations by the participants. It is only in Indonesia and the Philippines that this particular function is being used with some sort of headway. The best case is of urban Philippines where around 30% of Internet users are making use of the Internet on their cell phones to monitor local traffic and to seek information on public transportation at least once a day. The usage patterns for obtaining local weather reports are a little better for Myanmar, the Philippines and Vietnam when compared to the case of seeking traffic/public transport information. This may suggest a lack of available information on the latter (in terms of the areas covered), weather reporting might be a little leading to a higher usage. The trend for use of location maps is also similar to the case of seeking traffic/public transport information. This can be owed to the fact that both the functions are mostly integrated in all the available apps constructed for such reporting. Local maps form the base over which seeking traffic/public transport information can be relayed.

The use of social networking platforms via cell phone is probably the primary motive behind the use of Internet on cell phones. Even Myanmar, which lags behind in all other indicators reports a 20% use of at least once a day in rural areas, urban Myanmar reports over a 50% usage. The corresponding figures for all other countries average just shy of the 80% mark.

A couple of other features were tested, the first being mobile banking. This particular feature is more prevalent in developed, semi-developed economies. The figures above are commensurate with any developing economy; across cases more than 60% of the participants have never used this feature. Even the numbers associated with it being used once a day are negligible. The other was web radio that most often comes with added expenditure; this in conjunction with the local content generated in developing economies being close to zero does not make listening to web radio an attractive proposition. Vietnam heads the pack with 15% to 20% of the Internet users making use of the cell phone for this particular feature. The Philippines comes in at a close second.

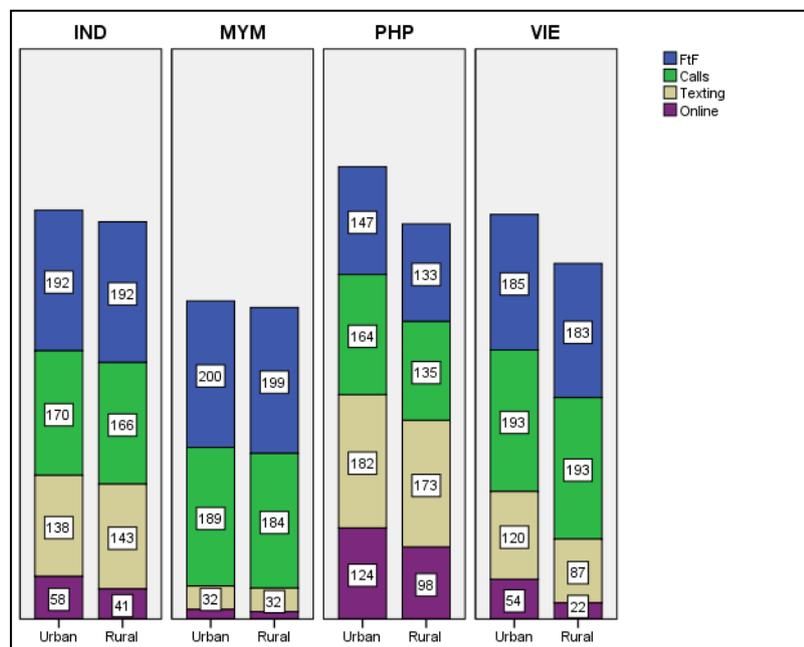
### **2.3 Social networks, social support and local attachment**

This sub-section presents the findings on the spread of support systems, both practical and emotional, across the four countries. The efficacy of support systems depends primarily on the communication between the different aspects of the system. We first focus on how the

communication (primarily by using cell phones and the Internet) with close relatives and close friends has been taking place followed by the availability of different kinds of support and also the support in terms of available information relevant to impending disasters to test the effectiveness of disaster management systems in general and the preparedness aspect in specific.

### 2.3.1 How people communicate?

Our survey elicited responses on the use of FtF, calling, texting, and online media to communicate with individuals' close relatives and close friends. Figure 2.3(a) provides the frequency counts of the use of each mode for communicating with close relatives.



**Figure 2.3(a) – Communication means with close relatives**

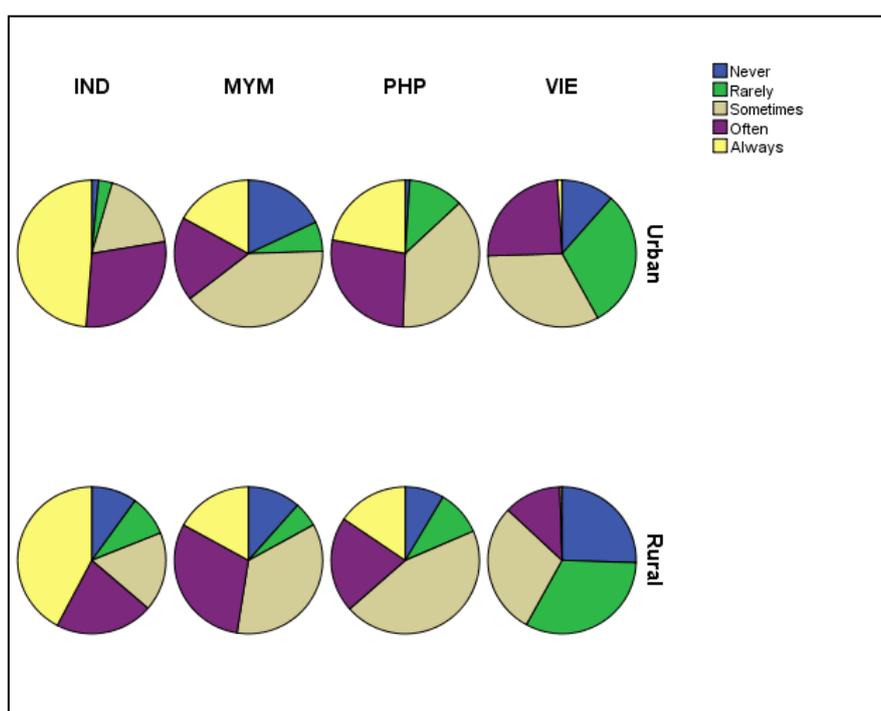
FtF usage for maintaining communication with close relatives in Indonesia, Myanmar, and Vietnam is extensive, with over 90% of participants in both rural and urban areas. In comparison the percentage of FtF users in rural Philippines is just 56.5%. Texting seems to be the most prevalent mean in Philippines with over 86% of the users making use of this mode. Making calls is a close second across countries, with the number not falling below the 80% mark. Texting in Myanmar (as seen before as well) is not popular at all. Along with the Philippines even in Indonesia texting is widely used with 70% users using texting to communicate with close relatives. Communicating online still lags but rural Philippines records a close 50% usage, urban areas fare even better with over 60% using online means

for communicating with relatives. In the online space rural Vietnam is worst off with a meagre 11% followed by rural Myanmar recording 16%.

Whilst communicating with close friends similar trends are seen as in the case of close relatives across countries and regions. The percentage of calling is however mitigated in the cases of Indonesia, the Philippines, and Vietnam.

### 2.3.2 Extent of the availability of practical and financial support

On being asked whether there exists external support in the way of someone demonstrating on how to carry out a task when the individual has no knowledge of the same [Figure 2.3(b)], the lack of support is very evident.

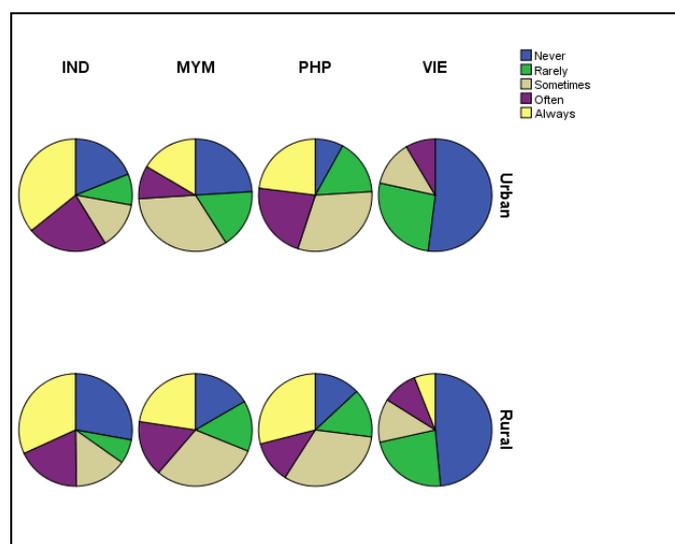


**Figure 2.3(b) – Availability of practical and financial support: Demonstrate**

Only in the case of Indonesia is there a close to 50% probability that someone may always show up for help. Having said that there is a significant proportion in urban Indonesia who feel no one will ever show up for help, the same perception is absent amongst the rural counterparts. The case of Vietnam is intriguing as it seems the support base is limited to just about 25% (“often”) in urban areas and drops down to half of that in rural areas. Myanmar and the Philippines show similar trends with a majority of participants stating that some sort of support base in terms of someone showing up exists.

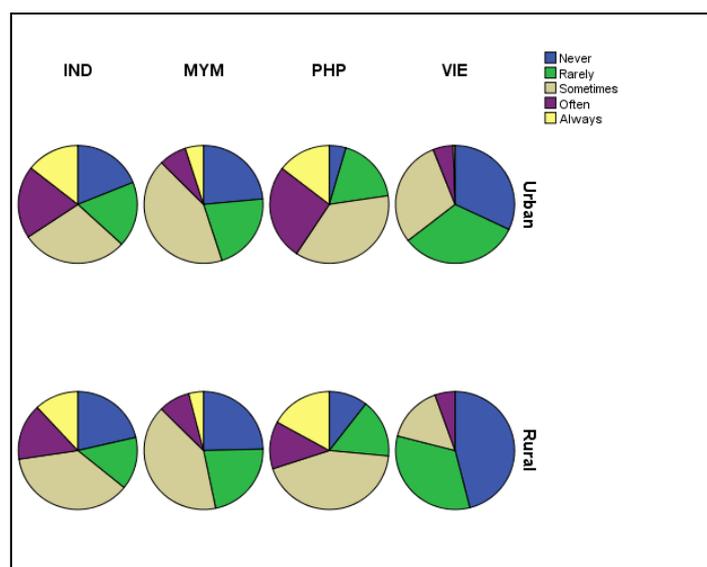
Queries were also made on whether there is someone available who arranges putting in place some level of support. The inter-country trends are similar to what was seen in Figure 3.3(a) but the levels of support in terms of someone talking and arranging for assistance drops significantly. For example in Indonesia the probability this sort of support will always be available falls by half.

The probabilities across counties pertaining to people offering shelter to people unknown are somewhat better, as can be seen in Figure 2.3(c).



**Figure 2.3(c) – Availability of practical and financial support: Offer shelter**

In the case of Vietnam the probability that no one will offer a place to stay to a displaced person is 50% and in addition only in 25% of the cases was it seen that some sort of support was available.

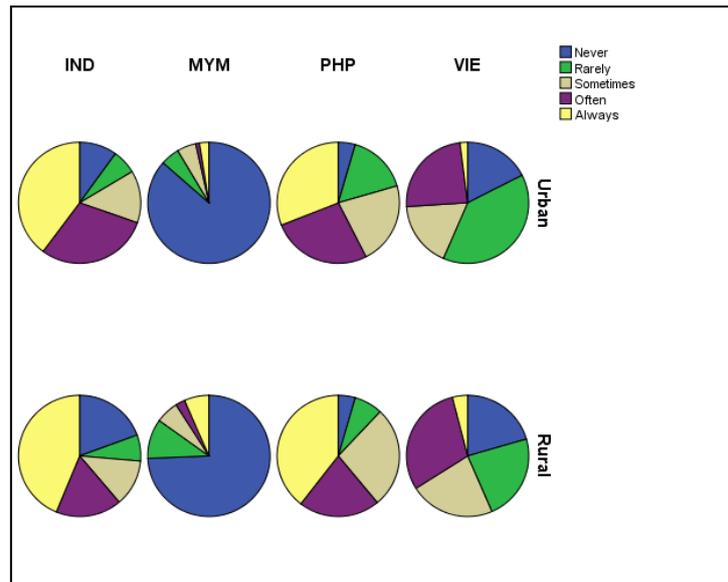


**Figure 2.3(d) – Availability of practical and financial support: Offer presents**

The probability of people offering things needed drops significantly [Figure 2.3(d)]. Though Indonesia still leads the pack, but the assurance on receiving this kind of support is further mitigated when compared with what is seen in Figure 2.3(b) and Figure 2.3(c). Vietnam is only slightly better off when compared to the case of offering shelter, with some sort of assurance in roughly 33% of the cases.

The countries are better off in receiving support by someone helping in necessary purchases when compared to the probability of receiving presents of things needed, and there is more of parity between Indonesia, Myanmar and Philippines. Even Vietnam registers better figures, albeit marginally when compared with other types of support. The availability of loans for unlimited periods is close to non-existent in Vietnam. Myanmar (approximately 67%) scores over the Philippines and Indonesia (approximately 50%) in terms availability of some sort of (“always”, “often”, “sometimes” combined) loan for indefinite periods.

Shifting to the case of practical and financial support available in the case of impending natural disasters, Myanmar proves to be the odd ball with close to no provision of someone helping out prepare for an impending natural disaster. The figures for rural Vietnam, Indonesia and the Philippines are encouraging with a well over 50% probability of achieving this kind of support [Figure 2.3(e)].

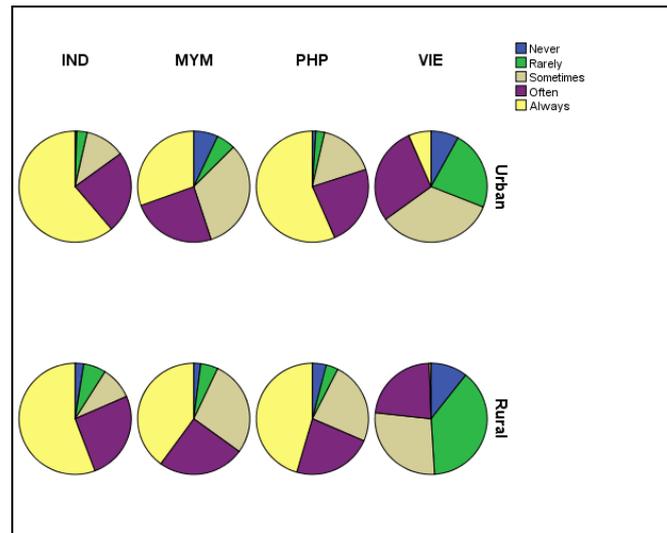


**Figure 2.3(e) – Availability of practical and financial support: Prepare for natural disasters**

Same responses are recorded when asked whether someone is available for guidance to reach an evacuation site, to offer place in case of displacement, or to help a person get back on his/her feet.

### **2.3.3 Extent of the availability of emotional and information support**

When it comes to counting on someone to hear a person out in the time of need, the level of support [Figure 2.3(f)] is similar to what was seen with the availability of the practical and financial types of support, large proportions of Indonesians feel that they can always count on someone to listen when they feel the need to talk. The situation in the Philippines too is on similar lines. Even in this case Vietnam records poor numbers in support of this particular support base.



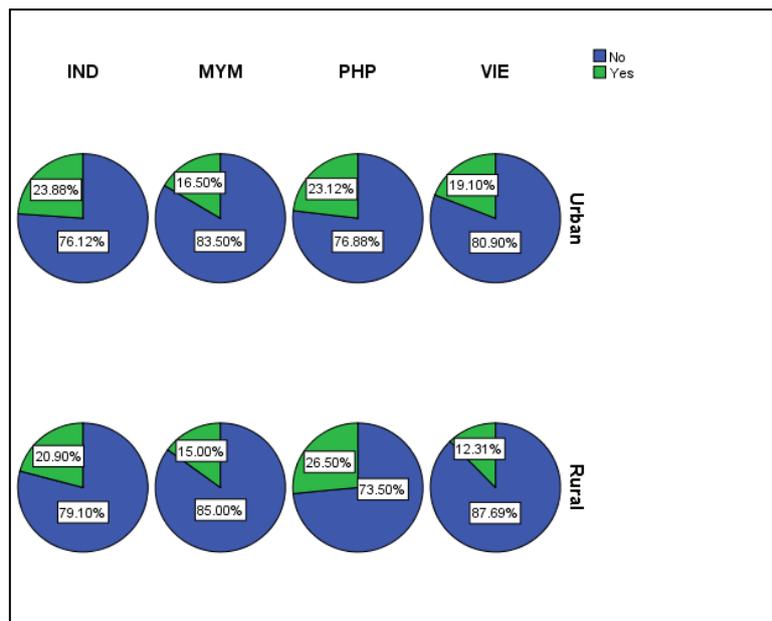
**Figure 2.3(f) – Availability of emotional and information support: Count on someone**

The probabilities are similar when someone needs someone to confide in, to share private worries, to speak to help understand personal problems, to seek advice and to seek information.

When it comes to support in the case of impending natural disasters, the results are same for emotional and information support as was seen in the responses to similar questions on technical and financial support. Myanmar presented a case where there is no formal or informal information dissemination system in place thus making it highly vulnerable to hazards. It also hints at the lack of community support in Myanmar, which could be attributed to lack of availability of local technical expertise. Which lead us to study the extent of participation in various types of local groups.

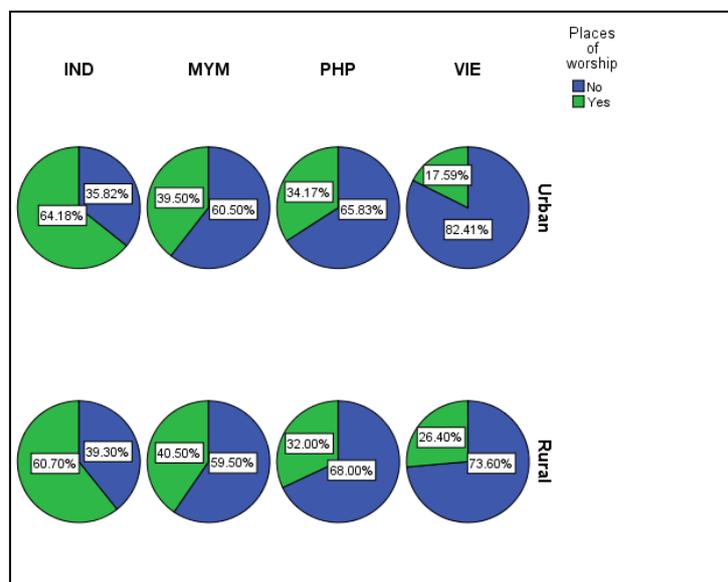
#### **2.3.4 Participation in local groups**

Majority people are not part of community voluntary groups [Figure 2.3(g)]. The case of Philippines is relatively the best with 26.5% and 23.12% of the participants participating in part of some sort of community groups in rural and urban areas respectively. It is only Philippines that the proportion of people participating in community groups is higher in rural areas than in urban areas.



**Figure 2.3(g) – Participation in local groups: Voluntary groups**

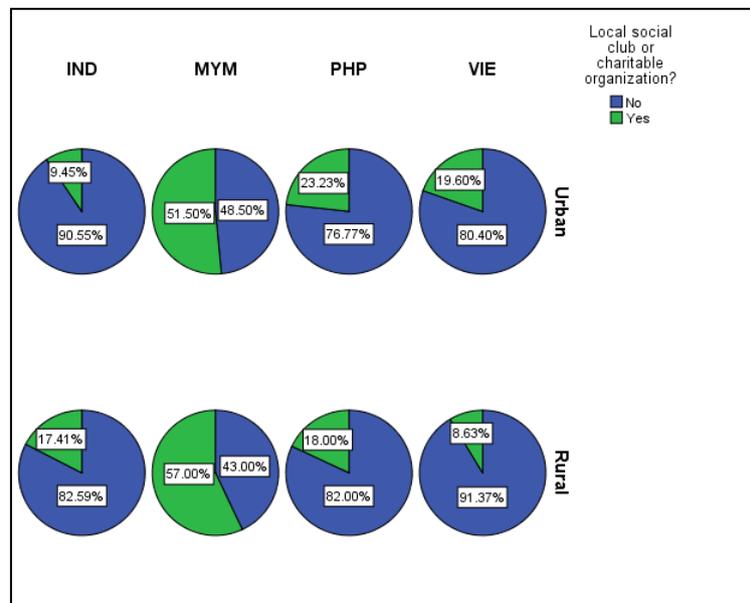
Participation is similar when it comes to professional associations, association of elders (veterans, retirees, famres and women), local sports leagues, and local youth groups such as scouts. Things change when it comes to participation in places of worship, such as a church, synagouge or mosque [Figure 2.3(h)].



**Figure 2.3(h) – Participation in local groups: Places of worship**

The distribution of participation at places of worship is completely different from all the other local groups under consideration. In Indonesia over 60% regularly attend, contribute money

and time to places of worship. In all other cases this number does not cross 40%. In Vietnam the behavior towards places of worship is not drastically different if compared with participation in local youth groups, in fact in urban Vietnam only about 18% are active members of places of worship, whereas 28% are active member of local youth groups.



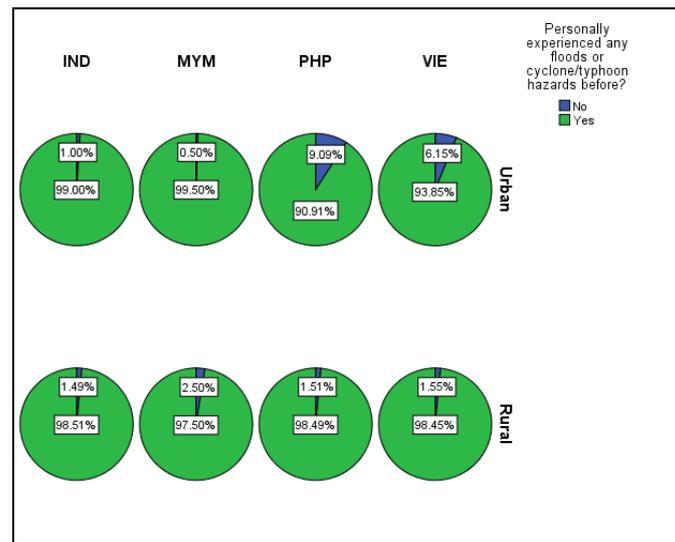
**Figure 2.3(i) – Participation in local groups: Charitable organizations**

Myanmar depicts a complete reversal of trends when it comes to participating in charitable organizations [Figure 2.3(i)], over 50% of participants in rural and urban areas participate in such organizations. No other local groups attract such a level of attention in Myanmar. In the other countries the average participation is generally low with participation in urban Philippines coming in at a distant second with 24% participation.

Vietnam has consistently reported a relatively good level of participation across local groups, But the lack in a social support base, as was seen in the previous section, brings under question the efficacy of this participation. Even with the lower level of participation, Indonesia, Myanmar and the Philippines easily outscore Vietnam on almost all aspects of social and technical support to the community.

## 2.4 Risk experience and risk info seeking

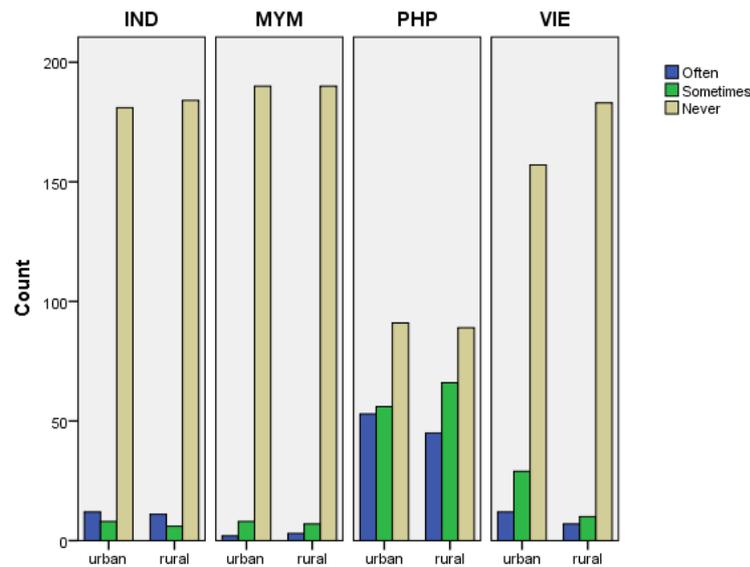
More than three fourths of the participants in the community said that they were aware of risks associated with weather. Vietnam registers the highest proportion of awareness with almost 100% of the urban participants affirming of associating risks with weather. Only 77.5% of the urban participants in Myanmar report being aware of weather related risks. On the whole more than 80% of the sample recognizes risks related to weather. This can be attributed to the fact that an overwhelming majority, as can be seen in Figure 2.4 have personally experienced floods/cyclones/typhoons in their lifetime.



**Figure 2.4 – Personally experienced floods/cyclone/typhoon**

### 2.4.1 Seeking/collecting information

Awareness of risks can be owed to a number of channels through which disaster related information may flow. The participants were asked to comment on the periodicity of the use of various channels, such as cell phone, print media, radio, television, word of mouth, in gaining information that helped them prepare for impending floods/cyclones. We first present the findings on the different ways in which a cell phone may have been used for collecting the relevant information. First, there seems to be no dissemination of information about impending disasters via cell phone applications with over 90% of the participants in Indonesia, Myanmar and Vietnam saying that they never receive such information via apps [Figure 2.4(a)].



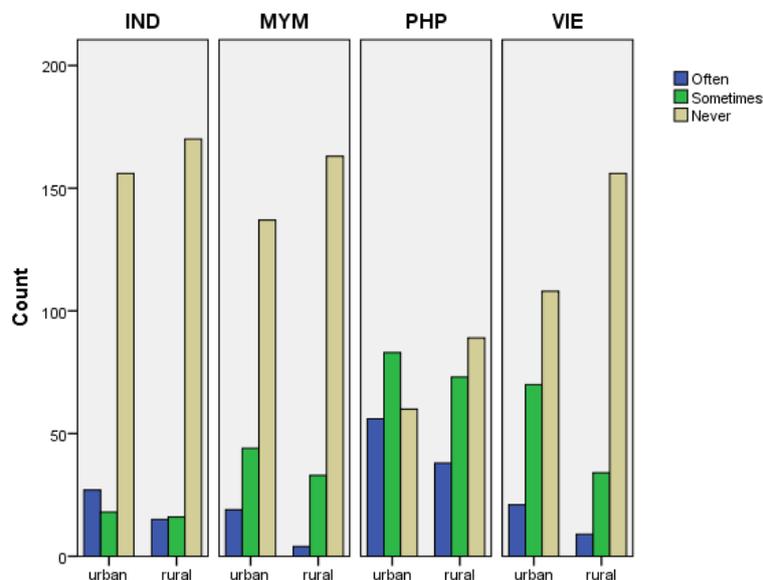
**Figure 2.4(a) – Collecting information on impending floods/cyclones: Cell phone app**

Going back to Figure 2.2(g), the proportion of using apps on cell phones among the survey participants is more than 35%, 31%, and 44% for Indonesia, Vietnam and Myanmar respectively. This just goes to show that there is no attention towards building of apps that would disseminate disaster related information. In the Philippines more than 50% of the participants say that they received disaster related information at least at some part of time, where over 56% of the participants reported using apps on cell phones.

The case is similar in the use of email alerts of cell phone. As was seen in section on the use of “smart” function on cell phones, 59% of Vietnamese mobile Internet users make use of email at least once per day; here well over 90% of the participants say that they have never received any mail related to giving out information of disaster related hazards. The Philippines that recorded the maximum number of participants using email on cell phone at some point in time seems to doing justice with close to 40% of the participant saying that they have received emails related to disasters. This service seems to be virtually non-existent in Indonesia and Myanmar. The two cases also show that participants are not forthcoming in making use of the Internet on their cell phones for disaster related information. This is corroborated by the fact that hardly anyone carries out a related information search on their own. This behaviour is seen across regions barring the Philippines where 64.5% urban and 69.5% of rural participants make at least some effort to seek information by using the Internet on cell phones.

In the case of text alerts, more the 50% of the participants from rural Philippines say that they often receive text alerts on their cell phones on impending disasters. Only 20% say that they never receive such information via texts. In urban areas however around less than 40% say that they often receive relevant text alerts and 25% say that they never receive such alerts. In Indonesia 63% rural and 75% urban report no receipt of texts; the corresponding numbers for Vietnam are 45% and 60%, which implies that Vietnam may have better processes in place for carrying out this activity. This is again non-existent in Myanmar.

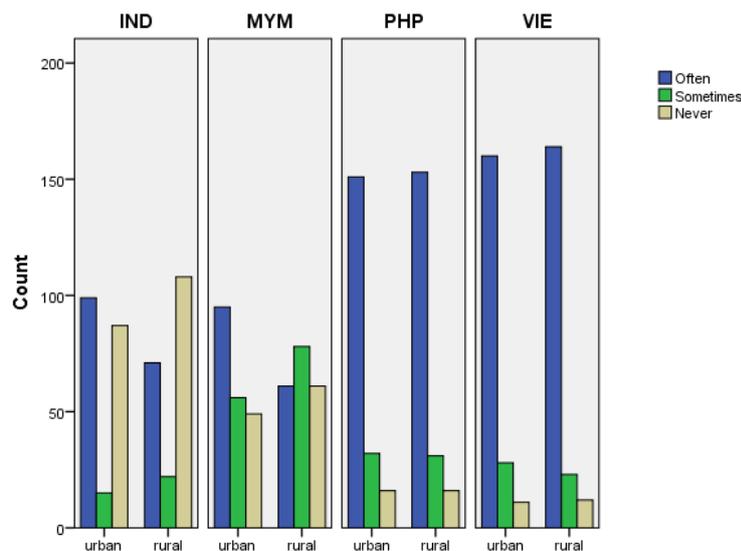
Shifting the focus from cell phones, even the numbers for gaining information via print media are discouraging [Figure 2.4(b)].



**Figure 2.4(b) – Collecting information on impending floods/cyclones: Local print newspaper**

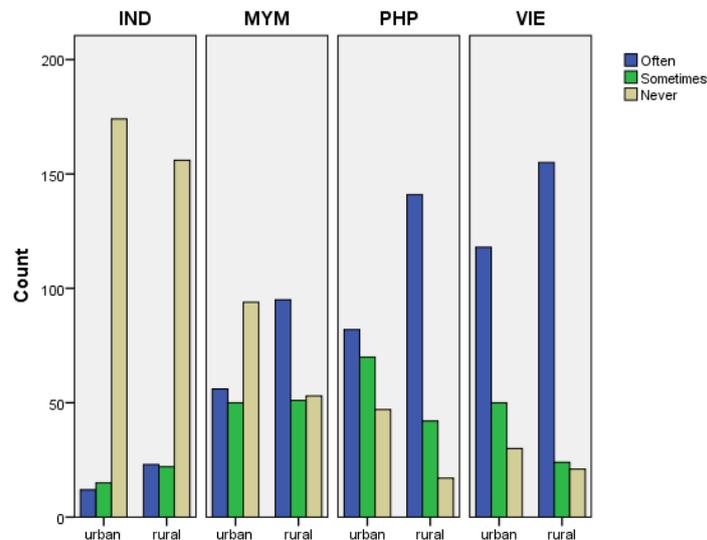
The reasons could be multi-fold, the first being that people do not read newspapers but this seems counterintuitive given the high literacy rates in all the countries. Second newspapers are apathetic towards printing information on impending disasters. Third the circulation of newspapers is not sufficient. Other reasons could include lack of effective communication etc. The Philippines again leads the pack with only 60% urban and 55% rural reporting using the print version of newspapers for information related to natural disasters at some point of time. Forty-six percent of participants in urban Vietnam reports using print media for seeking such information, whereas only a little over 20% report the same in rural areas. This proportion falls well below the 30% mark for all regions across Indonesia and Myanmar.

The situation is very different in the use of local television news broadcast [Figure 2.4(c)]. Over 90% of the participants in the Philippines and Vietnam source information related to impending disasters from the local television news broadcast, being an effective substitute this partly explains why print media is not used widely. The behavior is similar in both rural and urban areas in these countries. In Indonesia this proportion drops to less than 60%, even in Myanmar (lagging far behind in other means) over 72% of the participants report using this particular source.



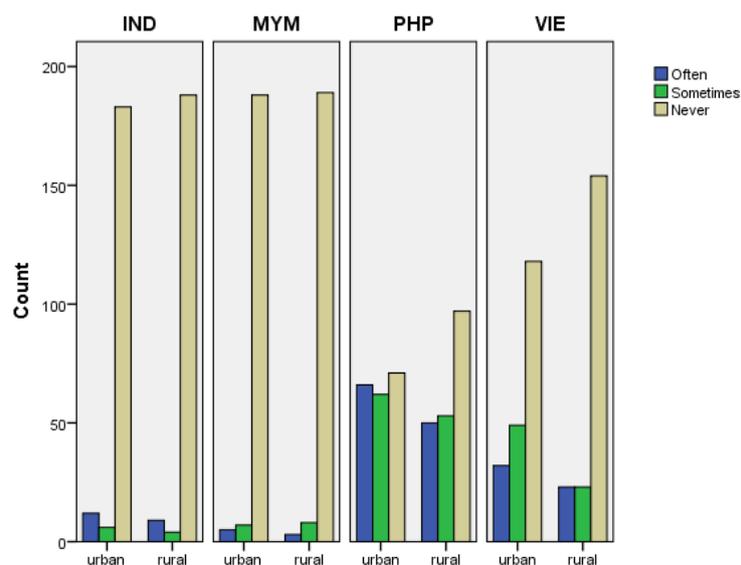
**Figure 2.4(c) – Collecting information on impending floods/cyclones: Local television news broadcast**

Contrasting this to the use of local radio broadcast, a reverse trend is seen in Indonesia where more than 80% does not use this channel for disaster warning information [Figure 2.4(d)]. The wide use in other countries is quite apparent. Elaborating further, often use (1 “often” plus 2 “sometimes”) of local radio broadcast in rural areas of Vietnam (89%) is more than in corresponding urban areas (84%). The same can be seen in the case of Myanmar but here there is a lower proportion accessing the local radio broadcast for sourcing disaster-related information.



**Figure 2.4(d) – Collecting information on impending floods/cyclones: Local radio broadcast**

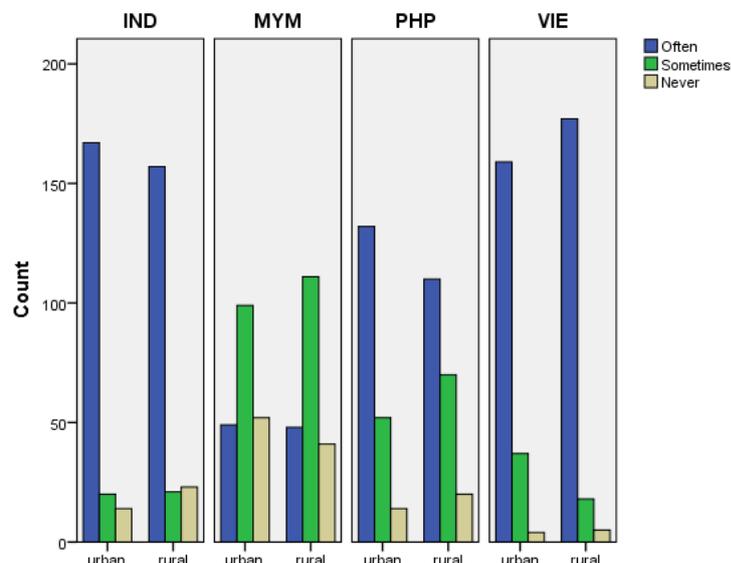
The story is similar across the use of online resources, be it websites of local newspapers, television/radio news stations, local governments/communities, or social networking websites or any other resource such as blogs, e-newsletters. Figure 2.4(e) graphs the responses for the use of websites of local newspapers. It is close to non-existent in Indonesia and Myanmar, whereas close to 60% of participants in the Philippines reporting usage at some point in time. The rural-urban distribution in the Philippines stands at 51% and 65% respectively. Vietnam also reports a small proportion of participant using the website of local newspaper.



**Figure 2.4(e) – Collecting information on impending floods/cyclones: Website of local newspaper**

The informal practice of word of mouth of close relatives [Figure 2.4(e)] seems to be the most effectively used media for sourcing and dissemination information on impending natural disasters such as floods and cyclones. Eighty percent of Vietnamese and 84% of Indonesian participants say they often use word of mouth to receive warnings from their close relatives. This number falls to 60% in the case of Philippines and further to 24% for Myanmar. In the case of Myanmar a majority (52%) say that they use this media sometimes. Also In the case of close friends the figures are in close proximity as stated in the case of close relatives.

One very peculiar observation was made on the use of calling the local government for seeking information. This surprisingly seems to be a non-practice, with 97%, 90% and 92% of participants in Indonesia, Myanmar and Vietnam reporting never calling the local government office to seek information on impending disasters. This throws light on the incapacity /apathy of the government towards one of the most important aspect of disaster management. In the Philippines too only 28% of urban and 32% of rural participants reported calling the local government office at some point in time.



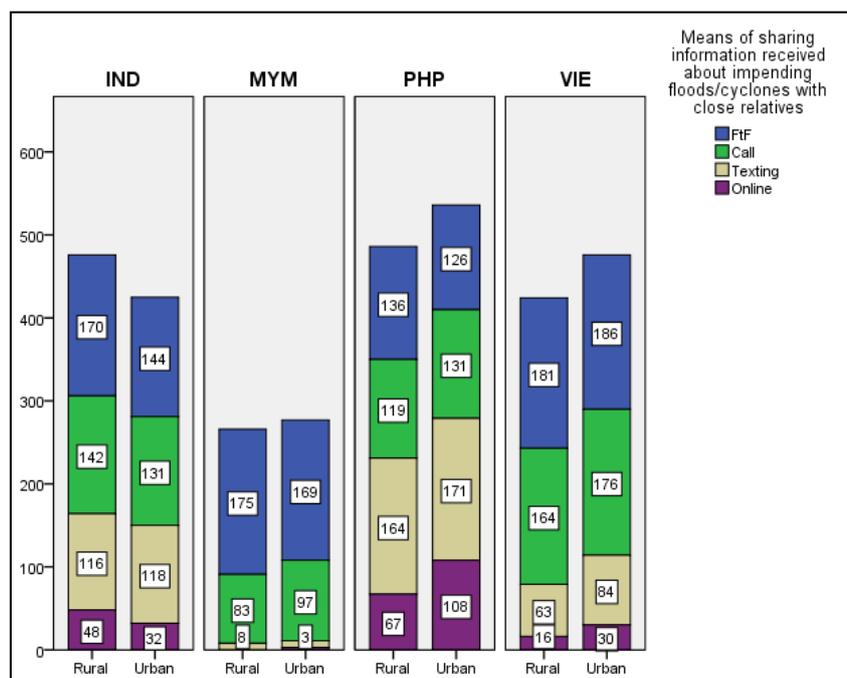
**Figure 2.4(f) – Collecting information on impending floods/cyclones: Word of mouth, relatives**

#### 2.4.2 Communicating disaster information to relatives/friends

On being asked whether information regarding impending floods and cyclones is shared with close relatives well over 90% of the participants across regions in Indonesia, Vietnam and Philippines responded in the affirmative. Myanmar lagged just a little with 88.5% of the rural and 87% of the urban participants saying that they do share information on impending natural

disasters. With regards to sharing such information with close friends an overwhelming 97% answered yes in Philippines. Indonesia too averaged out at the 90% mark with Myanmar recording an average figure of 86%. The peculiar case was that of Vietnam where 92% urban participants informed their friends about impending disasters, but only 81% did so in rural areas.

Figure 2.4(g) shows how information on the specific case of disaster related information is communicated with close relatives through the means of FtF, calling, SMS texting, and online communication. FtF usage in Vietnam is extensive, with over 90% users in both rural and urban areas. The corresponding number for Indonesia and Myanmar are a little lower, 85% rural, 72% urban and 87% rural, 84% urban, respectively. In comparison the percentage of FtF users in rural Philippines is just 65.5%. Texting seems to be the more prevalent mean in Philippines with over 82% of the users making use of this mode.



**Figure 2.4(g) – Means of communicating information on impending floods/cyclones to close relatives**

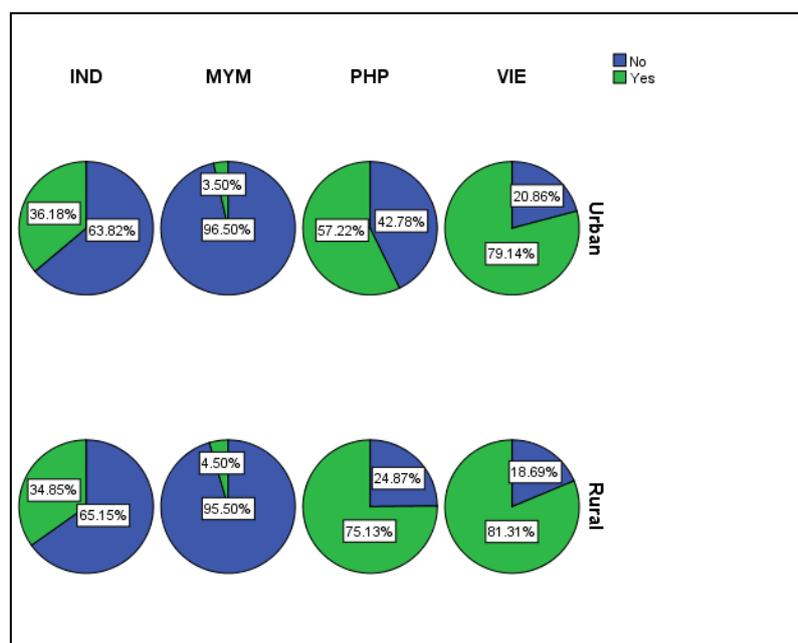
Making calls comes in second for Indonesia (71% in rural, 65% in urban) and Vietnam (82% rural, 88% urban). Texting in Myanmar (as seen before as well) is not popular at all. Along with the Philippines even in Indonesia texting is widely used with over 58% users using texting to communicate with close relatives regarding disaster information. Online communication still lags, but urban Philippines recording over a 50% usage. In the online

space rural Myanmar is worst off with a meagre no one reporting usage followed by rural Myanmar recording 8%. The communication to close friends roughly follows the same pattern.

## 2.5 Past preparedness measures

This sub-section presents the findings on the existence of various preparedness measures and the extent to which they are used by the participants having experience a natural disaster in their lifetime.

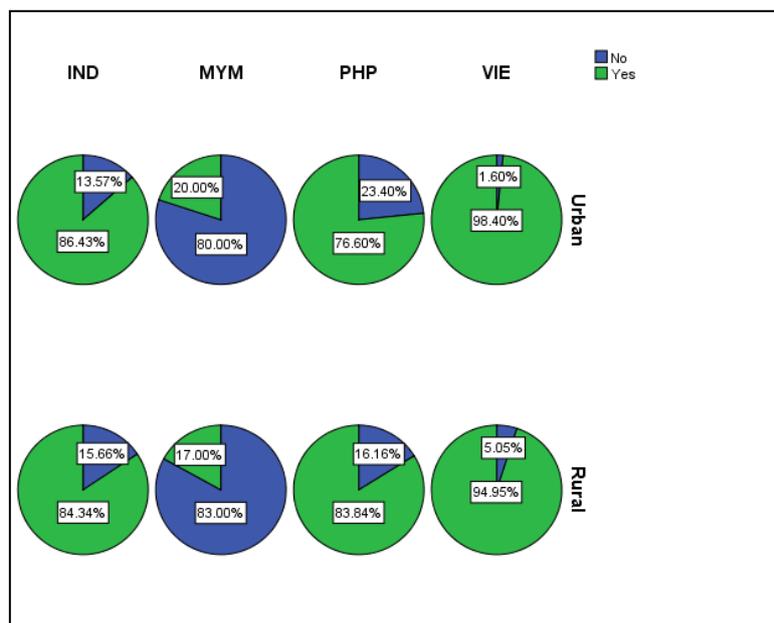
As per the responses regarding building of emergency kits [Figure 2.5(a)], the practice is not followed in Myanmar. Around 80% of rural and urban participants report having built an emergency kit in Vietnam. The participants in the Philippines come in next with 75% rural and 57% urban reporting positively. It is interesting to see that the rural lay more attention towards this than the urban residents. Indonesia lags with only 35% of the participants reporting having built an emergency kit.



**Figure 2.5(a) – Disaster preparedness measures: Built an emergency kit**

The results in the case of having a family communication plan in place are similar for Myanmar and the Philippines. Over 90% of rural and urban participants together report having made a family communication plan in Vietnam. Similar to building emergency kits the rural lay more attention towards this than the urban residents. Indonesians are more active in practicing this with 56% of urban and 65% of rural participants following this practice.

Securing personal property is the prerogative of citizens and is taken very seriously in Indonesia (approximately 85%), the Philippines (approximately 82%) and Vietnam (approximately 95%) as can be seen from the data [Figure 2.5(b)]. In a related query the response on whether participants had learned the elevation of their property closely mimics the results as seen in Figure 2.5(b) as this would form part of the plan to secure own property. There is very little to differentiate between urban and rural areas. In Myanmar majority participants do not seem to place too much importance on this practice.



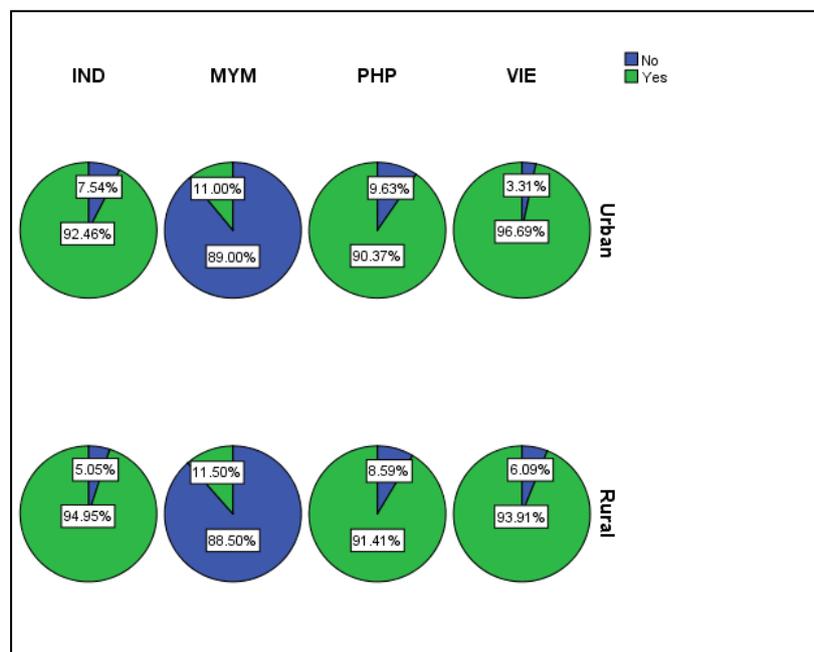
**Figure 2.5(b) – Disaster preparedness measures: Plan to secure own property**

Learning evacuation routes, which is again driven by self-concern, follows a similar trend though with a little less fever. Participants from Vietnam are most serious with over 80% of rural and urban participants following this practice. In Indonesia numbers fall to 76% of rural and 70% of urban and to 72% of rural and 51% of urban in the Philippines. It is interesting to note that in the Philippines rural participants are more inclined to follow this practice. Similar to prior cases Myanmar lags far behind in following this practice.

Almost everyone in the Philippines and Vietnam has adopted the practice of storing drinking water and food. A majority follow this in Indonesia as well, with higher proportion of rural participants (64%) when compared to their urban counterparts (54%). Myanmar lags far behind in this as well. Checking availability of flashlights, batteries or candles elicits the same response as these most often form part of the same plan. When it comes to checking the

functioning of portable radios, only the participants from the Philippines engage in checking with the same level of interest. The proportion in Vietnam falls to less than 50%; in Indonesia it is close to non-existent with only around 3% following this practice.

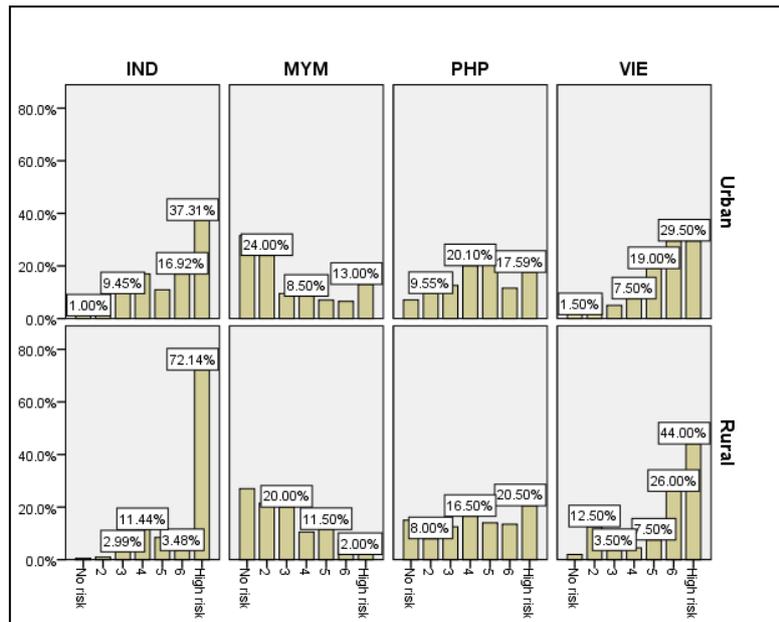
Apart from participants from Myanmar, everyone seems to be largely aware about their surroundings [Figure 2.5(c)]. The percentage is highest in the case of Vietnam; it can be attributed to the high percentage of people following all of the aforementioned practices that helps in heightening self-awareness.



**Figure 2.5(c) – Disaster preparedness measures: Knew the surroundings**

## 2.6 Risk perception

A large proportion of participants from Indonesia and Vietnam perceive themselves to be at high risk due to flooding hazards [Figure 2.6(a)]. What is interesting to see is that whilst rural Indonesia portrays the perceived the risk to be higher (with 75% stating a high level of risk) than the urban participants (53% stating higher risk), the case is similar for Vietnam where only 30% of urban participants state being exposed to high risks as compared to 44% in the rural areas. Participants in Myanmar have a low perception of risks arising from floods. In the Philippines the participants are almost equally distributed in terms of level of risk perception.

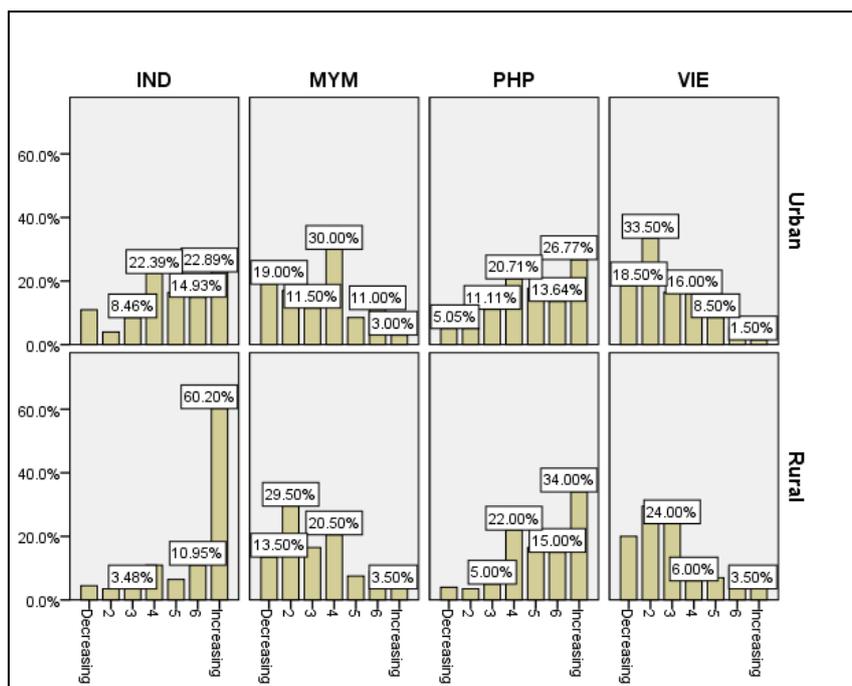


**Figure 2.6(a) – Personal risk perception towards flooding hazards**

The same trends are portrayed when people living near the area with risks of flooding hazards are questioned on the degree of calmness with which they think about the situation. The participants see their personal perceived risks to be high are the ones who are also most worried.

When questioned on the risk posed to future generations again a large proportion of participants from Indonesia and the Philippines agree, with a great degree of certainty, that future generations are vulnerable to risks. What is interesting to see is that urban participants in Indonesia and the Philippines portray higher levels of affirmation towards risks to future generation than the rural participants. Participants in rural Myanmar seem to be evenly spread out in their response, whilst close to 50% in urban areas agree with the participants from Indonesia and the Philippines. The response in Vietnam is a mixed bag and is slightly skewed towards the response that future generations are indeed at risk.

The participants were also asked what they felt about how the level of risk exposure was changing [Figure 2.6(b)].

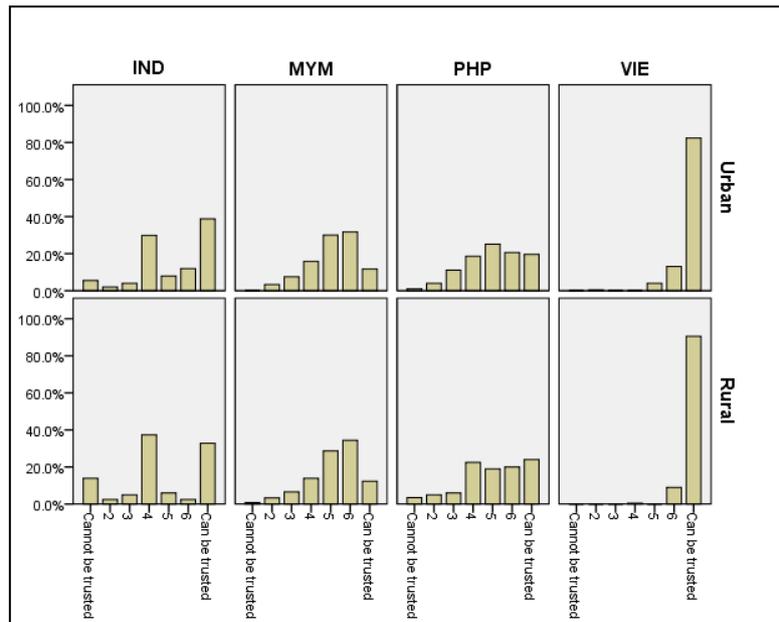


**Figure 2.6(b) – Risks posed increasing/decreasing**

A large proportion of participants from rural Indonesia (around 60%) felt that risks associated with flooding are on the rise, correspondingly only around 30% of urban Indonesian participants feel that the associated risks are on the rise. The Philippines response in this case is skewed towards the increase in the associated risks. Vietnam and rural Myanmar hints at a reduction in the perception of associated risks. Urban Myanmar sees no change in the level of associated risks.

### 2.6.1 Perception on different sources of information

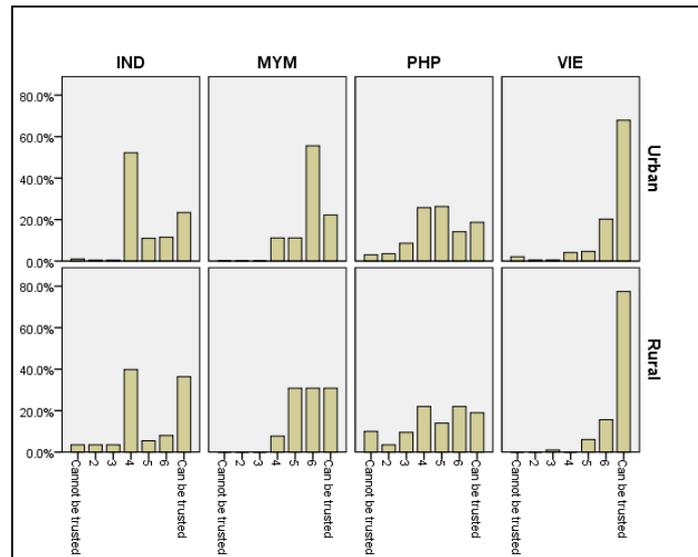
This sub-section presents the findings on how the participants perceive hazard related information from different sources. We start of by looking at the local government as a source. Figure 2.6(c) represents the distribution of the level of trust (on a scale of 1 to 7, with 7 denoting that the government can be trusted) rated by different groups of participants to hazard related information given by the government. An overwhelming majority in Vietnam (more than 80%) suggests that the local government can be trusted. In Myanmar and the Philippines the vote is skewed towards the “can trust” side of the spectrum. In Indonesia the vote seems to be split between the can be trusted and neutral opinions; in rural areas the neutral position taker proportion is a little higher than the proportion that trust the local government, the reverse is seen in urban Indonesia.



**Figure 2.6(c) – Perception on information with the local government as the source**

The responses are roughly the same and without any major deviation when responses are elicited of different scales such as the level of accuracy, fairness, completeness and biasedness.

Next we tested what values the participants associate to information from the community organizations [Figure 2.6(d)]. In Vietnam, more than 70% of the participants, slightly less than in case of local government, respond that the information disseminated by community organizations can be trusted. In Myanmar the vote is skewed towards the “can trust” side of the spectrum. In Philippines, a wider range of ratings regarding community organizations’ trust level was observed. In Indonesia the vote seems to be split between the can be trusted and neutral opinions in the rural areas, whilst in urban areas the neutral position taker proportion is higher than the proportion that trust the community organization.

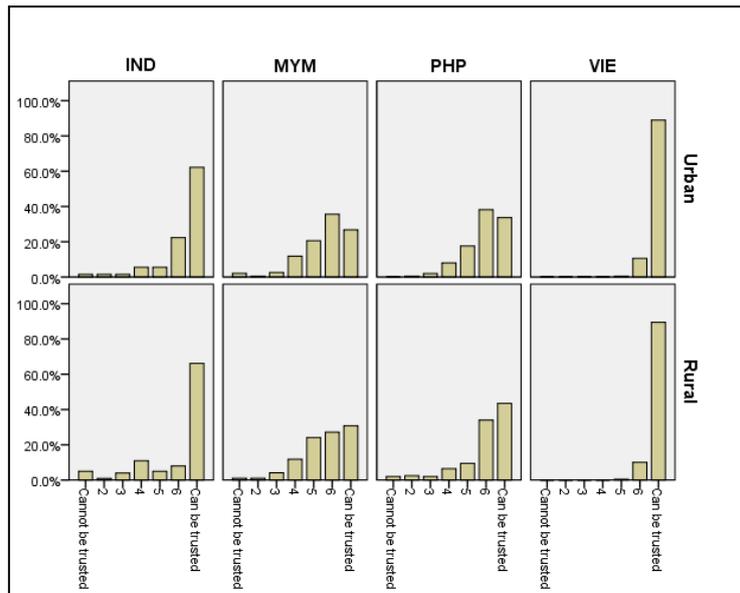


**Figure 2.6(d) – Perception on information with the community organization as the source**

In this case too, the responses are roughly the same and without any major deviation when responses are elicited of different scales such as the level of accuracy, fairness and biasedness. In Myanmar when people are asked whether the information from community organizations tell the entire stories, respondents lay a lot more faith in the community organization in reciting the story in entirety.

In the case of the radio/television news as the source and family/friends trends are almost identical with minor differences in the proportions across all five criteria. It is therefore sufficient to present a single set of observations. We take the case of trust in information dispersed by the radio/television news. Figure 2.6(e) provides the distribution of the responses.

As in the case of other sources an overwhelming majority in Vietnam (more than 80%), plus Indonesia (approximately 60%) suggest that radio and TV news can be trusted. In Myanmar and the Philippines the vote is skewed towards the “can trust” side of the spectrum.

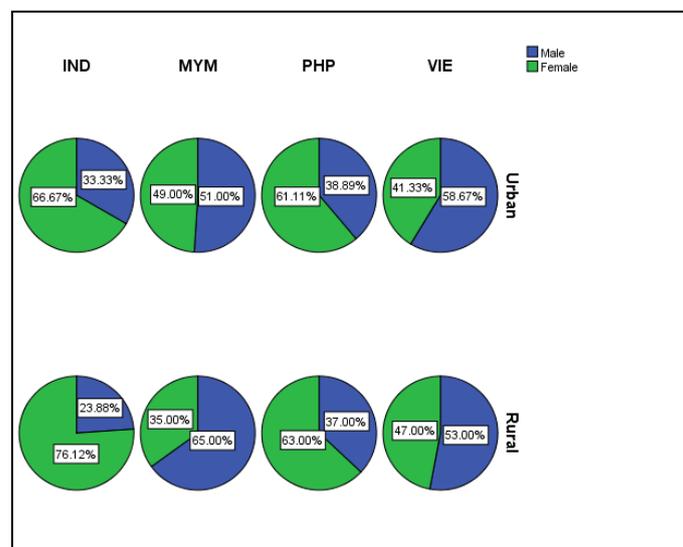


**Figure 2.6(e) – Perception on information with the radio/television news as the source**

## 2.7 Demographics

### 2.7.1 Male-Female composition of sample

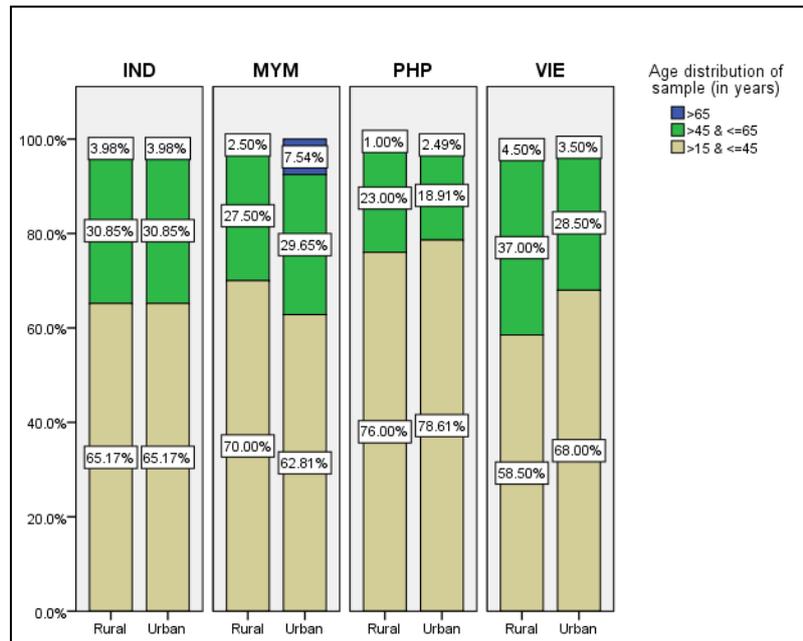
In the overall sample with recorded responses, 45% are male and 55% female. The rural – urban distribution across countries can be seen in Figure 2.7(a).



**Figure 2.7(a) – Male – female distribution**

### 2.7.2 Age distribution of sample

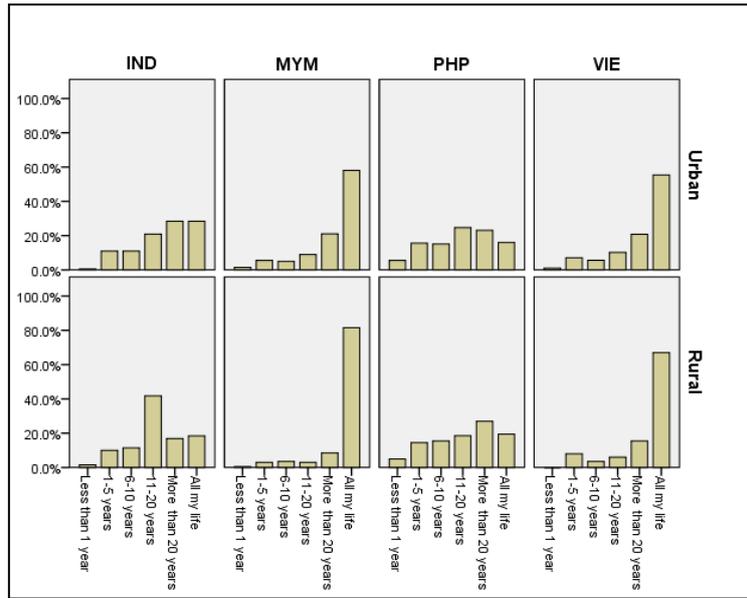
Majority of the sample size is under the age of 45 years, with a very low proportion old people beyond the age of 65 years [Figure 2.7(b)].



**Figure 2.7(b) – Age distribution of sample**

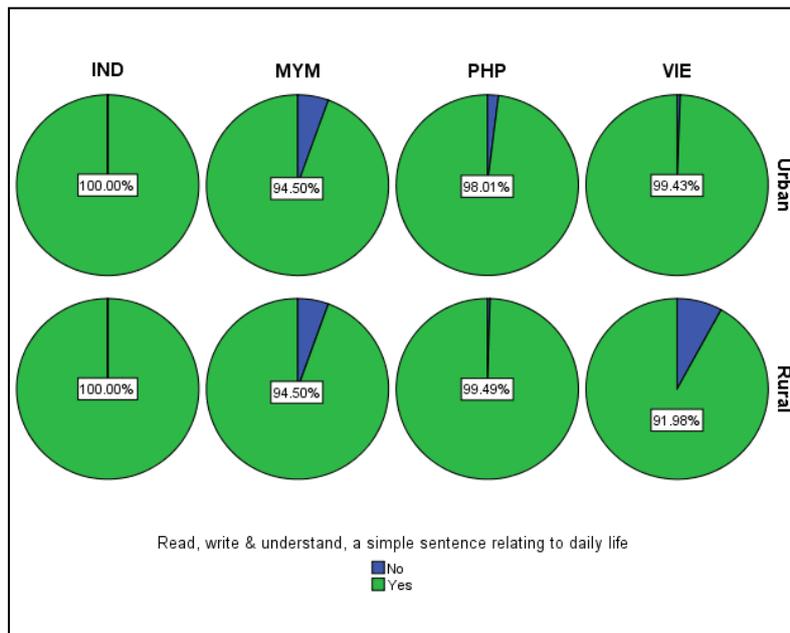
### 2.7.3 Longevity of stay in present community

We also made note of the longevity of stay in the present community [Figure 2.7(c)]. In case of Indonesia and the Philippines the number participants gradually increases with the increase in the number of years spent in the neighborhood, with the exception of urban Indonesia where a spike is seen in the 11-20 years category with 40% of the participants having spent that much time in the same neighborhood. In Myanmar majority of participants, 80% of rural and 60% of urban, have spent their entire life times in the same neighbourhood. Even in Vietnam 60% of rural and over 55% of urban participants have lived in the same neighbourhood in their entire lifetime.



**Figure 2.7(c) – Longevity of stay in the present community**

**2.7.4 Literacy rate**



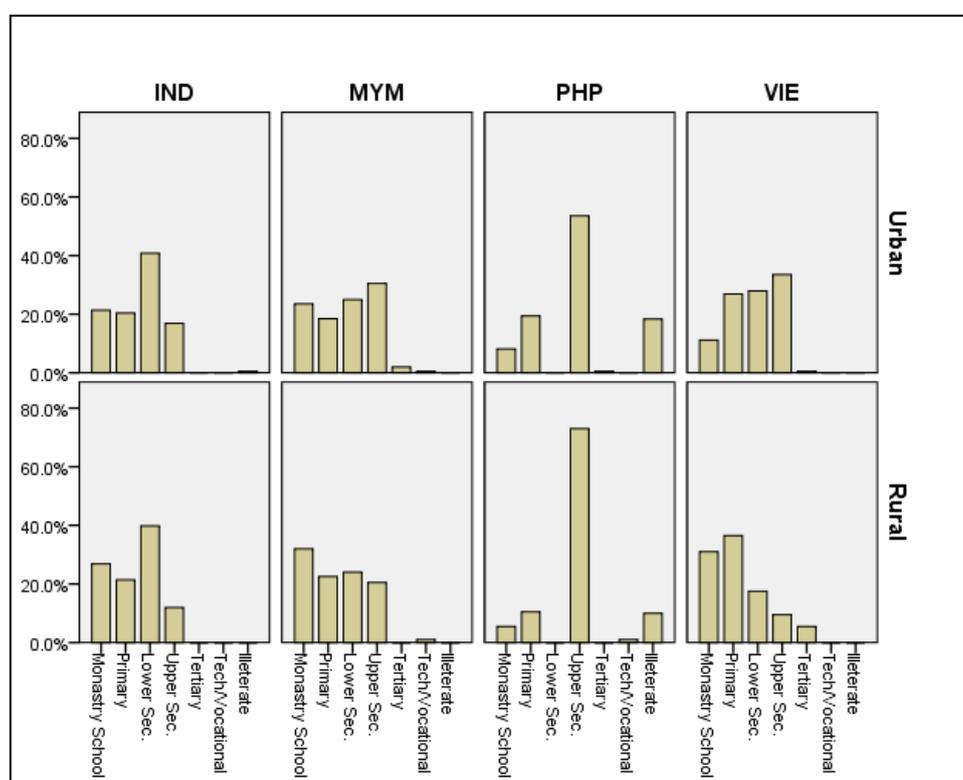
**Figure 2.7(d) – Percentage that can read, write and understand a simple sentence**

The figures above are commensurate with the literacy levels (age 15 and over and can read and write) in each of the countries. The rates are as follows:

Country	Literacy rate
Indonesia	93% (2010 est.)
Myanmar	93% (2012 est.)
The Philippines	93.4% (2013 est.)
Vietnam	94% (2002 est.)

**Table 2.3 – Literacy rates<sup>4</sup>**

### 2.7.5 Education levels



**Figure 2.7(e) – Distribution of education level**

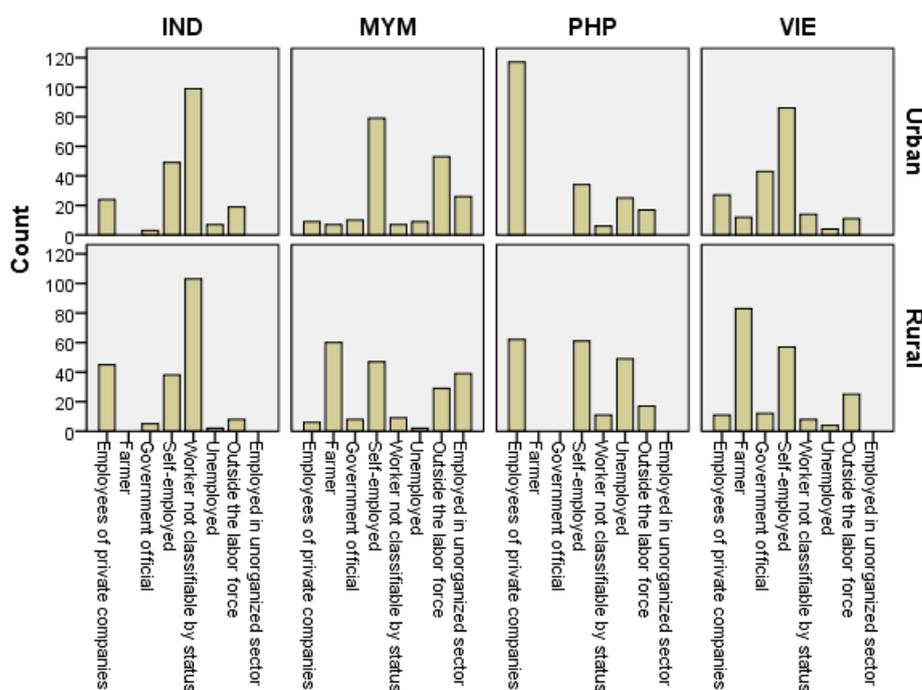
The important observations are tabulated next:

<sup>4</sup> Literacy Rate, adult total (% of people ages 15 and above), The World Bank. [www.data.worldbank.org/indicator/SE.ADT.LITR.ZS](http://www.data.worldbank.org/indicator/SE.ADT.LITR.ZS) (accessed March 19, 2015)

IND	MYM	PHP	VIE
<ul style="list-style-type: none"> <li>•40% of the participant have attained an upper secondary level of education. Only 14% have a tertiary attainment of education.</li> <li>•Only primary, lower sec., upper sec and tertiary listed.</li> </ul>	<ul style="list-style-type: none"> <li>•50% have at least an upper secondary level of education. 55% in urban areas and 49% in rural areas.</li> <li>•Over 60% have achieved a tertiary level of school education in urban areas. The corresponding rural number is 50%.</li> <li>•Primary, lower sec., upper sec, tertiary, illiterate and monastery school listed.</li> </ul>	<ul style="list-style-type: none"> <li>•73% of rural and 53% of urban have attained a tertiary level of education.</li> <li>•10% of rural and 18% of urban have some sort of a vocational/technical certification.</li> <li>•Primary, lower sec., tertiary, illiterate, vocational/technical listed.</li> </ul>	<ul style="list-style-type: none"> <li>•More than 60% in urban areas have achieved at least an upper secondary level of education , correspondingly 27% of rural participants have achieved the same.</li> <li>•Primary, lower sec., upper sec, tertiary and illiterate listed.</li> </ul>

**Box 2.7(a) – State of education levels in four countries**

**2.7.6 Employment status**



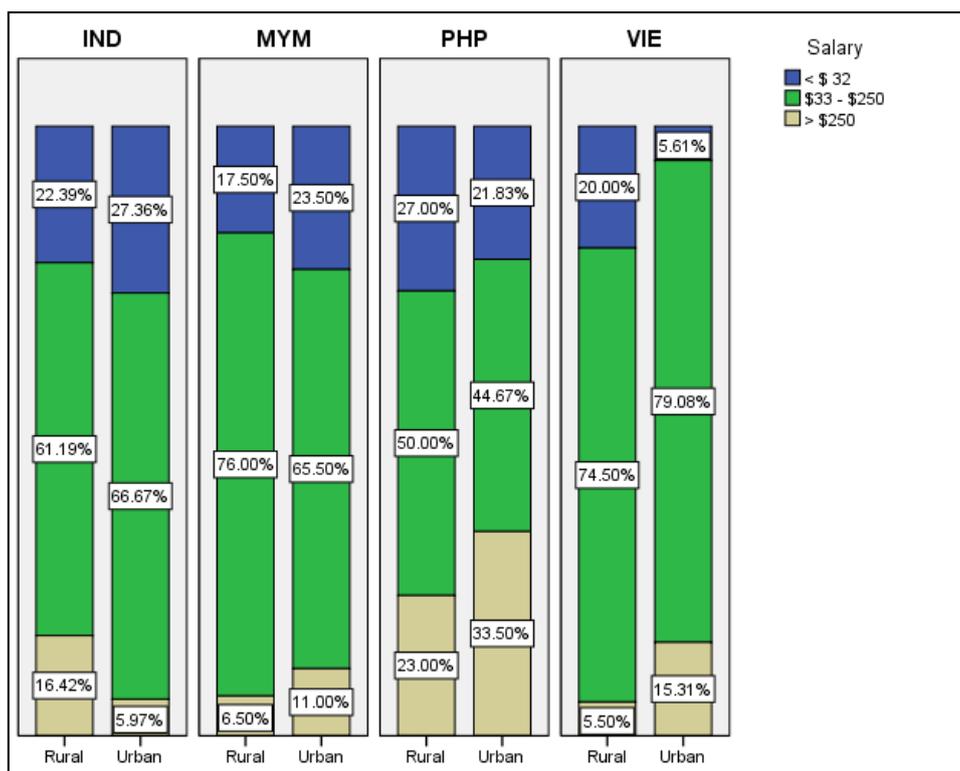
**Figure 2.7(f) – Employment status**

Important observations:

IND	MYM	PHP	VIE
<ul style="list-style-type: none"> <li>• 50% of the Indonesian rural and urban participants are not classified into any job.</li> <li>• In urban areas around 25% are self employed.</li> <li>• Rural areas records around 20% each of self employed and those employed in private companies.</li> </ul>	<ul style="list-style-type: none"> <li>• Self employed are above 40% for urban areas.</li> <li>• Rural Myanmar has 30% farmers amongst the participants.</li> </ul>	<ul style="list-style-type: none"> <li>• Urban Philippines records over 50% jobs under private companies.</li> <li>• In rural areas the self employed and those in private companies amount to close to 60% of the participants.</li> </ul>	<ul style="list-style-type: none"> <li>• Self employed are above 40% for urban areas.</li> <li>• Rural Vietnam has 40% farmers amongst the participants.</li> </ul>

**Box 2.7(b) – State of employment status in four countries**

**2.7.7 Monthly income (USD per person per month)**



**Figure 2.7(g) – Salary distribution**

### 3. Recommendations

In this section, we present five recommendations based on the findings (see Table 3). Each recommendation responds to the objectives of this proposed project in identifying the mechanisms of how to use mobile technologies to raise public awareness both in terms of the delivery mechanisms and the content of the messages and developing community-specific and country-specific parameters in designing and implementing mobile-enabled awareness and preparedness programs. Our analysis also provides insight into the solutions of whether and how to use mobile technologies to build an integrated system which allows effective engagement in protective behaviors in the form of exchanging risk information. We end this section by suggesting directions for next stage of research pertaining to GDPC's initiative on mobile weather alert apps in South East Asia.

#### **Findings related to cell phone and smartphone use**

It is obvious that across four countries, mobile access to the Internet has become a trend, even in Myanmar where more people use the Internet than the computer ([Section 2.1](#)).

Interestingly, compared to portable Internet use, adoption of texting is relatively low in Myanmar. Almost half of the surveyed participants across four countries use a smartphone and 41% of the surveyed participants use apps on their phone ([Section 2.2.3](#)). Myanmar and Vietnam see a relatively higher level of mobile messaging adoption. Similarly, the adoption of mobile email and mobile social networking websites is gaining ground in Vietnam and Philippines. For example, 59% of Vietnamese mobile Internet users use a cell phone to send/read at least one mail a day while 55% of Philippines mobile Internet users do so ([Table 2.2](#)). The use of social networking platforms via smartphone is practiced by 80% of mobile Internet users in three countries, while in Myanmar this usage reaches 45% of mobile Internet users ([Table 2.2](#)). Together, these results confirm the opportunity of using mobile platforms to disseminate weather risk alert message while identifying the need to consider the variation of usage by country.

In another section, we asked where individual receive information about weather-related risks. With a high usage of mobile email but a low level of mobile email use for disaster-related information in Vietnam and Philippines ([Section 2.4.1](#)), it suggests the potential of incorporating mobile emails for alert messages in Vietnam and the Philippines. Similarly, compared to the general use of texting, participants in Vietnam, the Philippines, and Indonesia reported a relatively lower level of usage of text alerts for disaster-related

information. Together this shows the utility of implementing text alerts in Vietnam, the Philippines, and Indonesia. The rural-urban divide is not salient when it comes to general cell phone use except with the case of Vietnam.

#### **Recommendation #1 for mobile delivery of alert messages**

Building on our findings, two tiers of alert message delivery mechanisms are proposed. First, the major warning messages should be delivered through texting and apps in parallel in the Philippines, Vietnam, and Indonesia. This is evidenced by the growing adoption of apps in these three countries. In Myanmar, compared to texting, the alert messages delivered through apps would be more effectively reaching out to individuals. It is also advisable to incorporate mobile messaging (e.g., LINE, What's app, GTalk, Skype, or Yahoo Messenger) in mobile apps' delivery of alert messages, especially in Vietnam and Myanmar. Second, mobile social networking sites (e.g., Facebook Mobile) and mobile email alerts could also be used as an alternative channel to reach people (booster message), especially in Vietnam and the Philippines.

#### **Findings related to sources of risk info seeking**

The consumption of information about impending disasters in these four countries tends to be concentrated in the mainstream media, including local television news broadcast, local radio broadcast (except for Indonesia), and websites of local newspaper ([Section 2.4.1](#)). Not surprisingly, local television news broadcast is the popular source of information across four countries. Yet Vietnam and the Philippines also see a higher percentage of participants using websites of local newspapers and local radio stations to obtain information about disasters. On the informal side, the practice of word of mouth from close relatives and close friends [[Figure 2.4\(f\)](#)] seems to be the most effectively used media for sourcing information on impending natural disasters, which is especially salient for the participants in Vietnam and Indonesia. In contrast, we found little use of mobile apps for getting information about disasters warning despite the growing app adoption in these countries ([Section 2.2.3](#)).

#### **Recommendation #2 for supplementary delivery of alert messages**

In delivering weather alert messages, it is recommendable to incorporate local television stations as part of the alert message package. In the Philippines and Vietnam, the website of local newspapers and local radio stations can be included as part of this media package. Door-to-door flyers and formal or informal community meetings could also be good ways to spread messages about impending disasters so individuals can in turn convey the information

to their social networks (especially in Vietnam and Indonesia). Moreover, a choice should be made in terms of designing messages for similar or different redundant and complementary channels for alert message dissemination. For example, the message can be first sent through the local television broadcast and the shorten version of it sent through mobile apps as people may read it on the road or during work time.

### **Findings related to risk info sharing**

The word of mouth from close relatives and close friends has been identified as a popular informal way to get information about impending natural disasters [\[Figure 2.4\(f\)\]](#). In the sharing side, our results showed that more than 90% of the participants across four countries (Indonesia, 94%, Myanmar, 88%, Philippines, 98%, and Vietnam, 97%) shared risk-related information to their close relatives and close friends ([Section 2.4.2](#)). Face-to-face (e.g., formal meetings or informal conversations) stands out as the most common mode of communication for this information sharing, especially in Vietnam. Making calls comes in second for Indonesia and Vietnam. Texting seems to be the more prevalent mean in Philippines and Indonesia for individuals to communicate with their relatives and close friends about risk information they have received. In contrast, texting in Myanmar is not popular at all. Online communication (e.g., email, messaging services, or social networking websites) is observable in Indonesia and more in the Philippines.

Actually, in addition to the risk information sharing, we asked how participants communicate with their close relatives and close friends ([Section 2.3.1](#)). It was shown that face-to-face usage was the most common mode of communication to maintain communication with close relatives and close friends in Indonesia, Myanmar, and Vietnam. In comparison, texting seems to be most prevalent means for such tie maintenance in the Philippines. Making calls is a close second across countries and texting is also popular in Indonesia but not the case in Myanmar. Again, online media use for communicating with close relatives and close friends is more observable in the Philippines and with Myanmar and Vietnam down on the list. Parallel to these results is the shared phone usage, which is also noticeable in rural areas of Myanmar, the Philippines, and Indonesia. This means that in delivering risk-related messages, messages need to be tailored to the social side of information behaviors.

### **Recommendation #3 for enhancing design and delivery weather-related risk messages**

Findings about the route of information behaviors involving one's social contacts provide insights into the choice of enhancing risk message dissemination. Specifically, as face-to-face

is the most common mode of communication for risk information sharing, this indicates the timing of disseminating risk messages. In most cases, individuals get to talk to their social contacts after work hours and over the weekend. If the messages are sent during these times, they are likely to stimulate the dynamics of social conversation and social influence.

Moreover, in the Philippines, the fact that individuals commonly share information through face-to-face, texting, and online media within their social contacts indicate that messages could be designed in ways easily to be forwarded in these platforms. Specifically, in the case of GDPC's mobile apps, there should be a certain feature that enables quick sharing through one's texting contact list as well as through their online social networking profiles. Similarly, in Indonesia and Vietnam, individuals are likely to use phone calls, in addition to face-to-face, to exchange risk-related information. In designing mobile apps in these two countries, the compatible interface design between the apps and the phone book is critical. Essentially, these recommendations respond to one of the objectives of this project in identifying the solution to build an integrated and open-access system which allows the public to engage in protective behaviors, especially in the aspect of sharing information about location and availability of preparedness services.

#### **Findings related to risk awareness and experience**

More than 90% of the sampled participations in both urban and rural areas reported having personal experience with flood/cyclone/typhoon. Yet the performance of actual preparedness behaviors is only consistent in the Philippines, where in particular the rural participants engaged in different types of preparedness behaviors more than those living in the urban areas ([Section 2.5](#)). In contrast, Myanmar lags in all types of preparedness behaviors.

Perceptions of personal risks were higher in Indonesia's rural area than the urban counterpart and the same for Vietnam. Participants in Myanmar have a low perception of risks arising from floods. Overall, these results indicate a gap between risk perception and actual preparedness behaviors. The Philippines especially presents an interesting case because even with a high level of reported preparedness behaviors, participants reported varied levels of risk perception. That means, individuals are predisposed to frequent risks to the extent that they do not necessarily think the risks are getting worse or too serious for them to actually carry out the preparedness behaviors.

#### **Recommendation #4 for design of weather-related risk messages**

In designing weather risk messages, we recommend special attention to the expected outcomes of preparedness and divergent levels of risk perceptions in rural and urban areas. The gap between risk perceptions and preparedness behaviors could be ascribed to reasons ranging from motivations, lack of knowledge about risks and preparedness, or lack of resources for preparedness. While it is challenging to address the individual motivation behind reluctant behaviors, it is possible to address the knowledge issues. Corresponding solutions are thus to educate community members about the level of actual risks in the local area where they live and expose to them the expected outcomes of preparedness behaviors. For example, a community meeting or flyers could be conducted or distributed concerning what would happen (would have been avoided) if batteries or candles were prepared or when a family communication plan was in place, when a typhoon happened in the area.

In the meantime, considering the relatively low levels of risk perception and disaster preparedness behaviors in Myanmar, the message can carefully be tailored to most first-timers. For example, the information can start with the basics about the importance of knowing anything about weather risks, and what preparedness can be done. In the case of the Philippines, where the engagement of preparedness behaviors is stable among certain populations, messages can include a wide range of risks and preparedness measures, for example, encouraging people to reach out to others and help them learn more about risks and about preparedness. Because of the differences between urban and rural participations' risk perceptions, it is critical to customize the messages targeted at rural and urban residents. Specifically, based on our findings, we will suggest stressing the imperative of building awareness in the urban areas of Indonesia and Vietnam.

#### **Findings related to social support and participatory capital**

We measured the existence of the social support system in disaster preparedness (whether someone is available for guidance to reach an evacuation site, to offer place in case of displacement, or to help a person get back on his feet). As seen in [Figure 2.3\(e\)](#), over 50% of achieving the provision of support for preparation for disasters in rural Vietnam, Indonesia and the Philippines. In contrast, Myanmar's disaster preparedness is relatively low, in terms of receiving social support for preparation. At the same time, majority people are not part of local voluntary groups (Indonesia and Philippines are better), but a higher participation in religious groups [\[Figure 2.3\(h\)\]](#). Myanmar is better at participation in local charitable

organizations. But compared to other three countries, Vietnam is relatively low in all types of voluntary associations, which indicates the potential of institutional or a broader scale of community-based support.

In one of the sections, we asked participant's perceived credibility of different sources of risk information, including local governments, community organizations, mass media, and personal social contacts ([Section 2.6.1](#)). Local governments are considered a highly trustworthy source in Vietnam, while a moderately trustworthy one in Indonesia and the Philippines. Community organizations are seen trustworthy as a source of risk information in Indonesia, Vietnam, and Myanmar. Radio and TV news are considered a reliable source across four countries. As a matter of fact, Vietnamese participants rated all four sources highly in the scale of trustworthiness.

#### **Recommendation #5 for institutional delivery of weather-related risk messages**

It is believed that the results regarding individuals' voluntary participation and level of trust toward different sources of public organizations are especially salient in GDPC's marketing strategies of the newly developed alert app in different countries. Combining these findings, it is recommended that weather warning and risk messages be disseminated with the cooperation from voluntary associations that people in the respective country are actively involved and thus likely exert influence on their risk attitude and behavior. It is advisable that messages disseminated by consulting or cooperating with community religious groups in Indonesia, with community charitable organizations in Myanmar, and with local-level public agencies in Vietnam and the Philippines. In this consultation process, these voluntary organizations can serve different roles, ranging from message endorsers, message announcers, to content contributors. Specifically, across four countries, seeking cooperation with radio/TV news stations is useful as the majority of participants in these four countries consistently perceive this mainstream news media as a reliable source of risk information.

	Indonesia	Myanmar	Philippines	Vietnam
Recommendation 1 <i>Mobile delivery of alert messages</i>	A combination of texting and mobile apps	A combination of mobile apps and mobile messaging	A combination of texting and mobile apps	A combination of texting and mobile apps, along with mobile messaging
	Use of mobile social networking for booster messages	-	Use of mobile email and social networking for booster messages	Use of mobile email and social networking for booster messages
Recommendation 2 <i>Supplementary delivery of alert messages</i>	Develop media package and include local television stations	Develop media package and include local television stations	Develop media package and include local television stations, websites of local newspapers, and local radio stations	Develop media package and include local television stations, websites of local newspapers, and local radio stations
	Supplement the electronic means with door-to-door flyers and community meetings	-	-	Supplement the electronic means with door-to-door flyers and community meetings
Recommendation 3 <i>Enhancing design and delivery weather-related risk messages</i>	Disseminate the message during off-work hours and weekend	Disseminate the message during off-work hours and weekend	Disseminate the message during off-work hours and weekend	Disseminate the message during off-work hours and weekend
	Message interface to be compatible between mobile apps and cell phone's contact list	-	Messages to be adaptable and compatible across face-to-face, texting, online media, and mobile apps	Message interface to be compatible between mobile apps and cell phone's contact list
Recommendation 4 <i>Design of weather-related risk messages</i>	Risk messages promotes enhanced knowledge about risk levels and expected outcomes of preparedness	Risk messages tailored to first-timers, emphasizing the basics about disaster preparedness	Risk messages promotes a wider range of risks and social influence of more people for awareness building and preparedness	Risk messages promotes enhanced knowledge about risk levels and expected outcomes of preparedness
	Emphasize the imperative of risk awareness in the urban area	-	-	Emphasize the imperative of risk awareness in the urban area
Recommendation 5 <i>Institutional delivery of weather-related risk messages</i>	Risk messages sent in cooperation with community religious organizations	Risk messages sent in cooperation with community charitable organizations	Risk messages sent in cooperation with local public agencies	Risk messages sent in cooperation with local public agencies

**Table 3 – Overview of recommendations by country**



**Figure 3 – Road map of the action plan**

## **Suggestions for future research**

Expanding on our findings and GDPC's initiative, we conclude our report with three areas of future research.

### **Future research 1: Follow-up study**

Results of our study revealed the potential of using mobile apps in building community members' awareness about weather-related risks in the four target countries. With the anticipated growing adoption of smartphones and apps in these four countries, especially in Myanmar, we consider that a follow-up study in six months or a year will be useful to understand whether and how the adoption of new technologies has been reflected in people's risk perceptions and preparedness-related information behaviors. The purposes of this follow-up study are twofold. First, it can examine whether and how the recommendations proposed in this report, once implemented, are successful. Second, it can enrich the findings with a longitudinal observation and thus the validity of the empirical claims reported in this research.

### **Future research 2: Effects of short-term alert vs. long-term risk messages**

Another related area of investigation is to consider whether the alert apps should be developed or expanded to accommodate different levels of expected impact and scopes of audiences. We intentionally separate alert and risk messages in our recommendations because of the underlying temporal effects of these two types of messages. Alert messages can take the form of brief content and be disseminated quickly to a large group of audience whereas risk messages can contain more details and be diffused to targeted groups. Mass media may be a good way for alert messages whereas interpersonal contacts can be more influential in risk-type messages. In other words, risk messages, if executed and responded effectively, may contribute to development of community resilience in the long run. As part of the follow-up study mentioned earlier, the effects of alert messages on participants' risk perceptions and preparedness behaviors can be examined, in comparison with those of risk messages geared toward long-term resilient behaviors (e.g., enhanced community involvement, flexible technical infrastructure, robust communication mechanisms).

### **Future research 3: User participation in risk and disaster detection**

It will also be useful to incorporate participation from community members in this message design and execution process, given the gap we have observed between popular uses of mobile technology vs. relatively low usage of mobile technology for disaster-related information behavior. For example, when individuals detect an increasing water level, they

can use the app or texting to notify not only their social contacts but also the public agency (or National Red Cross Society in each country). Instead of one-way dissemination, the message processing can become more interactive and stimulate individuals' motivations to engage in preparedness behaviors. To this end, a two-stage research project in the form of natural experiment can be conducted with a selected smaller sample of people who have used mobile apps. This will include the development of a prototype app and the investigation of whether and how participants use the app for risk detection in their everyday life, and to what extent this interactive use of the app changes their perceptions about risks and engagement in preparedness measures.

#### **4. Inter-Institutional Collaboration and Community Engagement**

The investigation team consists of PI, two co-PIs, and four researchers in the four target countries. PI (Chih-Hui Lai) and co-PIs (Arul Chib and Rich Ling) have performed a series of research on disaster response and recovery and technology use in the developing and developed contexts. Lai has been involved in several projects on organized disaster management, including Hurricane Katrina, Hurricane Sandy, and Hurricane Haiyan. Chib conducted research aiding in the development of communication initiatives for Tsunami-affected communities in Asia. He was an ICT4D specialist from 2005-2008 at World Vision Asia Tsunami Response. Ling has studied the social consequences of mobile communication for more than two decades and has significant contributions to the field of mobile communication, with more than 200 publications on this topic. He is currently researching the implementation of mobile communication in Myanmar. Ling has participated in the analysis of call data records in the wake of the 22 July bombings in Oslo.

Four partnering researchers have offered complementary capacities and resources that ensured effective and quality implementation of data collection in the designated localities. Saw Thu Nandar, an independent researcher, has rich experience conducting rigorous social scientific research on disadvantaged populations in Myanmar. Anas Hamidi, affiliated with International Education Center in Bandung, Indonesia, has been involved in works on sustainability. Ma. Regina M. Hechanova, specializing in social implications of technology use, is the project leader of Katatagan resilience program that was designed and pilot-tested among survivors of Typhoon Haiyan in the Philippines. Ty Pham Huu is a lecturer at Hue University of Agriculture and Forestry, Vietnam, specializing in geographic information system (GIS) and remote sensing for natural resources and disaster management. These managing partners are well equipped with capabilities and experiences of researching or implementing emergency management programs in their respective countries.

##### **Community capacity building**

This project contributes to community engagement in two ways. First, it offers the communities in the target countries practical insights to build resilience by means of building risk awareness and engaging in disaster preparedness. The preparation of local reports in these four countries is in process and when completed, will be shared with community members for feedback and discussion. Second, this project facilitates inter-country and inter-institutional collaboration in the form of capacity-building training with the research partners.

Specifically, to ensure the quality and validity of measurements and data collections, in-person and alternative forms of training workshops were conducted with the partners in each of the four countries, including with the interviewers who carried out the data collection work on the field. During the training session, the leading investigators (Lai, Chib, & Ling) engaged in vibrant discussion with the field teams, which was meant to clarify the questions and concerns regarding the instrument and the challenges associated with fieldwork. It is convinced that such training sessions are important because they create opportunities for community members to equip themselves with skills and tools necessary for engagement in community affairs. Inarguably, the social connections built between the investigation team based in Singapore and the research partners in these four countries also serve as useful social capacity building, which is an important foundation for the development of community resilience.

## Annex

### A. Photos of the fieldwork in Myanmar

Auk Kwin Village, Pyapon Township



Wet Kwin Village, Mawlamyinegyun Township



Ward (12), Patheingyi Township



Labutta Jetty, Labutta Township



Kan Ni Village, Patheingyi Township



B. Photos of the fieldwork in Indonesia

Cingcing Permata Indah during flooding in 2012



The condition of Dayeuh Kolot, Bandung, filled with mud after the recent flooding



Flooding in Bukit Duri, Jakarta



C. Photos of the fieldwork in the Philippines (San Mateo, top; Marikina, bottom)



#### D. Photos of the fieldwork in Vietnam



Dike along the Tam Giang lagoon in Huong Phong commune, Huong tra district



Storm prevention advertisement in Hai Duong commune, Huong Tra district



Online game shop in Hai Duong commune, Huong Tra district