



IMPACT ASSESSMENT ON EWS1294 REACH ON VULNERABLE GROUPS

(People living with disabilities, elderly,
women, and minority groups)



USAID
FROM THE AMERICAN PEOPLE



**World Food
Programme**



March 2022

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March 2022

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This research was carried out with the support of People in Need and the financial support of the World Food Programme (WFP) and the United States Agency for International Development (USAID).

This report was prepared by a consultant team with support of People in Need and the collaboration of the National Committee for Disaster Management, Provincial Committees for Disaster Management and local authorities and communities who participated in the study.

Executive Summary

The Impact Assessment on EWS1294 Reach on Vulnerable Groups (People living with disabilities, elderly, women, and minority groups) provides an overview of key research findings on EWS1294's inclusiveness of vulnerable groups. The study was conducted in four provinces, Prey Veng, Stung Treng, Koh Kong, and Battambang provinces in the beginning of March 2022. 4 vulnerable groups were targeted in this study: women, people living with disabilities, elderly and minority groups. In total, 12 Focus Group Discussions and 105 Key Informant Interviews were conducted for the purpose of the study.

People in Need (PIN) commissioned this study to assess the extent to which the current EWS1294 system is inclusive of vulnerable groups, considering the different components of the system:

- (i) Risk knowledge
- (ii) Detection, monitoring and warning service
- (iii) Dissemination and communication
- (iv) Response capacity.

After reviewing existing research on inclusive early warning system and vulnerable groups in Cambodia, the experiences of the targeted vulnerable groups were collected to assess the inclusiveness of vulnerable groups, and more specifically:

- The experiences of vulnerable groups with EWS1294,
- The satisfaction of vulnerable groups with EWS1294,
- The barriers experienced by vulnerable groups in subscribing or using EWS1294.

Overall, the existing EWS1294 system is beneficial to the four vulnerable groups in the research locations (women, elderly, minority, and people living with disabilities), although it is not yet entirely inclusive. Most respondents of the study were not aware of the existence of the system. Greater promotion of the system is key to ensure EWS1294 reach to vulnerable groups. This impact assessment provides general and specific recommendations per vulnerable group to improve inclusiveness of EWS1294 in the short and longer term.

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Acronyms

ADB	Asian Development Bank
CBFEWS	Community-Based Flood Early Warning System
CBS	Cell Broadcasting Service
CCDM	Commune Committee for Disaster Risk Management
CRC	Cambodian Red Cross
CWC	Central Water Commission
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
EWS	Early Warning System
FFWC	Flood Forecasting and Warning Centre
FGDs	Focus Group Discussions
IVR	Interactive Voice Response
KIIs	Key Informant Interviews
MAFF	Ministry of Agriculture, Forestry and Fisheries
MOWRAM	Ministry of Water Resources and Meteorology
NCDD	National Committee for Sub-National Democratic Development
NCDM	National Committee for Disaster Management
NGO	Non-governmental organization
PCDM	Provincial Committee for Disaster Management
PIN	People in Need Organization
PwDs	Persons with Disabilities
RGC	Royal Government of Cambodia
SMS	Short Message System
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNEP	United Nations Environment Programme
VCDM	Village Committee for Disaster Risk Management
VDMGs	Village Disaster Management Groups
WB	World Bank
WFP	World Food Programme
WHO	World Health Organization

1 Background

Cambodia is exposed to nearly all types of hydrometeorological hazards, from floods to droughts, heavy storms, typhoons and lightning strikes. Additionally, the Strategic National Action Plan for Disaster Risk Reduction recognizes disease outbreaks, climate change impacts, fires and technological hazards as potential triggers of disasters¹. However, the geographical characteristics of the country contribute to varying exposure; for example, the floodplains along the Mekong are more exposed to river flooding, whereas the mountain ranges have a higher risk of localized landslides and flash flooding². Storms and typhoons in Cambodia are often not considered a significant threat as the country is sheltered by mountain ranges which lessen the impacts³. Furthermore, fires, epidemics, lightning strikes and landslides (in the northern mountainous regions) contribute to disaster risks as well. Of these, riverine flooding poses the highest risk in terms of Average Annual Loss (AAL1) to the capital stock in Cambodia, which places the country third highest after Myanmar and Lao PDR in a global comparison⁴. Additionally, climate change is predicted to have impacts on the flood-pulse powered ecosystems, which are vulnerable to changes in annual weather patterns, such as the increase in or lack of monsoonal precipitation⁵.

Disasters have been stated to form a threat to the long-term economic development of Cambodia as the growth is narrowly based, with a dependence on garment exports, tourism, rice and construction⁶. In Cambodia, which is regularly subject to floods and droughts, the population is increasingly exposed to climate risks that seriously threaten livelihoods and education, for example. Generally, flooding occurs for more than three months per year between July and December, and thus schooling is affected at the beginning of the academic year. Students encounter difficulties accessing schooling due to obstructed infrastructure, and the public transportation system is often hindered by these events⁷.

People in Need (PIN) has been working in Cambodia since 2008, providing development and emergency assistance in both rural and urban areas, with a focus on Disaster Management (DM) and Disaster Risk Reduction (DRR). The DM team introduced the first early warning system (EWS), EWS1294, to Cambodia in 2013, collaborating with the National Committee for Disaster Management (NCDM) to support the hazard preparedness of communities vulnerable to flooding. EWS1294 provides important real-time hydrological information from the installed river gauges to national and provincial disaster management authorities. It allows the authorities to inform the population by sending out alert messages to subscribers of phone number 1294, using Interactive Voice Response (IVR) technology. Through close collaboration with both NCDM and PCDMs (provincial level), EWS1294 now provides full national coverage. The World Food Programme (WFP) Cambodia proposes a third phase of the 'Innovations for Risk-Informed Emergency Preparedness and Response' project from April 2021 to March 2022, aiming to strengthen the emergency preparedness and response capacities of key stakeholders. WFP supports PIN to strengthen and expand EWS1294 in Cambodia with improved early warning message dissemination, technical capacity building of NCDM and PCDMs to operate EWS1294 and public awareness.

¹ NCDM and MoP, (2008). Strategic National Action Plan for Disaster Risk Reduction 2008-2013. Phnom Penh: Royal Government of Cambodia.

² GFDRR, (2019). Think Hazard Cambodia. Available at: <http://thinkhazard.org/en/report/44-cambodia/LS>.

³ NCDM & Ministry of Planning, 2008. STRATEGIC NATIONAL ACTION PLAN FOR DISASTER RISK REDUCTION 2008 ~ 2013. Phnom Penh: Royal Government of Cambodia.

⁴ UNDRR, (2015). Global Assessment Report on Disaster Risk Reduction, Geneva: UNISDR

⁵ CFE-DM, (2017). Cambodia: Disaster Management Reference Handbook, Ford Island: Center for Excellence in Disaster Management and Humanitarian Assistance.

⁶ ILO, (2016). Kingdom of Cambodia Decent Work Country Programme (DWCP) 2016–2018, Phnom Penh: International Labour Organization.

⁷ ADPC, (2018). ADPC News Cambodia implements Disaster Management course to prepare for floods.

2 Objectives of the study

The overall objectives of the study were:

- To assess the extent to which is the current system EWS1294 inclusive (accessible, meeting the specific needs of different vulnerable), considering all components of the system and based on the experiences of the current subscribers as well as the perceptions of non-users.
- To identify specific, actionable improvements that PIN and N/PCDMs can introduce in the system to make it more inclusive for different vulnerable groups (recommendations that can be implemented immediately, within 6 months/1 year, long-term policy), incorporating input/suggestions from targeted vulnerable groups.

3 Literature Review

3.1 Flood Vulnerability in Cambodia

The definition of vulnerability provided by the United Nations Office for Disaster Risk Reduction (UNDRR)⁸ is “the conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards”. In this sense, vulnerable groups are not only at risk because they are exposed to a hazard but as a result of marginality, everyday patterns of social interaction and organization, and access to resources. The National Strategy for Disaster Risk Reduction recognizes underlying vulnerabilities as sources of disasters; high prevalence of poverty, remoteness of communities, dependence on agriculture and fisheries as well as exposure to weather-related events all contribute to increased vulnerability in Cambodia⁹. Vulnerability is a defining component of disaster risk as indicated in the formula: $\text{Risk} = (\text{Hazard} \times \text{Exposure} \times \text{Vulnerability}) / \text{Coping capacity}$. This formula can be used when information and data are collected regarding hazards, exposure, vulnerability, and adaptive capacities to respond to hazards in a specific location and time frame. A coping capacity is the ability of people, organizations and systems, using available skills and resources, to manage adverse conditions, risk or disasters¹⁰. The capacity to cope requires continuing awareness, resources and good management, both in normal times as well as during disasters or adverse conditions. Thus, the coping capacities of vulnerable groups are most important to contribute to the reduction of disaster risks. Vulnerability to flooding depends on the ability of individuals or groups to anticipate and adapt to flooding¹¹.

Cambodia is one of the most disaster-prone countries according to the world risk report¹². Cambodia is usually regarded as one of the countries highly exposed to floods. The areas of flooding in Cambodia stem mainly from water flow from the upstream of the Mekong River, in combination with the Tonle Sap Lake annual seasonal flood, tributary flash flood, urban flood, and failure of water infrastructure¹³. Among these factors, flash and riverine floods are classified to characterize the country's flooding. Moreover, Cambodia's vast floodplain is one of the country's most prominent geographical characteristics, and this makes large portions of the country naturally vulnerable to annual flooding, particularly along the Tonle Sap and Mekong River basins¹⁴.

Flooding in Cambodia usually occurs between August and October, and floods are divided into two categories-those due to the overflow of the Mekong River and the Tonle Sap Lake and flash floods caused by rain in the mountains¹⁵. The provinces of Battambang, Kampong Chhnang, Kampong Speu, Kampong Thom, Kampot, Kandal, Pursat, and Rattanakiri are regularly hit by flash flooding. The much slower but prolonged type of riverine flooding is caused by the overflow of Tonle Sap River and Mekong

⁸ UNDRR (2009). Terminology: Basic Terms of Disaster Risk Reduction. Available at: <https://www.undrr.org/terminology/vulnerability>. Accessed on 21 February 2022.

⁹ NCDM and MoP, (2008). Strategic National Action Plan for Disaster Risk Reduction 2008-2013. Phnom Penh: Royal Government of Cambodia.

¹⁰ UNDRR (2009). Terminology: Basic Terms of Disaster Risk Reduction. Available at: <https://www.undrr.org/terminology/capacity>. Accessed on 21 February 2022.

¹¹ Scoones I, (1998). Sustainable rural livelihoods: A framework for analysis, IDS Working Paper 72, Institute of Development Studies, Brighton.

¹² Aleksandrova, M. (2021). World Risk Report 2021. <https://reliefweb.int/sites/reliefweb.int/files/resources/2021-world-risk-report.pdf>

¹³ KEI, (2018). Environmental Sustainability in Asia: Progress, Challenges and Opportunities in the Implementation of the Sustainable Development Goals, Series 2 - Cambodia. Sejong: Korea Environment Institute.

¹⁴ NCDM and MoP, (2008). Strategic National Action Plan for Disaster Risk Reduction 2008-2013. Phnom Penh: Royal Government of Cambodia.

¹⁵ Helmers K and Jegillos S. Linkages between flood and drought disasters and Cambodian rural livelihoods and food security. Cambodian Red Cross Society. Phnom Penh. 2004.

tributaries, inundating the provinces of Kampong Cham, Kratie, Kandal Prey Veng, Stung Treng, Svay Rieng, and Takeo¹⁶. The historical severe flood events affected the Cambodian floodplain (1978, 1991, 1994, 1996, 2000, 2001, 2002, 2011, and 2013). Significant flooding with widespread damage is thought to happen every five years. The aftermath of these flood events exerted considerable complications on Cambodia's economic and social status. According to the National Committee for Disaster Management (NCDM), due to one of the worst floods in Cambodia's history, in the year 2000, 750,618 families had to be evacuated from their homes and of the 347 reported deaths, 80 percent were children, and total physical damage was estimated at \$150 million¹⁷. In 2001, floods caused the death of 62 people (70% children) and an estimated \$20 million in damages, and in 2002, 29 people (40% children) were killed where estimated damages were \$14 million.

In Cambodia, flood is, more often than not, viewed as the most deleterious threat among all hazards, given its high frequency and its adverse impacts by the number of casualties, injuries, and cost of damages. Between 1996 and 2013, there were 3,564 flood occurrences, which is twice more than the occurrences of drought (1,343) and storm (1,585)¹⁸. The damages on all rice paddy fields as a result of floods accounted for 67%, while 31% was a result of droughts. Plus, reported deaths due to floods during the 18-year observation were over a thousand people, far higher than due to other hazards¹⁹.

Another worst flood event ever recorded in 2011 was the consequence of storm rainfall and placed damages upon approximately 400,000 ha of agricultural land. On 10 August 2011, the flood caused 250 fatalities including 83 children, affected 1.6 million people, and damaged 354,217 households²⁰. This flood is said to have been the largest flood since 2000, but Phnom Penh was able to escape severe flood damages²¹. Moreover, the historic flood in 2011 affected many sectors; Transport (\$344.4 million or 57% of the total) and agriculture (\$179.6 million or 29% of the total) were the major sectors with significant damages and monetary damages loss. Other sectors entailed irrigation and water management, rural water and sanitation; in total, Cambodia had to bear over \$500 million for all the said damages. Compared to the events in 2011, floods in 2013 appear to have been less extensive in scale, although the impact was much unfavorable to several provinces. During the 2018 flood event, there were 16 fatalities, 70,448 families affected, and 7,153 of family evacuated²². Various provinces along the Mekong River, including Phnom Penh, suffered from this event.

Recently, on 20 September 2020, the Provincial Committee for Disaster Management (PCDM) reported 237 communes in 51 districts in 10 provinces had been damaged, more than 89,000 households have been affected, and 12,993 evacuated with 14 fatalities²³. Most emergency assistance has been distributed in Tbong Khmum, Kampong Cham, Kratie, and Stung Treng. In early October 2020, the evacuation measure took place mainly in the northwest provinces bordered with Thailand, in which around 262 people were evacuated from their homes in Banteay Meanchey, 1,693 in Pursat, 1,570 in Battambang, with collectively damaged 24,156 households²⁴. As of 26 October 2020, about 175,872 households in 14 provinces, including Phnom Penh, are reported to be affected by flash floods. PCDM

¹⁶ ADRC, 2014. Country Report of Cambodia Disaster Management, Kobe: Asian Disaster Reduction Centre.

¹⁷ NCDM and MoP, (2008). Strategic National Action Plan for Disaster Risk Reduction 2008-2013. Phnom Penh: Royal Government of Cambodia.

¹⁸ NCDM and UNDP, (2014). Cambodia Disaster Loss and Damage Analysis Report 1996–2013 (p. 98). https://www.kh.undp.org/content/cambodia/en/home/library/environment_energy/cambodia-disaster-loss-and-damage-analysis-report-1996---2013/.

¹⁹ UNDRR, (2019). Disaster Risk Reduction in Cambodia: Status Report 2019 [Status report]. United Nations Office for Disaster Risk Reduction. https://reliefweb.int/sites/reliefweb.int/files/resources/68230_1cambodiaupdate16oct2019.pdf

²⁰ ADB, (2012). Flood damage emergency reconstruction: Preliminary damage and loss assessment. Asian Development Bank.

²¹ JICA, (March 2015). Country Report Cambodia. <https://openjicareport.jica.go.jp/pdf/1000023400.pdf>.

²² CHRF, (2018). Cambodia: Cambodia Disaster 2018 Humanitarian Response Forum (HRF) Report - No. 11.

²³ CHRF, 2019. Situation Report No. 1, 2, 3 – Floods in Cambodia (As of 2 October 2019).

²⁴ WFP, (2020). Floods in Cambodia: Version 1.0 – Situation Report No. 1 – Humanitarian Response Forum, As of 12 October 2020.

has sent flood warning alerts via mobile phone to 62,079 subscribers through EWS1294 (Early Warning System '1294'), with an estimated reach of 254,524 people in 12 provinces²⁵.

Box 1: Summary of flood vulnerability in Cambodia

- ✓ The flood areas in Cambodia are mainly from water flow from the upstream of the Mekong River, in combination with the Tonle Sap Lake annual seasonal flood, tributary flash flood, urban flood, and failure of water infrastructure.
- ✓ The provinces of Banteay Meanchey, Battambang, Kampong Chhnang, Kampong Speu, Kampong Thom, Kampot, Kandal, Pursat, and Rattanakiri are regularly hit by flash flooding.
- ✓ The much slower but prolonged type of riverine flooding is caused by the overflow of Tonle Sap River and Mekong tributaries, inundating the provinces of Kampong Cham, Kratie, Kandal, Prey Veng, Stung Treng, Svay Rieng, and Takeo.
- ✓ Significant floods with widespread damage are expected to occur every five years.
- ✓ Between 1996 and 2013, there were 3,564 flood occurrences, which is twice more than the occurrences of drought (1,343) and storm (1,585).
- ✓ Recently, in September 2020, the PCDMs reported 237 communes in 51 districts in 10 provinces had been damaged, more than 89,000 households have been affected, and 12,993 evacuated with 14 fatalities.

3.2 Vulnerable groups in Cambodia

Vulnerable groups and other marginalized communities are often disproportionately affected by shocks²⁶. This study defines a vulnerable group as a population that is in a disadvantaged position due to specific characteristics or experiences of systemic exclusion or oppression, which means they are more likely to suffer more negative effects from natural disasters and require humanitarian assistance. The greater vulnerabilities and lower adaptive capacities of vulnerable groups are the result of political, economic, social and cultural processes and structural inequalities in access to power and resources. Yet, due to lack of data, it is difficult to assess the impacts of disasters on these groups²⁷. It's crucial to acknowledge that disasters affect vulnerable groups in different ways. People's experiences within each vulnerable group may vary based on a variety of factors. When major disaster risks are not addressed, they are absorbed by the affected populations, making the situation worse for the most vulnerable. Vulnerable groups tend to be excluded from disaster management and preparedness efforts, further increasing the risks they face when hazards strike. By including vulnerable groups in disaster management initiatives and addressing their specific needs in this regard, their risks are likely

²⁵ WFP, (2020). Situation Report No. 6 – Humanitarian Response Forum, As of 26 October 2020.

²⁶ The Global Facility for Disaster Reduction and Recovery (GFDRR), (2022). Inclusive Disaster Risk Management & Gender Equality. Available online: <https://www.gfdr.org/en/inclusive-drm>. Accessed on 21 February 2022.

²⁷ UNDRR (2019). Disaster Risk Reduction in Cambodia: Status Report 2019. Bangkok, Thailand, United Nations Office for Disaster Risk Reduction (UNDRR), Regional Office for Asia and the Pacific. Available at https://reliefweb.int/sites/reliefweb.int/files/resources/68230_1cambodiaupdate16oct2019.pdf

to be reduced. In this sense, risk awareness, warning dissemination and emergency preparedness plans should incorporate the specific needs of vulnerable groups²⁸.

Cambodia Disaster Management Law defines a vulnerable group as those members of a society who are socially disadvantaged or at greater risk of suffering from one or more of the problems afflicting that society²⁹. Hence, the Cambodian Government's National Social Protection Strategy for the Poor and Vulnerable (2011-2015)³⁰ identifies the following vulnerable groups: infants and children, orphans, working children, girls and women, single mothers, widows, pregnant women, households vulnerable to food insecurity and unemployment, indigenous and ethnic minorities, the elderly, people with chronic diseases (including HIV), people living with disabilities, victims of violence (including abuse and exploitation), migrant families, the homeless and veterans. The most vulnerable groups in Cambodia are street children, people living with disabilities, homeless women, elderly people without support, single parents with many children, sex workers, ethnic minorities, women and girls who are victims of sexual violence.

For the purpose of this impact assessment on EWS1294 reach on vulnerable groups, 4 vulnerable groups were considered: women, the elderly, people with disabilities (PwD), and indigenous/minority groups. This selection was made on the basis that these vulnerable groups represent a significant portion of the population, regularly affected by disaster risks. Thus, these vulnerable groups are and should be reached by the EWS1294 system.

Women

In Cambodia, over 7.9 million population is female, representing 51.3 percent of the country's total population in 2019³¹. Yet, women are still among the vulnerable groups that experience more disadvantage, marginalization and inequality. For example, there are a number of barriers to women's empowerment in Cambodia, including the lack of monetary and societal recognition of the domestic work they perform, but also lower educational investment as evidenced by lower levels of literacy, and limited access to the resources and power structures necessary for economic and political empowerment³². As a result of this systematic gender inequality, Cambodian women are more vulnerable to shocks and risks than men. Women's vulnerabilities vary over the course of their lives, exposing them to varying degrees of disaster risks³³. Moreover, women experience different vulnerabilities depending on their characteristics, hence the need for an intersectional analysis.

Elderly

The elderly in Cambodia have lived through very difficult times with civil war, political violence, dislocation and poverty resulting from the Khmer Rouge regime. Many of those killed during that violent period (the majority of them male) were the children or spouses of today's older generation. In 2019, over 1.3 million Cambodians were aged over 60 which is 8.9% of the country's total population³⁴. Cambodia's older people face multiple sources of vulnerability. These include low incomes, functional disabilities, health problems, social isolation, and limited opportunities to

²⁸ ADB (Asian Development Bank). DISASTER RISK MANAGEMENT IN CAMBODIA. Available at <https://www.adb.org/sites/default/files/linked-documents/46009-003-sd-02.pdf>

²⁹ CFE-DM, (2020). Cambodia: Disaster Management Reference Handbook, Ford Island: Center for Excellence in Disaster Management and Humanitarian Assistance.

³⁰ National Institute of Statistics (2011). National Social Protection Strategy for the Poor and Vulnerable. Phnom Penh, Cambodia.

³¹ National Institute of Statistics, Ministry of Planning (2019). General Population Census of Cambodia 2019 (Final Results). Phnom Penh, Cambodia.

³² ADB (Asian Development Bank) (2015). Promoting Women's Economic Empowerment in Cambodia. Available at <https://www.adb.org/sites/default/files/publication/156499/promoting-womens-economic-empowerment.pdf>

³³ ADB (2015). Promoting women's economic empowerment in Cambodia. Mandaluyong City, Philippines: Asian Development Bank. Available at <https://www.adb.org/sites/default/files/publication/156499/promoting-womens-economic-empowerment.pdf>

³⁴ National Institute of Statistics, Ministry of Planning (2019). General Population Census of Cambodia 2019 (Final Results). Phnom Penh, Cambodia.

participate in civic life. In a survey, two-thirds of older Cambodians rated their own health as poor or very poor, since their access to appropriate and regular health care is limited³⁵. In comparison to neighboring Asian countries, Cambodia's elderly has lower health status. Given their specific needs, the elderly needs access to special care and social protection mechanisms. Older women are more vulnerable: 10% of older women are the only adult in the household, compared to only 2% of older men³⁶.

Persons living with disabilities

The concept of disability, based on the WHO, is dynamic, multidimensional and very complex³⁷. It covers extremely different life experiences, and intersects with other social characteristics. There are over 300,000 people living with disabilities in Cambodia. About 2.1 percent of Cambodians live with at least one disability³⁸. Yet, global estimates and experts indicate that disability might be under-reported in Cambodia. The percentage of men living with disabilities (52.2 %) is higher than that of women (47.8 %). As a post-conflict country, Cambodia is subject to a number of risk factors that can lead to a high prevalence of disability. Because of the systematic exclusion of people with disabilities, their vulnerabilities accumulate. For example, landmine victims in Cambodia live with disabilities after their accident and lack access to education, training, employment, and physical and mental services³⁹.

People with disabilities are disproportionately vulnerable to disaster risks on the short and longer term⁴⁰. They are vulnerable as a result of society's failure to consider their needs and possibly their systematic marginalization in society's organization. Indeed, person with disabilities do not have full access to resources, social networks, support systems, and communities that enable them to cope with disasters. Poverty, restricted access to good health, education, sanitation, and social safety net services increase their vulnerability to disaster risks. For persons with disabilities of low and middle-income-based countries, hazards escalate to disasters and rob them of their capital and social support structure and are more likely to experience adverse socio-economic outcomes than persons without disabilities⁴¹. This increased vulnerability to disaster risk is exacerbated by the fact that their specialized requirements are frequently overlooked in disaster management and response strategies, putting them at even greater danger.

According to a research done in Cambodia in 2020⁴², women with disabilities are disproportionately affected by disasters and have the least access to institutional assistance during disaster planning, response, and recovery.

Indigenous/Minority Groups

Cambodia is a multi-ethnic society with a majority of Khmer, plus Vietnamese, Cham, Chinese, and indigenous peoples⁴³. Khmer people make up 90 percent of the population in Cambodia. Non-Khmer groups include the Vietnamese (5%), Chinese (1%), Cham (1%) and hill tribes (3%) that mainly live in

³⁵ National Institute of Statistics. 2012. Demographics of Population Ageing in Cambodia, 2012. Phnom Penh: UNFPA.

³⁶ National Institute of Statistics (2011). National Social Protection Strategy for the Poor and Vulnerable. Phnom Penh, Cambodia.

³⁷ World Health Organization, (2011). Summary World Report on Disability, World Health, Geneva.

³⁸ National Institute of Statistics, Ministry of Planning (2013). Cambodia Inter-Censal Population Survey. Phnom Penh, Cambodia.

³⁹ UNDP. Disability Rights Initiative Cambodia (DRIC). Website accessed September 30, 2020. https://www.kh.undp.org/content/cambodia/en/home/operations/projects/democratic_governance/disability-rights-initiative-cambodia.html

⁴⁰ World Bank and GFDRR. Disability Inclusion in Disaster Risk Management. Available at <https://reliefweb.int/sites/reliefweb.int/files/resources/Disability%20GFDRR%20DRM%20paper%20Oct%2021%20MA.pdf>

⁴¹ Chisty, M.A., Nazim, A., Rahman, M.M., Dola, S.E.A. and Khan, N.A. (2021). Disability inclusiveness of early warning system: a study on flood-prone areas of Bangladesh. Disaster Prevention and Management, Vol. 30 No. 4/5, pp. 494-509. <https://doi.org/10.1108/DPM-05-2021-0177>

⁴² Gartrell, A., Calgaro, E., Goddard, G., & Saorath, N. (2020). Disaster experiences of women with disabilities: Barriers and opportunities for disability inclusive disaster risk reduction in Cambodia. Global Environmental Change, 64, 102134.

⁴³ ADB, (2002). INDIGENOUS PEOPLES/ETHNIC MINORITIES AND POVERTY REDUCTION CAMBODIA. Available at <https://www.adb.org/sites/default/files/publication/28021/indigenous-peoples-cambodia.pdf>

the northeastern mountains⁴⁴. Indigenous ethnic minorities in Cambodia are variously referred to as ethnic minorities, hill tribes, highlanders, highland people, indigenous people, and Khmer Leu. They often call themselves *Choncheat*⁴⁵. The Cambodian National Institute of Statistics' 2013 survey estimated that there are around 400,000 indigenous people, representing between 2 to 3 per cent of the country's total population⁴⁶. The largest indigenous communities are the Kuy, Mnong, Stieng, Brao, Tampuan, Pear, Jarai and Rade communities. The first five speak Mon-Khmer languages, whereas Jarai and Rade are both languages of the Malayo-Polynesian branch of the Austronesian language family.

Ethnic minorities face higher poverty rates than the national average. Moreover, they suffer non-monetary barriers such as language, remoteness, and discrimination. In order to meet their specific needs, special attention must be paid to their social protection requirements, with the adaptation of programs to cultural norms and the implementation of appropriate targeting mechanisms (e.g., geographic)⁴⁷.

The literature review on flood vulnerability and vulnerable groups in Cambodia highlights key elements to be considered in this impact assessment. Exclusionary social processes cause heightened risk exposure and reduce resilience. Therefore, disaster risk reduction practices can contribute to greater social equity if addressing the needs of the most vulnerable. Inclusive disaster risk reduction must deliver support to those most at risk. Understanding root causes of vulnerable groups' marginalization is critical to not further exacerbate their exclusion in disaster risk reduction efforts. In this regard, it is critical to ensure that EWS1294 is inclusive of vulnerable populations, which is why this impact assessment has been conducted.

Box 2: Summary on vulnerable groups in Cambodia

- ✓ Cambodia Disaster Management Law defines a vulnerable group as those members of a society who are socially disadvantaged or at greater risk of suffering from one or more of the problems afflicting that society.
- ✓ The most vulnerable groups in Cambodia are street children, people living with disabilities, homeless women, elderly people without support, single parents with many children, sex workers, ethnic minorities, women and girls who are victims of sexual violence.
- ✓ For the purpose of this impact assessment on EWS1294 reach on vulnerable groups, 4 vulnerable groups were considered: women, the elderly, people with disabilities (PWD), and indigenous/minority groups.

⁴⁴ MINORITIES IN CAMBODIA. Available at https://factsanddetails.com/southeast-asia/Cambodia/sub5_2c/entry-2932.html. Accessed on 22 February 2022.

⁴⁵ ADB, (2002). INDIGENOUS PEOPLES/ETHNIC MINORITIES AND POVERTY REDUCTION CAMBODIA. Available at <https://www.adb.org/sites/default/files/publication/28021/indigenous-peoples-cambodia.pdf>

⁴⁶ National Institute of Statistics, Ministry of Planning (2013) Cambodia Inter-Censal Population Survey. Phnom Penh, Cambodia.

⁴⁷ National Institute of Statistics (2011). National Social Protection Strategy for the Poor and Vulnerable. Phnom Penh, Cambodia.

3.3 Early warning systems (EWS) in Cambodia and other regional countries

3.3.1 Early warning system (EWS)

The United Nations Office for Disaster Risk Reduction (UNDRR)⁴⁸ defines an early warning system as “an integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enables individuals, communities, governments, businesses and others to take timely action to reduce disaster risks in advance of hazardous events”.

The Third International Conference on Early Warning held in Bonn, Germany from 27 to 29 March 2006, organized by UNDRR⁴⁹ described the current concept of effective, "end-to-end" and "people-centered" early warning systems as including four key interrelated elements:

- 1) Disaster risk knowledge based on the systematic collection of data and disaster risk assessments;
- 2) Detection, monitoring, analysis and forecasting of the hazards and possible consequences;
- 3) Dissemination and communication, by an official source, of authoritative, timely, accurate and actionable warnings and associated information on likelihood and impact; and
- 4) Preparedness at all levels to respond to the warnings received.

These four interrelated components need to be coordinated within and across sectors and multiple levels for the system to work effectively. A feedback mechanism would support the continuous improvement of the system. Failure in one component or a lack of coordination across them could lead to the failure of the whole system.

⁴⁸ UNDRR (2009). Terminology: Basic Terms of Disaster Risk Reduction. Available at: <https://www.undrr.org/terminology/early-warning-system>. Accessed on 21 February 2022.

⁴⁹ UNDRR (2006). Developing Early Warning Systems: A Checklist. Proceeding of the Third International Conference on Early Warning (EWC III). Bonn, Germany. Available at: <https://www.unisdr.org/2006/ppew/info-resources/ewc3/checklist/English.pdf>.

RISK KNOWLEDGE Systematically collect data and undertake risk assessment <ul style="list-style-type: none"> • Are the hazards and vulnerabilities well-known? • What are the patterns and trends in these factors? • Are risk maps and data widely available? 	DETECTION, MONITORING & WARNING SERVICE Develop hazard monitoring and early warning services <ul style="list-style-type: none"> • Are the right parameters being monitored? • Is there a sound scientific basis for making forecasts? • Can accurate and timely warnings be generated?
DISSEMINATION & COMMUNICATION Communication risk information and early warning <ul style="list-style-type: none"> • Do warnings reach everyone that is at risk? • Are the risks and warning understood? • Is the warning information clear and useable? 	RESPONSE CAPACITY Build national and community response capacity <ul style="list-style-type: none"> • Are response plans up-to-date and tested? • Are local capacities and knowledge made use of? • Are people prepared and ready to react to the warning?

Figure 1. The components of an Early Warning Systems (EWS)

3.3.2 EWS1294, Cambodia’s Early Warning System

Early Warning System (EWS) 1294 is a life-saving system that provides accurate and timely flood information to national and provincial authorities, and allows them to easily and quickly disseminate reliable warning messages to at-risk communities regarding climatic or societal hazards.

Several floods in the 2000s and 2010s severely affected the lives and livelihoods of Cambodian people in about 20 provinces. According to a study by the Ministry of Environment (2011)⁵⁰ following the 2010 floods, 36% of Cambodians did not receive any information about the risk, and 72% of Cambodians who received warnings received them too late. In 2013, flooding affected more than 1.8 million people across 20 provinces in Cambodia. During this time, many families were unprepared for the intensity of the storms, nor were they aware of the severity of the flooding, affecting their lives and livelihoods.

Recognizing that the lack of flood information and warnings prevented families from preparing for floods, resulting in significant human and economic losses, People in Need (PIN) further supported the Royal Government of Cambodia (RGC) in disaster risk reduction and flood resilience. Thus, began the story of EWS1294 in 2013, in response to the absence of any structured early warning system in Cambodia. Named after the mobile short code “1294”, EWS1294 began first as a voice-based mobile phone early warning information dissemination system piloted in three flood-prone villages in Pursat province in 2013. Over the past 9 years, and thanks to support from international donors and close collaboration with NCDM, EWS1294 has seen progress in its expansion across Cambodia and successfully disseminated more than 774,400 alerts to the 120 000 users registered in the system. EWS1294 is now officially recognized and owned by the Royal Government of Cambodia as the national early warning system, covering all Cambodian provinces.

⁵⁰ Ministry of Environment, Kingdom of Cambodia. *Understanding Public Perceptions of Climate Change in Cambodia*, January 2011, p.13.

3.3.3 Other examples of Early Warning Systems in Asia

A similar system had been established in Bangladesh for Flood Forecasting and Warning Centre (FFWC) in 1972 as a permanent entity under the Bangladesh Water Development Board (BWDB) to reduce the loss of life and economic damage caused by riverine floods. It started by evaluating the current early warning system, particularly the use of mobile services, secondly by choosing different means to improve communication potentially, and thirdly by testing and evaluating these improvements in a pilot, Bangladesh⁵¹. The two methods chosen were Interactive Voice Response (IVR) for top-down warning dissemination from national to district and local levels simultaneously and Short Message System (SMS) for bottom-up water level data collection from the local to national level. Moreover, several studies tried to improve the flash flood early warning system⁵² and the social performance of flash flood early warnings using mobile services⁵³. Studies have shown that mobile services are the preferred means of alert communication. Communities clearly prefer voice SMS and IVR because of the ease of access and understanding of the message. Text-based services such as SMS and cellular broadcast services (CBS) were found to be acceptable because communities can access flood information directly without paying for this service.

An early warning system in Nepal explored another approach with the development of a telemetry system for real-time data acquisition. Practical Action has been working in Nepal since 2002 and implementing the flood EWS⁵⁴. With over half a century of experience, the system has grown from a pilot project to an effective early warning system saving lives and property in many communities. In another study, a community-based flood early warning system (CBFEWS) was explored, enabled by wireless technology. This system allows local communities to reduce disaster risks and people's physical and social vulnerability⁵⁵. The progress of the CBFEWS was evaluated considering the four major elements of an effective early warning system—community risk assessment, monitoring and early warning, dissemination and communication, response capabilities.

Finally, the Indian National Flood Forecasting and Warning Network of the Central Water Commission (CWC) disseminates forecasts through email, SMS and its website to various agencies including state and central government engineering agencies such as irrigation, revenue, railways, public utilities, dam authorities, district magistrates and subdivisional officers, and defense authorities involved in flood mitigation works⁵⁶.

Box 3: Summary of the EWS in Cambodia and other regional countries

- ✓ Since 2013, EWS1294 was developed by PIN in collaboration with NCDM and support from international donors.
- ✓ EWS1294 is now officially recognized and owned by the Royal Government of Cambodia as the national early warning system, covering all Cambodian provinces.

⁵¹ Cumiskey, L., Altamirano, M., & Hakvoort, H. (2014). Mobile services for flood early warning, Bangladesh: Final Report. Deltares, Cordaid, RIMES, Flood Forecasting and Warning Center, The Netherlands.

⁵² Anik Pal, Mohammad Jakariya, Mohammad Abdur Rahman, Munjira Yeasmin, (2018). Improve the Flash Flood Early Warning System in the North-Eastern Parts of Bangladesh. American Journal of Biological and Environmental Statistics. Vol. 4, No. 3, pp. 91-97. doi: 10.11648/j.ajbes.20180403.12

⁵³ Cumiskey, L., Werner, M., Meijer, K., Fakhruddin, S. H. M., & Hassan, A. (2015). Improving the social performance of flash flood early warnings using mobile services. International Journal of Disaster Resilience in the Built Environment.

⁵⁴ Gurung, G. (2016). Flood Early Warning System in Practice: Experiences of Nepal. Kathmandu, Nepal: Practical Action.

⁵⁵ Pradhan, NS; Bajracharya, N; Bajracharya, SR; Rai, SK; Shakya, D (2016). Community based flood early warning system – Resource manual. Kathmandu: ICIMOD

⁵⁶ Rahman, M., Action, O. P., Gurung, G. B., & Ghimire, G. P. (2018). Trans-border Flood Early Warning System in South Asia: Practices, Challenges and Prospects. Practical Action South Asia Regional Office.

- ✓ Since 2014, EWS1294 successfully disseminated more than 774,400 alerts to the 120 000 users registered in the system.
- ✓ The Flood Forecasting and Warning Centre developed in Bangladesh opted for SMS and IVR mobile services because of the ease of access and understanding of the message.
- ✓ Practical Action has been developing the Flood EWS in Nepal since 2002 as a community-based flood early warning system (CBFEWS) enabled by wireless technology.
- ✓ India's national flood forecasting and warning network of the Central Water Commission (CWC) disseminating forecasts by email, SMS and website to relevant agencies.

3.4 Inclusive early warning systems (EWS)

Early warning systems (EWS) and disaster risk reduction (DRR) are the most effective strategies for reducing risks for vulnerable populations in the case of a hazardous event⁵⁷. It is vital to build people's coping capacities by offering early warning and early response. To do so, vulnerable groups must be particularly included.

For the purpose of this impact assessment, identifying the fundamental components and characteristics of an inclusive early warning system is the foundation for assessing the inclusiveness of EWS1294 more specifically. An inclusive EWS is an integrated system of hazard monitoring, warning dissemination, and emergency preparedness that allows all communities, even the most vulnerable, to take prompt action to reduce disaster risks before hazardous events occur. As previously stated, it is critical to include vulnerable groups and address their specific needs in all disaster risk management and reduction efforts in order to ensure that such life-saving initiatives do not further marginalize or exclude vulnerable groups, exacerbating their initial vulnerabilities.

Reviewing attempts to assess the inclusivity of EWSs is the first step toward identifying the main research questions and findings on this topic⁵⁸. In other Asian countries, a gender analysis of Pakistan's flood EWS revealed that more work was required to successfully deploy a people-centered, gender-sensitive EWS. The biggest hurdles to achieving this goal are increasing citizen participation and closing the communication gap between official jargonistic early warning communications and populations at risk. The study's key conclusion is that special efforts should be made to target disadvantaged groups in order to assure their inclusion. An inclusive EWS should consider different vulnerabilities, needs and coping capacities of vulnerable populations as inflected by intersections of socio-economic resources, gender, ethnicity, age and location⁵⁹. Another study was conducted in Bangladesh to assess the disability inclusiveness of the current EWS in flood-prone areas⁶⁰. The main findings show that people with disabilities have a qualitative knowledge of risks, but there is room for improvement in the inclusivity of monitoring and warning services, dissemination, communication and response capacity. Response capacity was identified as a major gap. A study also conducted in Bangladesh provides recommendations for improving the social performance of warnings using mobile services in flash flood prone communities. The concept of “social performance of warnings” means that early warnings

⁵⁷ Osterwalder, K., Yea Cha, J., Pickles, J., Batchelor, C., & Stowe, C. (2021). Towards disability transformative Early Warning Systems: Barriers, challenges, and opportunities.

⁵⁸ Irfan Ahmad Rana, Saad Saleem Bhatti & Ali Jamshed (2020): Effectiveness of flood early warning system from the perspective of experts and three affected communities in urban areas of Pakistan, *Environmental Hazards*.

⁵⁹ Daanish Mustafa, Giovanna Gioli, Suleman Qazi, Rizwana Waraich, Abdul Rehman & Rashda Zahoor (2015): Gendering flood early warning systems: the case of Pakistan, *Environmental Hazards*, DOI: 10.1080/17477891.2015.1075859

⁶⁰ Chisty, M.A., Nazim, A., Rahman, M.M., Dola, S.E.A. and Khan, N.A. (2021). Disability inclusiveness of early warning system: a study on flood-prone areas of Bangladesh. *Disaster Prevention and Management*, Vol. 30 No. 4/5, pp. 494-509. <https://doi.org/10.1108/DPM-05-2021-0177>

are effective if they are received, understood and responded to by those at risk. This study demonstrated that the means of dissemination were critical to the inclusivity of an EWS, recommending dissemination by IVR and SMS⁶¹.

According to the findings of the literature review, certain particular considerations regarding inclusive EWS should be regarded:

- A rigorous study is needed to identify the gaps in EWS¹²⁹⁴ as an inclusive system.
- All components of an alert system, such as ways of broadcasting alerts, promotional campaigns for vulnerable groups, disaster preparedness plans and trainings, and so on, must be assessed in such study.
- Vulnerable groups should be particularly targeted to ensure that their specific needs are addressed and that the system is accessible to them.
- Involving vulnerable groups in the design of the system is key to ensure that the components of the system are inclusive. For instance, various means of dissemination could be relevant to the vulnerable groups' needs such as wireless radios, local traditional dissemination (drum, sneng horn flute), colored flags/light, hand mikes, FM radio and television stations.
- Ensuring the participation of vulnerable groups in all impact assessments is essential to monitoring the progress of an inclusive early warning system.
- Vulnerable populations should be targeted in emergency preparedness activities, with training and the organization of a coordinated and supportive response from rescue teams.
- Policies that defend disadvantaged groups' rights and encourage greater inclusion are critical.

Box 4: Summary of findings on inclusive EWS

- ✓ Early warning systems (EWS) and disaster risk reduction (DRR) are the most effective strategies for reducing risks for vulnerable populations in case of a hazardous event.
- ✓ It is critical to include vulnerable groups and address their specific needs in all disaster risk management and reduction efforts in order to ensure that such life-saving initiatives do not further marginalize or exclude vulnerable groups, exacerbating their initial vulnerabilities.
- ✓ All components of an alert system, such as ways of broadcasting alerts, promotional campaigns for vulnerable groups, disaster preparedness plans and trainings, and so on, must be assessed in such study.
- ✓ Vulnerable groups should be particularly targeted to ensure that their specific needs are addressed and that the system is accessible to them.
- ✓ Involving vulnerable groups in the design of the system is key to ensure that the components of the system are inclusive.
- ✓ Policies that defend disadvantaged groups' rights and encourage greater inclusion are critical.

⁶¹ Cumiskey, L., Werner, M., Meijer, K., Fakhruddin, S. H. M., & Hassan, A. (2015). Improving the social performance of flash flood early warnings using mobile services. *International Journal of Disaster Resilience in the Built Environment*.

4 Methodology of the study

4.1 Data collection tools

For the purpose of the impact assessment on EWS1294 reach on vulnerable groups, the following data collection tools were considered:

- Desk review
- Site reconnaissance
- Focus Group Discussions (FGDs) and
- Key Informant Interviews (KIIs)

4.1.1 Desk review

To support the methodology and data analysis, the literature review yielded the following key findings:

- Flood Vulnerability in Cambodia
- Vulnerable groups in Cambodia including women, elderly, persons living with disabilities and indigenous/minority Groups.
- Early warning system (EWS) in Cambodia and other Asian countries
- Inclusive early warning systems (EWS)

4.1.2 Site reconnaissance

The EWS1294 system covers all provinces of Cambodia. The following criteria have been considered to select the locations targeted for the study:

- Provinces targeted by concluded/ongoing EWS projects;
- Provinces targeted by incoming EWS projects;
- Geographical coverage, including southern and northern provinces;
- Equitable representation of both urban and rural locations;
- Inclusion of both areas that are typically hardly affected by floods and areas where flood events are milder

Selected locations for the impact assessment were located in Prey Veng province, Stung Treng province, Koh Kong province, and Battambang province (Table 1).

Site reconnaissance was conducted at the same place and date as the field interviews. The main objective of site reconnaissance was to gather a geographical understanding of the disaster-prone areas in the selected locations and identify the people affected by such events. Site reconnaissance served to update population statistics, identify at-risk populations, select participants for the KIIs and FGDs, and possibly collect preliminary information from populations about their experiences with EWS1294.

Table 1: List of targeted locations for data collection

N	Province	Location	Geographi area	Geography in Cambodia
1	Prey Veng	Angkor Angk commune, Peam Chor District	Rural area and neighbourhood	Cambodian Mekong Delta and close to Lower Mekong River
2	Battambang	Sangkat Ratanak and Sangkat Sla Ket, Battambang town	Urban neighbourhood	Located in Tonle Sap Lake basin and one of the most frequent floods in the basin
3	Stung Treng	Sangkat Sameaki, Krong Stueng Treng	Urban	Represent the Mekong River Basin in Cambodia (upper part in Cambodia)
4	Koh Kong	Pak Khlang commune, Mondol Seima District	Rural coastal area	Represent the coastal area which is likely hazard to tidal effect.

4.1.3 Focus Group Discussions (FGDs)

Vulnerable groups were defined based on demography, gender, age and other relevant characteristics impacting vulnerability and exposure to risks and specific societal composition of each targeted location. As detailed earlier, 4 vulnerable groups were specifically considered for this impact assessment: women, elderly, people living with disabilities and minority/indigenous groups (Table 2). Two FGDs were conducted in each targeted location, targeting two different vulnerable groups. FDGs gathered from 6 to 8 people each. The selected groups differed in terms of culture (religious, national and indigenous minorities), gender (women), or other characteristics (people with disabilities, and the elderly). An intersectional approach was adopted, taking into account vulnerabilities related to gender and other social categorizations.

Table 2: Vulnerable groups targeted for the impact assessment

Group	Age	Notes
Adult women	18-55	
Elderly	> 56	Subscribers and non-subscribers were submitted different sets of questions
People with disabilities (PWDs)	>18	
Indigenous Groups and Religious minorities	>18	

The questionnaires of the FDGs were specifically designed to collect experiences and feedback from both users and non-users⁶². Input and suggestions from FGD participants were collected on (but not limited to):

- Experience with EWS1294 (users)
- Satisfaction level towards EWS1294 (users)
- Challenges/gaps in using EWS1294 (users)

⁶² Users are defined as individuals who have registered for the EWS1294 platform; non-users are defined as individuals who are aware of the existence of the EWS1294 platform, but have not registered.

- Specific barriers to using or subscribing to EWS1294 (non-users)
- Recommendations from both users and non-users on how to improve the inclusiveness of EWS1294

The FDGs were held in communal halls or in places arranged by the village chief and PIN. The FDGs were mediated by a moderator who followed a pre-prepared questionnaire to ensure that the debate stayed on course and that all participants participated. The team made notes on the conversation based on the questionnaire and criteria discussed in advance, and a log of participants' attendance was kept.

4.1.4 Key Informant Interview (KIIs)

Key Informant Interviews (KIIs) were conducted with both subscribers and non-subscribers, in all targeted locations, for all vulnerable groups considered in this impact assessment. Two questionnaires were prepared for subscribers and subscribers, and included 6 sections:

- General Information
- Risk Knowledge
- Detection, Monitoring and Warning Service
- Dissemination and Communication
- Response Capacity

The KIIs were held in communal halls or in places arranged by the village chief and the PIN. While most KIIs were held in the community hall, door-to-door interviews were conducted to ensure representation of people with limited mobility (specifically women, the elderly and person living with disabilities). The interviewer ensured that subscribers had a safe space and quality time to share their experiences with EWS1294. Hence, each KIIs lasted between 20 and 25 minutes.

4.2 General approach to data collection

The data collection sites were located in Angkor Angk commune hall (Prey Veng province), Sangkat Sla Ket hall (Battambang province), Sangkat Sameakki hall (Stung Treng province), and Pak Khlang commune hall (Koh Kong province). The date and time of data collection were from 02-March-2022 to 07-March-2022 and between 8:30 and 11:00 am in the commune hall of each province, as summarized in Table 3 below.

Table 3: Data collection information for each location

N°	Location of data collection	Date and time of data collection	Data collection site
1	Angkor Angk commune, Peam Chor District	02-March-2022 8:30-11:00	Angkor Angk commune hall
2	Sangkat Ratanak and Sangkat Sla Ket, Battambang town	04-March-2022 8:30-11:00	Sangkat Sla Ket hall

3	Sangkat Sameakki, Krong Stueng Treng	07-March-2022 8:00-11:00	Sangkat Sameakki hall
4	Pak Khlang commune, Mondol Seima District	07-March-2022 8:30-11:00	Pak Khlang commune hall

The purpose of the study was explained to participants before they gave verbal consent to the investigator. In addition, the study team made a commitment to the participants to protect their privacy and not to disclose specific information about their opinions. FGDs and KIIs were conducted until data saturation, i.e., until repetition of participants' stories became evident.

All FGDs and KIIs were done in Khmer before being translated into English for data analysis. The transcribed FGDs and KIIs texts were read numerous times in order to fully comprehend the transcribed and translated data. Data collections were generated by evaluating the study's goal. Data collected was clustered into sections and subsections of vulnerable groups.

After all the data was collected from the FGDs and KIIs for different vulnerable groups (women, the elderly, people with disabilities and indigenous/religious minorities groups), the data was tabulated into an excel sheet, and statistical analysis was carried out by Microsoft Office Excel 2016. The collected data was plotted as a graph/table and analyzed for different vulnerable groups. Moreover, the data was answered for separate questionnaires based on subscribers and non-subscribers of EWS1294

The findings were explained based on the FGDs and KII data from different vulnerable groups with subscribers and non-subscribers of EWS1294, which was established as a description of the key issues identified. During the interpretative analysis, a series of feedback sessions with members of the FGDs and KIIs were contributed to improving the validity of the study. A range of analyses was performed to investigate experience within and across sites in relation to significant problems.

5 Findings of the study

5.1 Data collected through the assessment

5.1.1 Flood hazards in the targeted locations

The impact assessment focused on four different locations in four provinces; thus, the nature of the hazard (flood information) is different. Flood events' information (i.e. frequency, severity, vulnerability, damages, and losses) was obtained from the local people interviewed in each community and summarized in Tables 4 to 7.

Table 4: Flood information in Angkor Angk commune, Peam Chor District, Prey Veng Province

Frequency	Severity	Vulnerability	Damages
Angkor Angk commune has experienced floods every year. Typically, it is a seasonal flood that occurs during the rainy season which is caused by the overflow from the Mekong River.	The flood is usually severe since the inundation lasts about two months, and the flood depth is relatively high.	Angkor Angk commune is very vulnerable to flood hazards since it is the lowland area near the Mekong River and also has a stream connected from the Mekong River.	The commune is often affected by floods. The damages from the floods are significant since there are only two safe places for evacuation (Commune Hall and Pagoda). Moreover, the floods also affect the rice field in the commune, with consequent economic losses. There were livestock and household equipment losses when the floods occurred.

Table 5 Flood information in Sangkat Ratanak and Sla Ket, Ballamberg town

Frequency	Severity	Vulnerability	Damages
The overflow of water from the Sangkae River floods the communes every year, usually in September.	The flood is considered mild since the flood depth is not excessive. Only a few places along the Sangkae River experience extreme flooding.	The areas are relatively vulnerable to flood hazards due to their location and low resilience capacity.	Some areas are affected by the flood, and some zones have never experienced a flood before. The damages from the floods depended on specific areas since the elevation of the region varies from location to location. Moreover, both communes have no significant losses due to the floods.

Table 6: Flood information in Sangkat Sameakki, Krong Stueng Treng, Stueng Treng Province

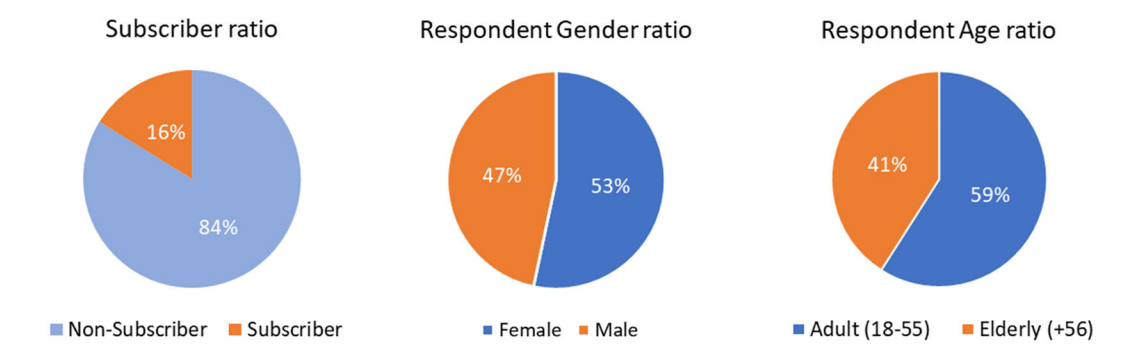
Frequency	Severity	Vulnerability	Damages
The floods frequently happened in the past. However, for the last few years, there was no evidence of flood occurring in the region.	The severity of the previous flood events was rather high as the duration was lasted up to a month with a flood depth of 2 to 3 meters.	Sameakki commune is very vulnerable to flood hazards due to the topography and location of the area being low-lying and located along the Mekong River and the downstream region of the 3S Rivers.	Flood in this region normally causes some damage to the livelihoods, livestock, paddy fields, and infrastructures. There was a significant loss in the commune in the past floods.

Table 7: Flood information in Pak Khlang commune, Koh Kong Province

Frequency	Severity	Vulnerability	Damages
The tidal floods frequently occur in Pak Khlang commune and normally happen during November.	Even though the commune is located along the sea bank, the severity of the flood disaster is not intensive.	The commune is partly vulnerable to tidal floods. Even though it happens frequently and unexpectedly, most of the commune villagers are already adapted to it.	The damages of tidal floods are not serious since the flood duration is not long. There are some losses due to tidal floods, but it is not significant.

5.1.2 General information on respondents

Figure 2 summarizes extensive information from KIIs respondents, including subscribers, genders, ages, physical disabilities, respondent education level, minority groups, and detailed minority groups ratio. 84% of the participants were not subscribers to EWS1294, owing to a lack of awareness of the system, compared to 16% who were. The subscribers are mainly members of the communal council who have attended previous trainings. About 53% of the respondents are females, while 47% are males, according to the study results. In terms of age, 59 percent of the participants were between the ages of 18 and 55, and 41% were beyond the age of 56. In addition, around 11% of the respondents were disabled. 76 percent of those polled said they were not from a minority or indigenous group, while 24 percent said they were from one.



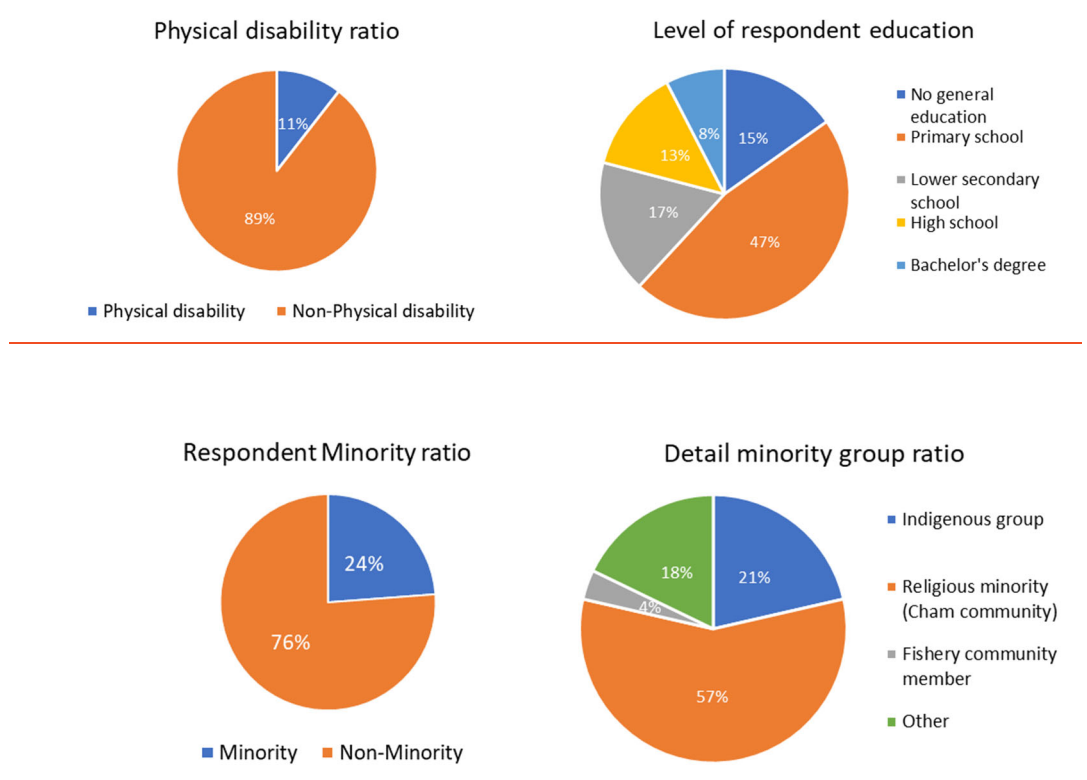


Figure 2: Respondent detailed information (KIIs) including subscriber ratio, gender ratio

- Focus Group Discussions (FGDs)

Focus Group Discussions (FGDs) collected information regarding: comprehension of EWS, understanding of disaster warnings received through EWS, actions or non-actions taken by vulnerable groups, processes, and significant obstacles.

Table 8 shows the number of focus groups conducted per targeted site, as well as the age and gender of the participants. In each province, two focus groups with two separate vulnerable groups were held. There were a total of eight focus groups, including two for women, three for the elderly, one for persons with disabilities (PWDs), one for the Cham community, and one for indigenous people. There were 6–7 persons per FGD, comprising ladies and males, with ages ranging from 18 to 55 years old and older than 56 years old.

Table 8: Number of FGDs and composition

Location for study	Targeted groups	Number of people per FGDs	Gender		Age	
			Female	Male	Adult (18-55)	Elderly (+56)
Angkor Angk commune, Peam Chor District, Prey Veng Province	1. Women	6	6	0	6	0
	2. Elderly	6	4	2	1	5
Sangkat Ratanak and Sangkat Sla Ket, Battambang town, Battambang Province	1. Cham Community	7	5	2	5	2
	2. PWDs	6	1	5	1	5
Sangkat Sameakki, Krong Stueng Treng,	1. Indigenous	7	1	6	4	3

Stueng Treng Province	2. Elderly	7	3	4	0	7
Pak Khlang commune, Mondol Seima District, Koh Kong Province	1. Elderly	7	4	3	0	7
	2. Women	7	7	0	4	3

- Key Informant Interviews (KIIs)

Table 9 shows the number of KIIs per targeted site, as well as age and gender of participants. In all, 105 KIIs were performed, with 56 women and 49 men making up 22 to 30 persons per KII in each region. 62 participants were between 18 – 55 years old and 43 people above 56 years old. In total, 11 people were living with disabilities.

Table 9: Number of KIIs per targeted location with age and gender information

Location for study	Number	Gender		Age		PwDs
		Female	Male	Adult (18-55)	Elderly (+56)	
Angkor Angk commune, Peam Chor District, Prey Veng Province	22	13	9	16	6	1
Sangkat Ratanak and Sangkat Sla Ket, Battambang town, Battambang Province	30	16	14	18	12	5
Sangkat Sameakki, Krong Stueng Treng, Stueng Treng Province	25	8	17	13	12	3
Pak Khlang commune, Mondol Seima District, Koh Kong Province	28	19	9	15	13	2
Total	105	56	49	62	43	11

Table 10 summarizes the KIIs that were conducted per targeted location, with more detailed information on the participants and their affiliation to vulnerable groups. 25 participants were part of minority groups such as indigenous communities (6 people from Phnorng, Tum Poun, Brov, Kovet, and Chor Ray communities), religious minority (13 people from Cham community), fishery community member (1 people), and other groups (5 people from Khmer-Laos and Vietnamese minority).

Table 10: Number of KIIs per targeted location with a detailed vulnerable group

Location for study	Number	PwDs	Minority group	Minority group detail				Duration of interviews per KII
				Indigenous group	Religious minority	Fishery community	Other	
Angkor Angk commune, Peam Chor, Prey Veng	22	1						10-30 min
Sangkat Ratanak and Sangkat Sla Ket, Battambang, Battambang	30	5	13		13 ⁽²⁾			7-35 min
Sangkat Sameakki, Krong Stueng Treng, Stueng Treng	25	3	11	6 ⁽¹⁾			5 ⁽³⁾	7-21 min
Pak Khlang commune, Mondol Seima, Koh Kong	28	2	1			1		8-22 min
Total	105	11	25	(6	13	1	5)	

Note: ¹ including Phnornng, Tum Poun, Brov, Kovet and Chor Ray

² Cham community

³ including Khmer-Laos and Vietnamese

5.2 Performance of EWS1294 per component

- Overall perception of EW1294

100% of respondents said that the EWS1294 is a beneficial system (Figure 3). Moreover, Figure 4 illustrates the benefits of the EWS1294 in percentage for the community to get prepared for the disaster. 48% of people believe that the EWS1294 can help them be ready to respond to the disaster, while 33% think it is a helpful system that can help them convey information to other people. Furthermore, 11% of people think that the EWS1294 can help them reduce the damage and prevent losses from the disaster, which is only 2% higher than people who think it can help on something else.

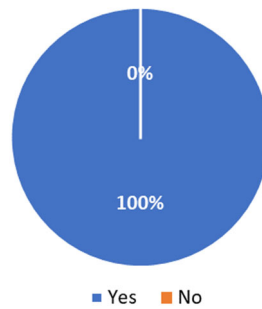


Figure 3: Respondents' perception of the benefits of EWS1294

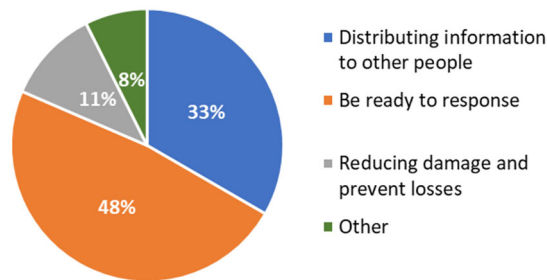


Figure 4: Respondents' perception of the best benefits of the system

5.2.1 Risk Knowledge

- Community vulnerability

The flood vulnerability of the respondents was illustrated by their testimonies of losses (damage of private such as house, agricultural land etc. and of public property such as road and other infrastructures etc.). Floods inflict substantial financial damage, thus appropriate planning is required to minimize losses. Figure 5 summarizes the community's opinion of their vulnerability level (extremely vulnerable: 5 - very low vulnerable: 1). Around 49% of those polled claimed they are extremely vulnerable to flooding, with 16% saying they are very vulnerable, 14% saying they are moderately sensitive, and 19% saying they are not at all exposed.

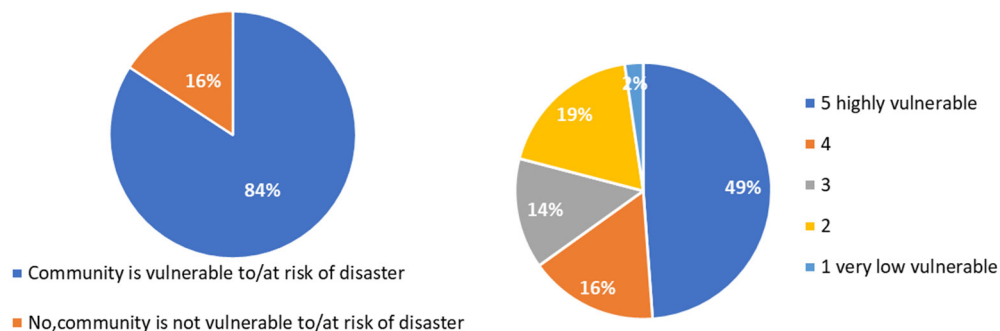


Figure 5: Respondents' perception of vulnerability to flood risk

- Knowledge of EWS1294

The majority of respondents had never heard of EWS1294, 66%, while only 34% had prior knowledge of the system (Figure 6). This suggests that the alert system is not yet widely promoted.

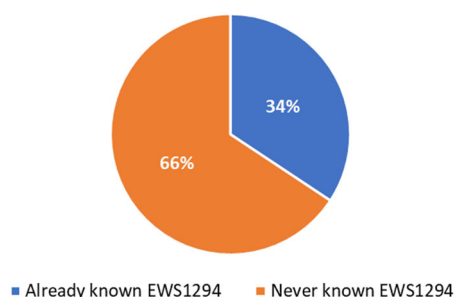


Figure 6: Respondents' knowledge of EWS1294

- Subscription to EWS1294

By subscribing to EWS1294, users demonstrated that they fully understood the benefits of the system in the event of hazards. According to the information collected, the best means of promotion of the system are summarized in Figure 7. Local authorities were identified as the most relevant promoters of the system by 47% of the respondents. Furthermore, 9% of respondents said they got information via word of mouth, 5% from radio, and 2% from Tuk-Tuk campaigns, with TV ads and social media each accounting for 7%. 23% of respondents stated they learned about the system by participating to a PIN training, by informing themselves on disaster risks or consulting a workplace handbook.

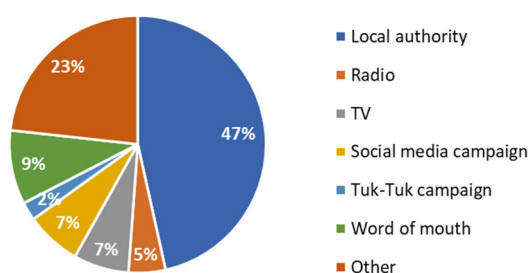


Figure 7: Respondents' opinions on the best ways to promote the system

The data collection demonstrated that 61% of the respondents subscribed to EWS1294 by calling 1294 by themselves, while 17% got support from the local authority, followed by 5% of the respondents who asked help from someone (Figure 8). However, about 17% of others said that they are used to participating in the training of PIN and signed up for EWS1294 at that time.

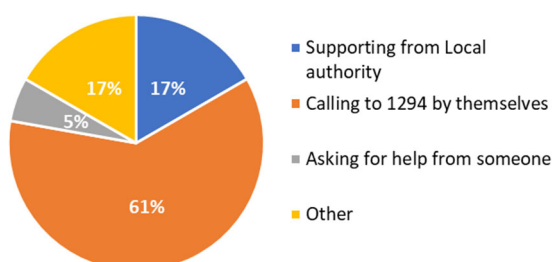


Figure 8: Respondents' subscription to EWS1294

- Non-Users

The result of the interview showed that 79% of the non-user respondents were willing to subscribe to EWS1294, while 21% were not willing to do so (Figure 9). Therefore, it is clear that the majority of non-users are willing to sign up to use EWS1294. However, they face some barriers to enrollment, such as no phone, lack of time, not wanting to use the system, never receiving information about EWS1294, its potential inefficiency, and other barriers.

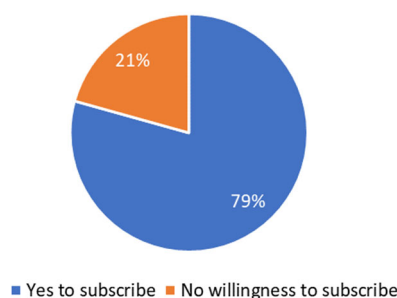


Figure 9: Non-user respondents' willingness to subscribe to EWS1294

Barriers to subscription were identified during the interviews. Because they never received information on EWS1294, 79 percent of respondents said they were hesitant to sign up (Figure 10). Approximately 5% of respondents stated that they do not have a phone, another 5% stated that they do not wish to use it, and only 1% stated that the EWS1294 is useless. Other hurdles to respondents signing up, according to the remaining 10%, include not understanding how to sign up or use, no one assisting to register, the preference to be alerted by loudspeakers installed in the commune. As a result, it is clear that the biggest obstacle to individuals signing up is not the phone, but rather the fact that they lack information and have never subscribed before.

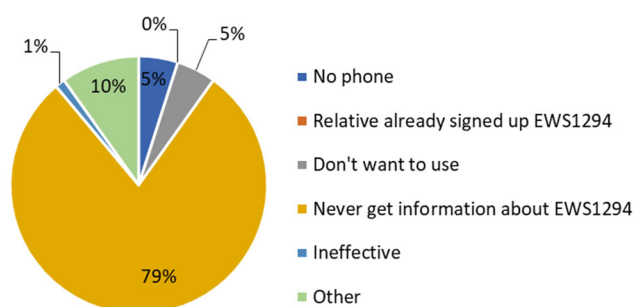


Figure 10: Respondents' barriers to signing up to EWS1294

According to the respondents, 36 percent, 28 percent, 12 percent, and 12 percent of the respondents said they would subscribe if they were given assistance in signing up, if they were given system details, if they were given information after the interview, and if they had a phone, respectively (Figure 11). However, 8% of respondents stated that they do not wish to join up, and that others are unaware of the EWS1294 system due to a lack of understanding. As a result, the non-subscribers surmounted the barrier and expressed readiness to utilize EWS1294 when seeking assistance in signing up and receiving extensive information on the system.

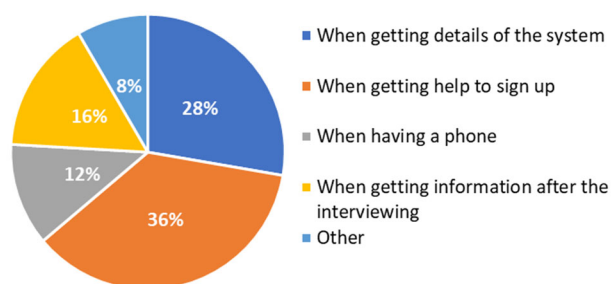


Figure 11: Respondents' needs for support in subscribing to EWS1294

5.2.2 Detection, Monitoring and Warning Service

- Effectiveness of EWS1294 in the community

According to interviews with people who have subscribed (mainly commune council members), based on their experiences, the EWS1294 is effective in increasing flood preparedness in the community (Figure 12). The EWS1294 is critical in assisting their community in receiving information about flooding and other disaster risks that they were previously unaware of due to the lack of an early warning system in the area. Furthermore, it is customary in the community to wait and listen to the EWS1294 warning service throughout the rainy season in order to obtain information and be prepared to manage their family properties, prepare the boat, and find a safe spot to relocate cattle during floods.

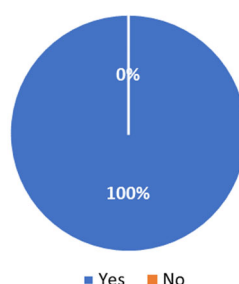


Figure 12: Respondents' perception of EWS1294 effectiveness in their community

- Potential improvements

According to subscriber feedback, the EWS1294 is highly helpful in improving flood preparedness in the neighborhood. However, it is strongly advised to increase the EWS1294's effectiveness by doing the following:

- The relevant institutions should conduct training on EWS at school since the students can understand better and share the knowledge about EWS with their parents.
- The relevant local authority, NGOs, and agencies working on disasters arrange some programs to support them in signing up for the EWS1294.
- Communicate more on the cost-free system since fear of being charged to access to the system in one barrier to subscription.
- Increase the means of dissemination to reach more people.
- Make warning service easier to send automatic messages or phone calls directly without signing up.

- Encourage local subscribers to convey the information to other people near vulnerable areas, be ready to manage their family properties, prepare the boat, and seek a safe place for displacing the livestock during the flooding and reducing some damages on their livelihood.
- Level of satisfaction

Based on the survey with those who have subscribed (mostly the commune council members), 88% of subscriber respondents are highly satisfied with the EWS1294, while 12% are very satisfactory (Figure 13). Therefore, the EWS1294 is perceived as very useful for the communities.

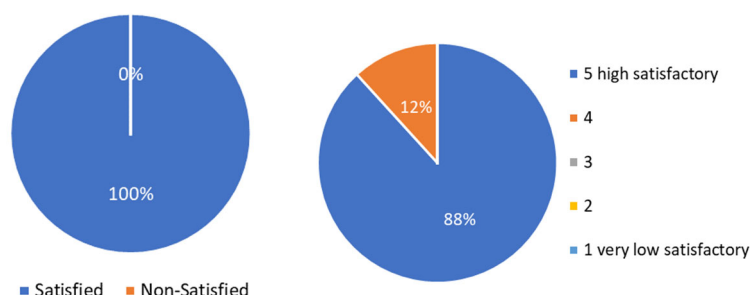


Figure 13: Respondents' satisfaction with EWS1294

5.2.3 Dissemination and Communication

- Reception of EWS1294 alert messages

100% of the respondent users have received the warning messages disseminated by EWS1294 (Figure 14). The last time they received the message was between September 2021 and February 2022. So, it is clear that the warning messages disseminated by EWS1294 reached the subscribers.

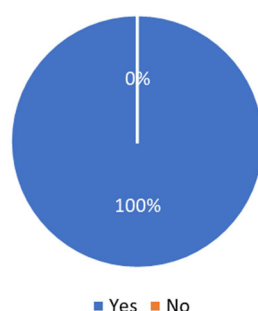


Figure 14: User respondents' reception of EWS1294 alert messages

- Understanding of the EWS1294 alert message

The warning messages are comprehensible. It is revealed that 100% of the users can fully understand the messages after receiving the warning alert (Figure 15). It enables the users to get ready and well-prepared for disasters. For example, the warning messages disseminated by EWS1294 that the local people have received the system informs as follows:

- The upstream is flooded, so please be careful along the river downstream.
- The upstream is opened the dam, so please be careful along the river downstream.
- According to MOWRAM, Battambang is a vulnerable province; the weather is very cold, the elderly, etc. Please be prepared.

- On this day and that area, please be careful. There will be flooding along the riverside.
- The duration of flooding must be well prepared for preventing the upcoming disaster.
- There will be storms from this day to that day, and please be careful. Especially fishermen, please do not go fishing between that day.
- Please be careful from this day to that day, and there will be extremely strong to minor storms along that area.
- From this day to that day, there will be storms. Please be careful.
- There will be storms from this day in that area. Please be prepared and be careful.
- The date of the coming flood event and warn us when or duration that we should not use boats or go for the fishery.
- There is a strong wind or storms, and warn us not to go for the fishery.
- The storm event from neighbouring countries caused the coming flood event. Please be careful and protect the valuable things.
- The level of the Mekong River is high, so the population that live in this commune have to go to a safe place.

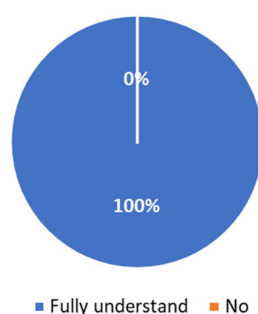


Figure 15: Respondents' understanding of EWS1294 alert messages

- Preferred means of dissemination

46 percent of respondents preferred the Interactive Voice Response (IVR) platform because they have a quick and easy access to their phone, allowing them to receive the alert message. 30% of the respondents preferred loudspeakers as it spreads the information directly to all villagers at the same time. It would also be a suitable method for people who do not have a phone (Figure 16). People who selected radio broadcasting were 10% because it is easy to listen and understand although they have never been educated. Besides, 3% of the interviewees thought that SMS is preferable because it is faster and more understandable of the information for them. On the other hand, 9% of the respondents wish to receive the warning messages through the combination of other approaches such as social media (Facebook), TV, tell them directly, and local authority announcements to their community. Overall, the majority of the interviewees prefer to receive the early warning messages through the Interactive Voice Response (IVR) Platform and Warning siren speaker, contrary to SMS broadcasting.

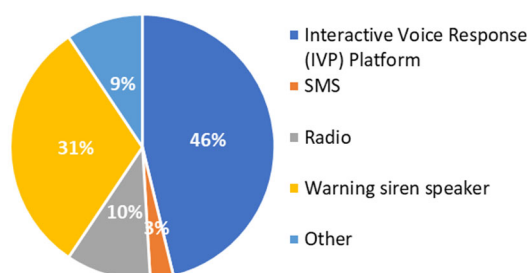


Figure 16: Respondents' preferred means of alert dissemination

Based on the interview, 70% of the respondents claimed that there was no capacity-building training for the Village Disaster Management Groups (VDMGs) in the community, while the remaining 30% has participated in the training for the VDMGs to enhance the capacity-building in the community (Figure 17). Some respondents benefited from disaster preparedness capacity building trainings by other organizations. For instance, trainings and promotional campaigns through loudspeakers and posters in July-August-September were provided by Cambodian Red Cross (CRC) to prepare for pre-and post-disasters. Along with the training by CRC, there were also meetings and announcements at the commune and village level. The training is beneficial for providing knowledge and information to the community to manage their properties, prepare boats, prepare the shelf, and some seek a safe place for displacing livestock during the flooding.

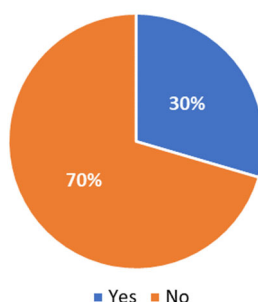


Figure 17: Respondents' participation to capacity-building trainings for the Village Disaster Management Groups (VDMGs)

Respondents shared their preferred means of promotion. Over half of the respondents preferred loudspeakers (27%) and social media campaigns (26%) to promote the system (Figure 18). At the same time, 13% of the respondents preferred television, 10% Tuk-Tuk campaigns, and 9% radio broadcasting. Only 5% of respondents believed local authorities were an effective tool of promoting the system. The remaining 10% preferred different methods to raise awareness and promote the campaign, including direct speech, wallpaper/posters at schools or hospitals, and connecting audio messages to local Pagodas.

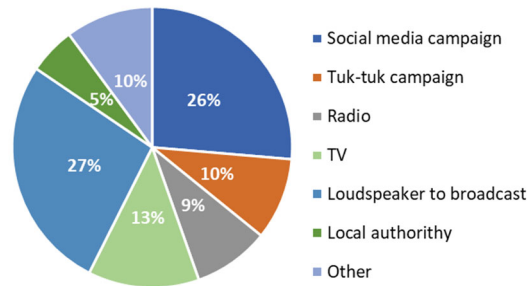


Figure 18: Respondents' preferred means of promotion of EWS1294 and disaster preparedness efforts

5.2.4 Response Capacity and Community Preparedness

- Community preparedness and early action after warning dissemination

According to the survey, 90% of the total respondents (both subscribers and non-subscribers) mentioned that they are prepared and ready to respond to the flooding, while only 10% were not (Figure 19). Regarding non-subscribers, even if they did not register, they can access the warning message from other subscribed community members. The respondents mentioned that their previous experiences with flooding enable them to prepare for such event. Generally, the community deploys its experience in disaster preparedness from July to September (rainy season), waiting and listening to the radio and TV. Some villagers have started to take many actions such as managing their properties, preparing boats, and seeking to find a safe place for displacing livestock during the flooding.

Figure 19: Respondents' perception of disaster preparedness

- Barriers to evacuation

Figure 20 summarized the barriers to evacuation informed by the respondents. Based on the interview, children under the age of 12 are facing more challenges in evacuating as they do not have access to a personal vehicle. The elders also face great challenges in evacuating (23%). The percentage of people with disability and women were respectively almost the same with 18% and 16%, while 11% of other vulnerable groups were facing obstacles in evacuation.

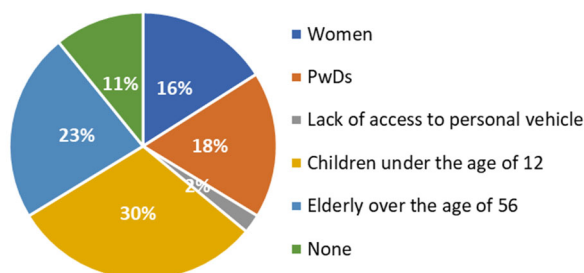


Figure 20: Respondents' perception of barriers to evacuation

- Community disaster response

According to the field study, almost every responder took action to respond to the hazard after getting the warning message (Figure 21). During the flooding, the community emphasized its preparedness and readiness for the risks. As a result, Figure 21 depicts the community's actions to respond to a disaster risk after reception of the alert message. Around 28% of respondents relocate their valuables, 24% stock up on emergency supplies (dresses, dry food, plastic bags, and other items), 21% bring their family members to a safe location, 14% share information with others, and 10% do other things (tell

children not to go swimming, find a safe place to stay temporarily, rebuild the house stronger to withstand the storm, and so on). 3% of the respondents displace animals to a safe place.

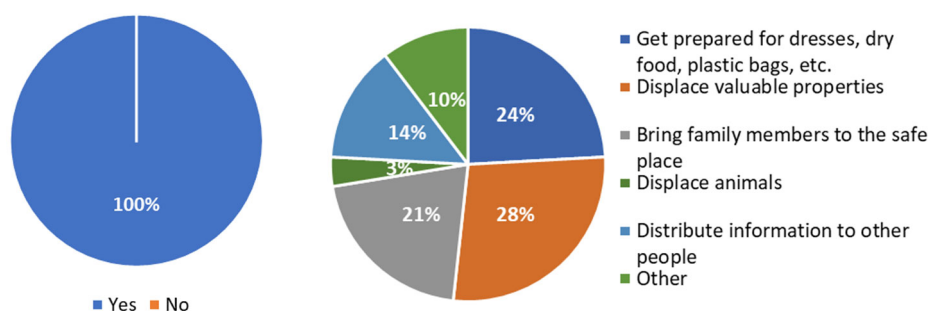


Figure 21: Respondents' actions after receiving an alert message

Based on the interview, the respondents firmly voiced their opinions on how disaster response capacity could be improved through EWS1294:

- EWS1294 should send an early warning alert to their phone before to the floods so that they may be well-prepared and avoid losing their property during and after the disaster.
- 2 to 3 alert messages should be disseminated to ensure maximum reach of the at-risk people.
- Rescue equipment should be provided to the communities such as rescue jacket.
- Dissemination through loudspeakers and warning sirens by local authorities would ensure the all community had access to the warning.
- More promotional activities should be conducted such as social media campaigns (Facebook), Tuk-Tuk campaigns, TV and radio promotion.
- EWS1294 should provide clear guidance on evacuation and safe steps to follow.
- EWS1294 should automatically send the alert to vulnerable people, even if they did not subscribe.
- EWS1294 should be further promoted to vulnerable people.

5.3 Inclusiveness of EWS1294 per vulnerable group

5.3.1 Women

- Knowledge / understanding of EWS1294

From one province to the next, women's knowledge of EWS1294 differed. Women in Prey Veng province knew about EWS1294 thanks to the direct speaker in the previous commune hall. However, none of them subscribed to the system. In Koh Kong province, women were not much aware of EWS1294 but one woman subscribed to the system after participating to a workshop conducted by PIN. Both women's groups claimed that they lacked the necessary skills and expertise to utilize the EWS1294. They have no idea how to sign up for the system or how it operates.

- Perceptions of the system's benefits

Women thought that by assisting one another before, during, and after a crisis, they might minimize or decrease the harm that a disaster would do in their community. If there are persons in need, they can alert their neighbors and the commune head. Members of the commune, for example, are always

willing to assist those with impairments and vulnerable people in moving to secure zones. Aside from that, they can help transfer essential items during an evacuation and look after their neighbors' children or homes if their parents were abroad during a hurricane or tidal flood. Women usually help each other to prepare their neighbors' houses after they have prepared their own following floods, especially in Prey Veng province.

- Emergency preparedness

Starting from July, women reported monitoring the riverbank and preparing the house to a potential flood.

- Response capacities

Women's response capacities mainly rely on their observations of the riverbank and heavy rain past experiences in evacuation. According to the FGDs, men are usually leading the evacuation or safe measures to take in the event of a disaster risk. Women contribute to the response by supervising the children.

Testimony of a women user of EWS1294

One woman in Koh Kong province subscribed to the EWS1294. She decided to use the EWS because she wants to know about the situation of the storm and tidal floods in advance. She stated that "the EWS1294 provides many benefits for people in the coastal area". The last message that she received from EWS1294 was on 12 October 2021. She also claimed that "the warning could reach everyone that is at risk and the fishery group was the most severely impacted since they usually go to sea for fishing even during stormy periods". Moreover, she can understand clearly the warning messages. After receiving the message, she is able to prepare and respond to the tidal flood. She could inform her husband not to go fishing and her children not to go out. She thinks that once we subscribed to EWS1294, there has no barrier to action for the women group because EWS1294 can help improve tidal flood prevention in her community by disseminating the disaster situation in advance so that the villagers are able to prepare well. She rated the score 4 out of 5 for the effectiveness of EWS1294 (1 as the less to 5 as the most satisfaction). However, she has never had the chance to express her complaints or requests for clarification on EWS to any community representative (such as a village or commune chief or community committee). She would like the system to define the exact date, frequency, and severity of the disaster.

Testimony of women non users of EWS1294

12 out of 13 women who attended the FGDs in Prey Veng and Koh Kong provinces were not subscribers of EWS1294. Even if women in Prey Veng knew about the system, they did not subscribe to the system because they do not have access or regularly access to phones (only their children have access to mobile phones). Most importantly, they do not know how to use the phone to sign up for the EWS1294 and are not clearly aware of the benefits of the system. Women explained that they usually used their traditional knowledge of flood risks. Therefore, they observe the water level and prepare their habitation during the rainy season.

All women's groups in Prey Veng and Koh Kong provinces said that if they could get help to register, it would be more accessible and beneficial to register for EWS1294. They also want the relevant institutions to widely promote EWS1294 to the community.

5.3.2 Persons living with Disabilities

- Risk knowledge

According to the FGDs, both Sla Ket and Ratanak villages of Battambang Province were rarely severely flooded. However, the flooding from the Sangkae River still harms the villagers every single year, especially those who live nearby the river shore. About 2-3 years ago, there was a precipitation flood (reach between 0.5m – 1m). The flood destroyed the households furniture and objects (kitchen materials, table, chair, fan, etc.) and the livestock (cattles, chickens, ducks, etc.). Some of their belongings, such as door roofs, automobiles, motorcycles, and bicycles, were lost or broken.

- Knowledge of EWS1294

Only one among the 18 PwDs who participated in the KII and FDG subscribed to EWS1294. Most of them did not know about the system and therefore did not subscribe. They have not yet subscribed to EWS1294 for a variety of reasons. For example, they did not receive any information on the EWS1294, or were not aware of what the EWS1294 is or what the system's benefits are. They also claimed that it was during the FGD that they learnt about the EWS1294 for the first time after settling in this commune. Normally, the commune councils/staff inform the community of flood-related news. After the interview, three people with disabilities directly registered to the system as they estimated it is a valuable system. Those who just signed up to EWS1294 mentioned having capacity and knowledge in accessing and using of this system.

- Alert dissemination

The system does not accommodate all kinds of disability. For example, persons with hearing problems (including deaf people) have no accessibility to the alert message because the warnings are delivered by IVR and radio broadcasts. Person with disabilities reported finding the voice message clear and understandable. Some respondents recommended the voice message to be slower and more precise, and sent multiple time per day.

- Emergency preparedness

PwDs could not prepare well in advance for the disaster since they never received an alert prior the event. Generally, the commune chief is the one in charge of preparing the commune development plan / investment plan (CDP/CIP) and supporting villagers during flooding at the commune level. They alerted the community by using the direct speaker. Nevertheless, the volume of the speaker was too low for villagers who live far away from the commune hall. PwDs reported strongly relying on the commune chief and being grateful of the support provided. They receive regular information from the commune chief about floods, safe zone, and logistics. Some commune leaders have identified people with disabilities who need help evacuating and have informed relief teams to provide support in the event of flooding.

- Response capacities

Some PwDs reported being able to evacuate to a safe site, and following the necessary safe steps (collect important documents, prepare the house for the event etc.). Other respondents reported relying on the help of their family members such as husbands, wives, children, relatives, and neighbours (for those who have no family) to evacuate to the safe sites and provide some foods and water to survive during the emergency period. Some reported not being able to evacuate and staying within their home while water level was raising. Rescue teams also support the PwDs for evacuation to safe sites.

5.3.3 Elderly

- Risk knowledge

Based on the FGDs, a heavy flood inundated Angkor Ang commune of Prey Veng Province at the depth between 1.5 – 2 m and Sangkat Samaki of Steung Treng Province at the depth between 2 – 3 m during the last six years. The inundation lasted about a month. In Pak Khlong commune of Koh Kong Province, tidal floods occur frequently and unexpectedly and cause damage to their household stuff. The damage has increased significantly during the last few years. Flood damages their paddy fields and vegetation farms and causes the loss of their vegetation production, livestock (cattle, chickens, ducks, etc.), vehicles (motorbike, and bicycles), and stuff under their house.

- Knowledge of EWS1294

Only the elderly in Angkor Ang have long known about the EWS1294 from the commune meeting between the commune chief and NGOs (PIN). However, they did not get detailed information or understand well about the system, so they did not subscribe to it. The group reported that they received generic information and some reported that they still did not understand well about the EWS1294 even after meeting. Additionally, one main subscription barrier is the fact that most of them do not know how to use a mobile phone and rely on their children and grandchildren to do so. They reported that the system was beneficial, including for their family members, and should be widely promoted.

- Alert dissemination

Some respondents reported not trusting the system because they do not know how the system perform and fear that the information provided is not accurate compared to their own observations of the water level for instance.

- Emergency preparedness

The elderly can prepare bamboo shelves for storing their livestock food and their necessary stuff above the ground. Moreover, they can also prepare boats and food and move their livestock to a higher zone. However, they do not know how to support their community to respond during the flood event. Most of them stay in their house and prevent their grandchildren from getting near the water.

Children, with the support of family members, provide critical support to the elders in preparing for the rainy season. They move the livestock to high zones or raise the land with earthy fill to prepare for any risk. Commune chiefs and officers also provide support in disaster preparedness at the community level and arrange a few boats for evacuating people to safe places. They particularly identify the elders in need for support.

- Response capacities

Without the support of their children who live far from their home, it is challenging for the elderly to take appropriate actions in the event of a disaster risk. They are concerned about their own safety as they face challenges in evacuating or securing their house.

5.3.4 Minority / Indigenous groups

- Risk knowledge

Respondents from minority and indigenous groups informed that flood does not frequently occur in Sangkat Sla Ket of Battambang Province. This commune has experienced flood only some years ago with slight damage. The flood severity varies from year to year. However, in Sangkat Samaki of Steung Treng Province, heavy rainfall flooded the commune between 2 and 3 m during the last five years. The

flood took a day to inundate the whole commune and lasted months at a depth of 0.5 – 1 m. As population density is low and houses are far from each other, information sharing and support coordination between the villagers was quite challenging. They did not have enough food and drink when the water flooded their village. Damage and loss happened to their household stuff (kitchen materials, tables, chairs, fan, etc.), rice, livestock (cattle, chickens, ducks, etc.), paddy fields, and vegetation farms.

- Knowledge of EWS1294

Only one man from the minority / indigenous groups subscribed to EWS1294 in Sangkat Sla Ket because he participated in a PIN training at his work place and know the benefits of the system. He received the alert message from the EWS1294 in February 2022. According to this respondent, the warning message is accessible to at-risk minority / indigenous communities if they are aware of this system. He stated that he could fully understand the warning message as it was clear and audible. Moreover, he claimed that he could prepare and respond to the flood after receiving the message from EWS1294. He informed other villagers to prepare and displace older people in safe places. According to him, there is no barrier to action for these communities. He rated the score 5 out of 5 for the effectiveness of the EWS1294 (1 as the less to 5 as the most satisfactory) because it is helpful for his community. However, he has never had a chance to express his complaints or requests for clarification on the EWS1294 to any community representative.

6 out of 7 villagers who attended the FGD in Sangkat Sla Ket were not subscribers of EWS1294 as they did not know the system. None of their family members were subscribers.

- Alert dissemination

Most of the respondents have regular access to mobile phones. Therefore, the cell phone-based means of dissemination is relevant to their case. The participants claimed that they could comprehend the alert message even if it was not in their mother language if it was delivered slowly, precisely, and in Khmer.

- Emergency preparedness

Respondents from minority / indigenous groups stated that every household prepared for flood by docking their boats when the water level starts rising significantly (when it rises to between 0.5 and 1 m). Most households use sandbags to make a barricade around their house and move their stuff, such as vehicles, food, trackers, etc., to high elevated places such as schools. In Sangkat Samaki, the villagers take these actions a day or two before June and when water starts inundating the land beneath their house. These actions are led by the husband/father with the involvement of family members. Their commune chief also prepares supplies to respond to disasters.

The minority groups believed that they could support their communities to prepare for disaster. They can help each other to secure their possession and prepare food and water supplies before the water rises. Besides, they prepare boats to move their property and family members to safe places. The cham community can quickly spread information about the preparedness to other people as they usually go to the mosque to pray.

- Response capacities

Overall, the respondents stated that they were well prepared ahead to any threat. As a result, in the case of an emergency, minority / indigenous populations appear to be prepared to protect their belongings and evacuate. If the water level continues to rise, they utilize their prepared boat to evacuate their belongings and persons from the flooded region.

During a flood, the commune leader directs his officials to relocate residents to a high location, such as the commune hall or school, with the help of the inhabitants. Furthermore, several villagers use

their boats to save individuals in the commune, and the commune leader prepares extra boats for the rescue as well as additional lodging for the inhabitants. They send out a message to the people to dock their boats and get their fishing gear ready.

6 Recommendations

Based on the findings of this impact assessment, this section outlines specific, practical improvements that PIN and N/PCDMs may introduce in EWS1294 to make it more inclusive of various vulnerable groups. These suggestions were created using direct feedback from FGDs' participants as well as information gathered during the interviews. The key actions proposed are both immediately implementable (within six months/1 year) and long-term disaster risk management policies (DRM).

Overall, the existing EWS1294 system is beneficial to the four vulnerable groups in the research locations (women, elderly, minority, and PwD - only for those who are not deaf), although it is not yet entirely inclusive. The vast majority of participants were non-users of this system owing to a lack of knowledge and/or understanding on how to utilize it. Greater promotion of the system is key to ensure EWS1294 reach to vulnerable groups. Such promotion efforts must be accompanied by comprehensive training on the system, how it works, and its benefits, to ensure that people enroll and follow its instructions. To make the system more inclusive, key enhancements may be made to each component, as detailed below:

6.1 General recommendations

General recommendations for improving the EWS1294 inclusion of vulnerable groups

Awareness raising	<ul style="list-style-type: none">Greater promotion of the system is key to ensure EWS1294 reach to vulnerable groups. EWS1294 should be further promoted to vulnerable groups. To do so, loudspeakers, social media, TV and radio and tuktuk campaigns could be considered. By specifically targeting vulnerable communities with tailored and adapted promotional contents and media, locations, etc., the reach to vulnerable people can be increased. In such promotional campaigns, it should be highlighted that EWS1294 is free of charge and is accessible also by those who have no internet connection. Systematic outreach activities would reduce the risk of vulnerable groups relying more on their past experience (i.e. low damages of flooding in their village in the past years) than on the alert messages received.
Capacity building trainings	<ul style="list-style-type: none">Additional efforts to deliver capacity-building for disadvantaged groups would result in more vulnerable persons subscribing to and using the system. These sessions should cover in a comprehensive way how the system works and its benefits. Local community meetings have a great and positive impacts on the population's subscription to the system. Such meetings should be designed taking into account the specific needs of each vulnerable group.
Alert message language	<ul style="list-style-type: none">The alarm messages are reported to be clear and audible enough to understand it and respond appropriately by the vulnerable persons questioned. However, several people expressed that the slow tempo and clarity of the voice are crucial for some of them to understand the Khmer message. Even if they reported being able to comprehend the Khmer version, non-Khmer speakers may be interested in having translated versions of the alert messages.

Means of dissemination	<ul style="list-style-type: none"> Means of alert dissemination should be diversified to ensure that alerts are accessible to all vulnerable groups depending to their specific needs. For instance, some vulnerable groups (eg. Women and the elderly) reported having limited or unregular access / knowledge to use mobile phones. On the contrary, some respondents mentioned the ease of use of the EWS1294 IVR system. The multiplication of the means of dissemination of the alerts allows the access and the satisfaction of a larger number of users. Furthermore, voice alarm messages are inaccessible to those with hearing impairments. Combining voice and text alerts would increase the reach to vulnerable people. SMS dissemination (including to non-subscribers) would allow a wider reach of EWS1294 among vulnerable groups.
Alert dissemination	<ul style="list-style-type: none"> If possible, alerts should be provided in advance of a potentially dangerous event, and they should be delivered numerous times to ensure that vulnerable populations have enough time to receive the information, take appropriate precautions, and perhaps evacuate. This is especially true for disadvantaged populations, as it could take them longer to respond. To maintain user confidence in the system, alerts should not be sent out too much ahead of the threat or should include a forecast date. Alert messages should be as detailed/specific as possible on the required behaviors and measures to be adopted by the recipients (e.g. within a <i>specific timeframe</i> and not further, population living in a <i>specific area/neighborhood</i> have to move to that <i>specific safe place</i>)
Emergency preparedness	<ul style="list-style-type: none"> Certain respondents stated that they were unable to adequately prepare for disaster risks. While some vulnerable groups reported being able to plan ahead for the rainy season and help their communities, others reported having difficulty with emergency preparedness. This is primarily due to physical limitations. As a result, these vulnerable persons require special assistance in the emergency preparedness. They can sometimes rely on their families and relatives. However, it is crucial that local authorities monitor vulnerable people's capacity to prepare for disasters and provide critical assistance in case of difficulties. Training children in schools would increase the system's reach since youngsters are in a better position to grasp the system's technology and persuade their family members to subscribe. At the local level, such engagement would also help to create long-term resilience.
Response capacities	<ul style="list-style-type: none"> The capacities of response to a risk following the reception of an alert diverge from one vulnerable group to another. Some disadvantaged people demonstrated high capacities to act upon the alert, thanks to advanced local emergency preparedness. However, certain vulnerable people face great challenges and limited emergency response capacities. For instance, they are not able to secure their belongings or evacuate due to limited physical mobility. Therefore, it is critical for local authorities to identify the people in need of assistance in the event of evacuation in the emergency preparedness plans and coordinate this with the rescue teams.

Local authority involvement	<ul style="list-style-type: none"> At the local level, authorities have a critical role in EWS1294 promotion, alert dissemination, emergency preparedness and response capacities. Yet, the Commune Committees for Disaster Management (CCDM) and the Village Disaster Management Groups (VDMGs) were found not to be fully operational due to unclear distribution of roles and responsibilities. Clarifying such roles and tasks, as well as assigning them the responsibility of supporting disadvantaged groups, will improve the inclusivity of EWS1294.
Community feedback	<ul style="list-style-type: none"> Collecting regular feedback from vulnerable groups is key to ensure the inclusiveness of the system. I would ensure to keep track of the obstacles that disadvantaged individuals confront when utilizing the system, as well as the progress made in include them.
Representation	<ul style="list-style-type: none"> Overall, to communicate on the accessibility and inclusion of EWS1294, a stronger representation of vulnerable persons should be guaranteed in communication materials, capacity development posters and videos.
Further targeted study	<ul style="list-style-type: none"> A key finding of the impact assessment is that the EWS1294 registration proces, and the system itself, could adopt a more inclusive approach by collecting very specific data on vulnerable populations at risk by province. It would then be possible to guide a more customized approach based on recurring vulnerabilities by province. By better understanding the specificities of the province in terms of vulnerabilities and needs, EWS1294 would be able to better target communities and guide local disaster management authorities to include these communities.

6.2 Specific recommendations per vulnerable group

6.2.1 Women

Specific recommendations for improving the inclusion of Women with EWS1294

- Training and awareness campaigns should specifically target women or ensure gender balance.
- When choosing and developing dissemination channels, women's limited access to mobile phones should be taken into account. Some women said that their spouse was the only one who had access to the phone. Using radio broadcasting or loudspeakers in the communities would ensure that everyone, including those without access to cell phones, have access to the warning.
- Women should receive additional training in emergency preparedness and early action, since they are more likely to stay at home with their children and so be at greater danger in the case of a flood.

6.2.2 Person living with disabilities

Specific recommendations for improving the inclusion of Person living with disabilities in EWS1294

- Information and awareness-raising campaigns should be specifically designed for different kinds of impairments that people with disabilities are living with in the targeted area; this includes ensuring that physical or virtual sites for awareness raising sessions are barrier-free, providing accommodations such as sign language interpretation when needed, and providing information in accessible formats.
- Trainings on EWS1294, emergency preparedness, and response capacity should be tailored to the individual requirements of persons with disabilities, as well as the type of impairment they have.
- Diversification of the means of dissemination is critical to ensure that the warning are accessible to all people with disabilities taking into account their specific needs. Therefore, text message should be provided to ensure that people with hearing impairments can access the content of the alert message.
- People with disabilities in need of assistance in emergency preparedness and early response should be identified by the local authorities and should be provided with assistance prior and during the hazard. This process of identification should be conducted regularly (on a yearly basis) and during the last quarter preceding the rainy season.
- Local authorities should coordinate with rescue teams to ensure that people in need are evacuated on time upon the spread of the early warning.

6.2.3 Elderly

Specific recommendations for improving the inclusion of Elderly people in EWS1294

- Trainings on EWS1294, emergency preparedness, and response capacity should be adapted to their specific needs and circumstances (surrounded with family or in isolated situation).
- Since some elders are not familiar in using mobile phones or have limited access to mobile phones, the means of alert dissemination should be diversified to ensure reach to the elder (radio broadcasting, loud speakers etc.).
- Since it can not be assumed that all elders will benefit from the support of their families in emergency preparedness and disaster response and evacuation, local authorities should identify the elders in need of assistance and provide the appropriate support to facilitate their response to early warnings. This process of identification should be conducted regularly (on a yearly basis) and during the last quarter preceding the rainy season.

6.2.4 Minority / Indigenous Groups

Specific recommendations for improving the inclusion of Minority / Indigenous groups in EWS1294

- Promotional campaigns and capacity building should ensure a fair representation of minority and indigenous groups whenever possible.
- Exploring the possibility of a multi-language dissemination could have a significant impact on those who do not speak Khmer. However, the study found that when the alarm message was

delivered in Khmer, at a slow tempo and with a clear voice, the message was understood by the population.

- Mobile phone service providers should ensure mobile network coverage, particularly in isolated locations where indigenous tribes reside. Local authorities are responsible for ensuring such network coverage.

6.3 Long-term disaster risk management (DRM) policy actions

Proposed Action for long term policy on Disaster Risk Management (DRM):

- Introduce the sub-decree No.188 Or-Nor-Kr-Bor-Kor on the establishment of the sub-national committee for disaster risk management, which was issued on December 4, 2019, to ensure that local authorities understand their duties and responsibilities in assisting the community.
 - Provide regular training to the local authorities (PCDMs) on their roles and responsibilities to strengthen the system at the local level.
 - Provide technical training on emergency preparedness and capacity response to local disaster management authorities, focusing on how they can address the specific needs of vulnerable groups.
 - Ensure that representatives from vulnerable groups „have a seat at the table“: it is vital to include them in the design, implementation, and monitoring of disaster management at different levels (village/province).
 - Advocate through PCDMs for Commune Council to integrate EWS1294 capacity building and DRM strategies in the Commune Investment Plan/Commune Development Plan.
 - Collect regular feedback from diverse stakeholders on the system’s inclusiveness.
-

7 Annexes: Questionnaires used for FDGs and KIIs

7.1 Questionnaire of FGD with Women Group

Before you start the FGD:

- Introduce yourself and PIN
- Introduce about this study and the expectation of the FDGs:
 - o To assess the extent to which is the current system EWS1294 inclusive (accessible, responsive to specific needs different vulnerable groups might have), considering all steps/project components and based on the experience of the current users as well as perceptions of no-users (define non-user as someone who knows about the system but chose not to sign up).
 - o To identify specific, actionable improvements PIN and N/PCDMs can introduce in the system to make it more inclusive for different vulnerable groups (recommendations that are feasible to implement immediately, within 6 months/1-year, long term policy), embedding inputs/suggestions from the targeted vulnerable groups
- Information provided will be kept confidential; no names of personal details will be shared with anyone outside of PIN. Participation does not guarantee any direct support from PIN.
- Time will be no longer than 1 hour.

Date:.....	Location: Village
Contact:	Commune:.....
Tel:.....	District:.....Province:.....
Start time:.....	Minute taker:.....
End Time:.....	Facilitator:

Questionnaire for Women

1. Please describe flood events, frequency, severity, vulnerability, damages and losses in your community.
2. **How does the household prepare for a crisis/emergency/disaster?** When do you start preparing? Who is involved in the planning? Who takes the lead on preparations?
3. **How does the community prepare for a crisis/emergency/disaster?** When do you start preparing? Who is involved in community-level planning? Who takes the lead on preparations at the community level?
4. Can you share an example of how your household/community has responded to floods in the past? Who was involved in the response and what roles did they play?
5. Do you know about the EWS 1294? How did you learn about it?
6. Did you subscribe to EWS1294? Why? and why not?
7. Your experiences of vulnerable groups (**Women Group**) with EWS1294 (**users**)
 - Do you receive alert messages disseminated by EWS1294? If yes, when was the last time?

- Do warning reach everyone that is at risk? Who within the household and community was most severely impacted? Why do you think this was the case?
 - Do you understand the warning message from the EWS1294? Please give example. Yes / Partially / No. If Partially and no, why? Suggestions for improvement
 - If you don't understand? Why? Any suggestion for Suggestions for improvement
 - Are you able to prepare and respond to the flood after receiving message from EWS1294? If yes, how? If no, why? Yes / Partially / No. If Partially and no, why? Suggestions for improvement
 - What are the actions that you have taken to respond to the disaster? List all those points.
 - If not able to take actions, why?
 - What are the existing barriers to action for **Women Group** (e.g: dissemination, communication, available response capacities, full access to information...)? Please elaborate
 - How these barriers can be overcome? Please provide your suggestions on how to overcome these barriers
8. Satisfaction levels of vulnerable groups (**Women**) with EWS1294 (**users**)
- What is the efficiency of EWS 1294 in improving flood prevention in your community? (1. 2 . 3. 4. 5) (5 is highest)
 - Are you satisfied with EWS 1294? (score from 1 as the less to 5 as the most satisfaction). Why and why not?
 - Have you ever had the chance to express your complaints/requests for clarification on EWS to any community representative (community chief etc.)? If yes, what have you reported? And what was the feedback you received?

9. **For Non-users:** The barriers for non-users

- Do you have regular access to phone? And to a laptop?
- Is anybody in your family a EWS subscriber?
- Why you chose not to sign up?
- What would make it easier and useful for you (and for **women**) to sign up? (in term of accessibility and use information shared via EWS 1294)

10. How do you think you can support your community to prepare to a disaster? Describe.
11. How do you think you can support your community to respond to a disaster after it has happened? Describe.
12. Please tell us about your capacity and knowledge on the use of EWS 1294
13. Please select three main activities that you think it can support the **women** in your community to prepare and response to disaster/flood? (put number 1 as the least and 3 as the most favored action)
- ☐ Alert message disseminated by EWS1294/ Subscription to the system by phone call
 - ☐ SMS broadcasting
 - ☐ Radio broadcasting
 - ☐ Direct Speakers
 - ☐ Community feedback mechanisms (2 ways communication channel)
 - ☐ Capacity building training on EWS
 - ☐ Awareness raising and promotional campaigns offline and online (National Disaster Safe Steps Social Media Campaign, Tuk-Tuk Campaign etc.)

☐ Others: please specify.....

14. Please provide your recommendations for the improvement of the early warning system to especially increase access and use of EWS for **women**?
15. How do you think that children can benefit from EWS? And what could be done more to facilitate their access to EWS1294?

7.2 Questionnaire of FDG with People with Disabilities (PwDs)

Before you start the FDG:

- Introduce yourself and PIN
- Introduce about this study and the expectation of the FDGs:
 - o To assess the extent to which is the current system EWS1294 inclusive (accessible, responsive to specific needs different vulnerable groups might have), considering all steps/project components and based on the experience of the current users as well as perceptions of no-users (define non-user as someone who knows about the system but chose not to sign up).
 - o To identify specific, actionable improvements PIN and N/PCDMs can introduce in the system to make it more inclusive for different vulnerable groups (recommendations that are feasible to implement immediately, within 6 months/1-year, long term policy), embedding inputs/suggestions from the targeted vulnerable groups
- Information provided will be kept confidential; no names of personal details will be shared with anyone outside of PIN. Participation does not guarantee any direct support from PIN.
- Time will be no longer than 1 hour.

Date:.....	Location: Village
Contact:	Commune:.....
Tel:.....	District:.....Province:.....
Start time:.....	Minute taker:.....
End Time:.....	Facilitator:

Questionnaire For People with Disabilities (PwDs)

1. Please describe flood events, frequency, severity, vulnerability, damages and losses in your community.
2. **How does the household prepare for a crisis/emergency/disaster?** When do you start preparing? Who is involved in the planning? Who takes the lead on preparations?
3. **How does the community prepare for a crisis/emergency/disaster?** When do you start preparing? Who is involved in community-level planning? Who takes the lead on preparations at the community level?
4. Can you share an example of how your household/community has responded to floods in the past? Who was involved in the response and what roles did they play?
5. Do you know about the EWS 1294? How did you learn about it?
6. Did you subscribe to EWS1294? Why? and why not?
7. Your experiences of with EWS1294 (**users**)

- Do you receive alert messages disseminated by EWS1294? If yes, when was the last time?
 - Do warning reach everyone living with disability and who is at risk in your community?
 - Do you understand entirely the warning messages?
Yes / Partially / No. If Partially and no, why? Suggestions for improvement
 - Is the warning clear and useable?
Yes / Partially / No. If Partially and no, why? Suggestions for improvement
 - Are you able to prepare and respond to the flood after receiving message from EWS1294?
Yes / Partially / No. If Partially and no, why? Suggestions for improvement
 - What are the actions that you have taken to respond to the disaster? List all those points
 - If not able. Why?
 - What are the potential and specific barriers to action for **PwDs** (e.g: dissemination, communication, available response capacities, full access to information...)?
8. Satisfaction levels of vulnerable group with EWS1294 (**users**)
- What is the efficiency of EWS 1294 to improve flood prevention in your community? (1. 2 . 3. 4. 5) (5 is highest)
 - Are you satisfied with EWS 1294? (score from 1 as the less to 5 as the most satisfaction) why and why not?
 - Have you ever had the chance to express your complaints/requests for clarification on EWS to any community representative (community chief etc.)? If yes, what have you reported? And what was the feedback you received?

9. **For Non-users:** The barriers for non-users

- a. Do you have regular access to phone? And to a laptop?
- b. Is anybody in your family a EWS subscriber?
- c. Why you chose not to sign up?
- d. What would make it easier for **PwDs** to sign up? (in term of accessibility and use information shared via EWS 1294)

10. How do you think **PwDs** can cooperate with others groups in your community to prepare to disaster? Describe.
11. How do you think **PwDs** can cooperate with others groups in your community to respond to disaster? Describe.
12. Please tell us about your capacity and knowledge in access and use of EWS 1294
13. Please select three main activities that you think it can support PwDs in your community to prepare and response to disaster/flood? (put number 1 as the least and 3 as the most favored action)
- ☐ Alert message disseminated by EWS1294/ Subscription to the system by phone call
 - ☐ SMS broadcasting
 - ☐ Radio broadcasting
 - ☐ Direct Speakers
 - ☐ Community feedback mechanisms (2 ways communication channel)
 - ☐ Capacity building training on EWS
 - ☐ Awareness raising and promotional campaigns online and offline (National Disaster Safe Steps Social Media Campaign, Tuk-Tuk Campaign, other)

14. Please provide your recommendations for improving access to and use of the early warning system for PwDs (please, specify different suggestions related to various types of impairment, e.g. mobility/ visual / hearing etc.)

7.3 Questionnaire of FGD with Elderly Group

Before you start the FGD:

- Introduce yourself and PIN
- Introduce about this study and the expectation of the FGDs:
 - To assess the extent to which is the current system EWS1294 inclusive (accessible, responsive to specific needs different vulnerable groups might have), considering all steps/project components and based on the experience of the current users as well as perceptions of no-users (define non-user as someone who knows about the system but chose not to sign up).
 - To identify specific, actionable improvements PIN and N/PCDMs can introduce in the system to make it more inclusive for different vulnerable groups (recommendations that are feasible to implement immediately, within 6 months/1-year, long term policy), embedding inputs/suggestions from the targeted vulnerable groups
- Information provided will be kept confidential; no names of personal details will be shared with anyone outside of PIN. Participation does not guarantee any direct support from PIN.
- Time will be no longer than 1 hour.

Date:.....	Location: Village
Contact:	Commune:.....
Tel:.....	District:.....Province:.....
Start time:.....	Minute taker:.....
End Time:.....	Facilitator:

Questionnaire for Elderly Group

1. Please describe flood events, frequency, severity, vulnerability, damages and losses in your community.
2. **How does the household prepare for a crisis/emergency/disaster?** When do you start preparing? Who is involved in the planning? Who takes the lead on preparations?
3. **How does the community prepare for a crisis/emergency/disaster?** When do you start preparing? Who is involved in community-level planning? Who takes the lead on preparations at the community level?
4. Can you share an example of how your household/community has responded to floods in the past? Who was involved in the response and what roles did they play?
5. Do you know about the EWS 1294? How did you learn about it?
6. Did you subscribe to EWS1294? Why? and why not?
7. Your experiences of vulnerable groups (**Elderly Group**) with EWS1294 (**users**)
 - Do you receive alert messages disseminated by EWS1294? If yes, when was the last time?

- Do warning reach everyone that is at risk? Who within the household and community was most severely impacted? Why do you think this was the case?
 - Do you understand the warning message from the EWS1294? Please give example.
 - If you don't understand? Why?
Yes / Partially / No. If Partially and no, why? Suggestions for improvement
 - Are you able to prepare and respond to the flood after receiving message from EWS1294? If yes, how? If no, why?
Yes / Partially / No. If Partially and no, why? Suggestions for improvement
 - What are the actions that you have taken to respond to the disaster? List all those points.
 - If not able to take actions, why?
 - What are the existing barriers to action for **Elderly Group** (e.g: dissemination, communication, available response capacities, full access to information...)? Please elaborate
 - How these barriers can be overcome? Please provide your suggestions on how to overcome these barriers
8. Satisfaction levels of vulnerable groups (**Elderly**) with EWS1294 (**users**)
- What is the efficiency of EWS 1294 in improving flood prevention in your community? (1. 2 . 3. 4. 5) (5 is highest)
 - Are you satisfied with EWS 1294? (score from 1 as the less to 5 as the most satisfaction). Why and why not?
 - Have you ever had the chance to express your complaints/requests for clarification on EWS to any community representative (community chief etc.)? If yes, what have you reported? And what was the feedback you received?

9. **For Non-users:** The barriers for non-users

- Do you have regular access to phone? And to a laptop?
- Is anybody in your family a EWS subscriber?
- Why you chose not to sign up?
- What would make it easier and useful for you (and for **Elderly**) to sign up? (in term of accessibility and use information shared via EWS 1294)

10. How do you think you can support your community to prepare to a disaster? Describe.
11. How do you think you can support your community to respond to a disaster after it has happened? Describe.
12. Please tell us about your capacity and knowledge on the use of EWS 1294
13. Please select three main activities that you think it can support the **Elderly** in your community to prepare and response to disaster/flood? (put number 1 as the least and 3 as the most favored action)
- ☐ Alert message disseminated by EWS1294/ Subscription to the system by phone call
 - ☐ SMS broadcasting
 - ☐ Radio broadcasting
 - ☐ Direct Speakers
 - ☐ Community feedback mechanisms (2 ways communication channel)
 - ☐ Capacity building training on EWS
 - ☐ Awareness raising and promotional campaigns offline and online (National Disaster Safe Steps Social Media Campaign, Tuk-Tuk Campaign etc.)

☐ Others: please specify.....

14. Please provide your recommendations for the improvement of the early warning system to especially increase access and use of EWS for **Elderly**?
15. How do you think that children can benefit from EWS? And what could be done more to facilitate their access to EWS1294?

7.4 Questionnaire of FGD with Minority and Indigenous Groups

Before you start the FGD:

- Introduce yourself and PIN
- Introduce about this study and the expectation of the FGDs:
 - o To assess the extent to which is the current system EWS1294 inclusive (accessible, responsive to specific needs different vulnerable groups might have), considering all steps/project components and based on the experience of the current users as well as perceptions of no-users (define non-user as someone who knows about the system but chose not to sign up).
 - o To identify specific, actionable improvements PIN and N/PCDMs can introduce in the system to make it more inclusive for different vulnerable groups (recommendations that are feasible to implement immediately, within 6 months/1-year, long term policy), embedding inputs/suggestions from the targeted vulnerable groups
- Information provided will be kept confidential; no names of personal details will be shared with anyone outside of PIN. Participation does not guarantee any direct support from PIN.
- Time will be no longer than 1 hour.

Date:.....	Location: Village
Contact:	Commune:.....
Tel:.....	District:.....Province:.....
Start time:.....	Minute taker:.....
End Time:.....	Facilitator:

Questionnaire For Minority Groups/Indigenous Minorities/Fishery Community

1. Please describe flood events, frequency, severity, vulnerability, damages and losses in your community.
2. **How does the household prepare for a crisis/emergency/disaster?** When do you start preparing? Who is involved in the planning? Who takes the lead on preparations?
3. **How does the community prepare for a crisis/emergency/disaster?** When do you start preparing? Who is involved in community-level planning? Who takes the lead on preparations at the community level?
4. Can you share an example of how your household/community has responded to floods in the past? Who was involved in the response and what roles did they play?
5. Do you know about the EWS 1294? How did you learn about it?
6. Did you subscribe to EWS1294? Why? and why not?

7. Your experiences of vulnerable groups (**Minority Groups/Indigenous Minorities/Fishery Community**) with EWS1294 (**users**)
 - Do you receive alert messages disseminated by EWS1294? If yes, when was the last time?
 - Do warning reach everyone that is at risk?
 - Do you fully understand the warning messages?
Yes / Partially / No. If Partially and no, why? Suggestions for improvement
 - Is the warning clear and useable?
Yes / Partially / No. If Partially and no, why? Suggestions for improvement
 - Are you able to prepare and respond to the flood after receiving message from EWS1294?
Yes / Partially / No. If Partially and no, why? Suggestions for improvement
 - What are the actions that you have taken to respond to the disaster? List all those points?
 - If not able. Why?
 - What are the potential barriers to action for **Minority Groups/Indigenous Minorities/Fishery Community** (e.g: dissemination, communication, available response capacities, full access to information...)?
 - How these barriers can be overcome? Please provide your suggestions on how to overcome these barriers
8. Satisfaction levels of vulnerable groups (**Minority Groups/Indigenous Minorities/Fishery Community**) with EWS1294 (**users**)
 - What is the efficiency of EWS 1294 to improve flood prevention in your community? (1. 2 . 3. 4. 5) (5 is highest)
 - Are you satisfied with EWS 1294? (score from 1 as the less to 5 as the most satisfaction) why and why not?
 - Have you ever had the chance to express your complaints/requests for clarification on EWS to any community representative (community chief etc.)? If yes, what have you reported? And what was the feedback you received?

9. **For Non-users:** The barriers for non-users

- Do you have regular access to phone? And to a laptop?
- Is anybody in your family a EWS subscriber?
- Why you chose not to sign up
- What would make it easier for **Minority Groups/Indigenous Minorities/Fishery Community** to sign up and use EWS ? (in term of accessibility and use information shared via EWS 1294)

10. How do you think **Minority Groups/Indigenous Minorities/Fishery Community** can support your community to prepare to disaster? Describe.
11. How do you think **Minority Groups/Indigenous Minorities/Fishery Community** can support your community to respond to disaster? Describe.
12. Please tell us about your capacity and knowledge in accessing and using EWS 1294
13. Please select three main activities that you think it can support the **Minority Groups/Indigenous Minorities/Fishery Community** in your community to prepare and response to disaster/flood? (put number 1 as the least and 3 as the most favored action)
 - ☐ Alert message disseminated by EWS1294/ Subscription to the system by phone call
 - ☐ SMS broadcasting
 - ☐ Radio broadcasting

- ☐ Direct Speakers
- ☐ Community feedback mechanisms (2 ways communication channel)
- ☐ Capacity building training on EWS
- ☐ Awareness raising and promotional campaigns offline and online (National Disaster Safe Steps Social Media Campaign, Tuk-Tuk Campaign etc.)
- ☐ Others: please specify.....

14. Please provide your recommendations for the improvement of the early warning system to increase access and use from **Minority Groups/Indigenous Minorities/Fishery Community?**

7.5 Questionnaire for KIIs

Before you start the KII:

- Introduce yourself and PIN
- Introduce about this study and the expectation of the KIIs:
 - o To collection information on users and non-users of EWS 1294 in order to assess the extent to which is the current system EWS1294 inclusive (accessible, responsive to specific needs different vulnerable groups might have), considering all steps/project components and based on the experience of the current users as well as perceptions of no-users (define non-user as someone who knows about the system but chose not to sign up).
 - o To identify specific, actionable improvements PIN and N/PCDMs can introduce in the system to make it more inclusive for different vulnerable groups (recommendations that are feasible to implement immediately, within 6 months/1-year, long term policy), embedding inputs/suggestions from the targeted vulnerable groups.
- Information provided will be kept confidential; no names of personal details will be shared with anyone outside of PIN. Participation does not guarantee any direct support from PIN.
- Time will be no longer than half an hour.

Date:	Location: Village
Interviewee:	Commune:
Tel:	District: Province:
Start time:	Interviewer:
End Time:.....	Tel:.....

Questionnaire for KIIs “Impact assessment on EWS 1294 reach on people living with disabilities, the elderly, women, and minority groups”

GENERAL INFORMATION

1. Gender: ☐ Female ☐ Male
2. Age: years: ☐ adult (18-55) ☐elderly (+56)
3. Disability (Mental/Physical disability)

- ☐ No ☐ Yes
4. Minority group
☐ No ☐ Yes
5. Which minority group:
☐ Indigenous group (.....)
☐ Religious minority (Cham community)
☐ Fishery Community member
☐ Other (.....)
6. What is the level of your education?
☐ No general education ☐ Primary school ☐ Lower secondary school
☐ High school ☐ Bachelor's degree

RISK KNOWLEDGE

7. Do you think your family/community is vulnerable to/at risk of disaster?
Yes, why? how is its vulnerability?
No, why?
8. Have you ever heard about EWS 1294?
Yes, how do you know?
No.
9. Have you signed up for EWS 1294?
Yes, how?
No, why?
10. **(Non-users)** Are you willing to sign up for EWS 1294?
Yes, why and how to sign up?
No, why?
11. **(Non-users)** When will you sign up for EWS 1294? And what would make it easier and useful for you to sign up?

DETECTION, MONITORING AND WARNING SERVICE

12. **(Users)** Is EWS 1294 efficient in improving flood prevention in your community?
Yes, how?
No, why? Partially, why?
What can be done to improve its efficiency?
13. **(Users)** Are you satisfied with EWS 1294?
Yes, what level of your satisfactory? (1 to 5)
No, why? Partially, why?

DISSEMINATION AND COMMUNICATION

14. **(Users)** Do you receive warning messages disseminated by EWS 1294? When was the last time?
15. **(Users)** Do you understand the warning message from EWS 1294?
Yes, please give example:
No, why? Partially, why?
16. How do you prefer to receive the early warning system? Why?
.....



EWS 1294 - Early Warning System



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