# ANNEX II. POST-EXERCISE EVALUATION COMPILATION

This Annex presents a compilation of the responses provided by countries to the Exercise PacWave22 post-exercise evaluation forms: communication test and National/regional exercises. Altogether 27 countries (including one sub-national entities) submitted evaluation forms about the TSP communication test and 21 states members submitted their assessments about regional/National exercises.

Surveys were completed online through the Survey Monkey online survey and questionnaire tool, or submitted by transmission of the completed survey file to the PacWave22 Co-Chairs. Several countries submitted multiple evaluations to reflect the participation and experience of these agencies. Where submissions were from different agencies within the same country, it was asked to the country which for the submission that shall be used in for purposes analysis.

The online surveys were available as follows:

* PacWave22 Live TSP Communication Test <https://www.surveymonkey.com/r/pacwave22_comm>;
* EXERCISE PACIFIC WAVE 2022 (PacWave22) National and Regional Communication and Cooperation Post-Exercise <https://www.surveymonkey.com/r/pacwave22_eval>
* PACIFIC WAVE 2022 (PacWaveE22) PICT REGIONAL EXERCISE  <https://www.surveymonkey.com/r/PacWave22_PICTs>;

The surveys Live TSP Communication Test and National and Regional Communication and cooperation exercise are divided into four sections according to the PacWave20 objectives, and evaluation statements and questions focused on different components of the warning and response process.

For each question, a short statement is provided that summarises the responses, and this is followed by comments provided by the countries.

Other activities were encouraged but at the discretion of each country.

1. Overall Country and Agency Participation: TSP Communication Test.

|  |  |  |
| --- | --- | --- |
|  | Country | Agency |
| 1 | Australia | Bureau of Meteorology |
| 2 | Brunei Darussalam | Brunei Darussalam Meteorological Department |
| 3 | Chile | Hydrographic and Oceanographic Service of the Chilean Navy (SHOA) |
| 4 | Colombia | Dirección General Marítima |
| 5 | Cook Islands | Cook Islands Meteorological Service |
| 6 | Ecuador | Instituto Oceanográfico y Antártico de la Armada |
| 7 | El Salvador | Centro de Monitoreo de Amenazas Naturales del Ministerio de Medio Ambiente y Recursos Naturales. |
| 8 | Fiji | Mineral Resources Department |
| 9 | French Polynesia | CPPT |
| 10 | Guatemala | Instituto Nacional de Sismologia, Vulcanologia, Meteorologia e Hidrologia |
| 11 | Hong Kong, China | Hong Kong Observatory |
| 12 | Japan | Japan Meteorological Agency |
| 13 | Malasya | MALAYSIAN METEOROLOGICAL DEPARTMENT |
| 14 | Mexico | Centro de alerta de tsunamis de la secretaría marina armada México |
| 15 | New Caledonia | Direction de la sécurité civile et de la gestion des risques - DSCGR |
| 16 | New Zealand | National Emergency Management Agency |
| 17 | Nicaragua | INETER / CATAC |
| 18 | Papua New Guinea | National Disaster Centre |
| 19 | Perú | DIHIDRONAV |
| 20 | Philippines | Philippine Institute of Volcanology and Seismology (PHIVOLCS) |
| 21 | Republic of Korea | Korea Meteorological Administration |
| 22 | Russian Federation | Sakhalin Tsunami Warning Center,Federal Service of Russia for Hydrometeorology and Enviromental Monitiring |
| 23 | Samoa | MNRE/Met Division/Geo-science/ NDC |
| 24 | Singapore | Meteorological Service Singapore |
| 25 | Solomon Islands | Solomon Islands NDMO/Meteorological Services |
| 26 | United Kingdom | UK Met Office |
| 27 | United States | NOAA/NWS/NTWC |

1. Overall Country and Agency Participation: Regional/National Exercise

|  |  |  |
| --- | --- | --- |
|  | Country | Agency |
| 1 | Australia | Bureau of Meteorology |
| 2 | Chile | Chilean Navy Hidrographic and Oceanoraphic Service |
| 3 | China | National Marine Environmental Forecasting Center |
| 4 | Colombia | Dirección general Maritima |
| 5 | Costa Rica | SINAMOT-UNA |
| 6 | Ecuador | Instituto Oceanográfico y Antártico de la Armada |
| 7 | El Salvador | Centro de Monitoreo de Amenazas Naturales del Ministerio de Medio Ambiente |
| 8 | Fiji | NTWC |
| 9 | French Polynesia | Laboratoire de Géophysique de Tahiti / CPPT - French Polynesian Tsunami Warning Centre |
| 10 | Hong Kong, China | Hong Kong Observatory |
| 11 | Japan | Japan Meteorological Agency |
| 12 | México | Centro de alerta de tsunamis de la secretaría marina armada México |
| 13 | New Caledonia | Government of New Caledonia - DSCGR |
| 14 | New Zealand | National Emergency Management Agency (NEMA) |
| 15 | Palau | National Weather Service Office (WSO PALAU) |
| 16 | Panamá | Consejo de Seguridad Nacional |
| 17 | Perú | DIHIDRONAV |
| 18 | Russian Federation | Sakhalin Tsunami Warning Center, Federal Service of Russia for Hydrometeorology and Enviromental Monitiring |
| 19 | Solomon Islands | National Disaster Management Office and SI Met Service |
| 20 | Tonga | National Emergency Management Office |
| 21 | Thailand | National Disaster Warning Center |

***Objective 1: To test communications from the approved and developing Tsunami Service Providers (PTWC, NWPTAC, SCSTAC, CATAC) to Member States/Countries.***

The results that allowed to identify the fulfillment of the objective were submitted by 27 countries. Below are the results according to the type of question and comments submitted by the respondents.

* 1. **Did your country Tsunami Warning Focal Point receive the PTWC, NWPTAC, SCSTAC, and/or CATAC Exercise Dummy message?**

**Figure 1: Receipt of the Dummy message (text product).**

The majority respondents indicated that the Dummy message was received. Two respondents indicated that the Dummy message was not received (Mexico and Samoa). PTWC, NWPTAC, SCSTAC messages were received in a timely manner.

* 1. **If yes, please select which Tsunami Service Provider you received the Exercise Dummy message from:**

**Figure 2: Where the Dummy tsunami message was received from**

All the TSP that participated in the exercise send messages according procedures,93% respondents reported that received the message from PTWC correctly, 41% from NWPTAC, 26% from SCSTAC and 11% from CATAC.

**Comments:**

* + - JMA has operated NWPTAC.
    - PTWC via e-mail & GTS NWPTAC via GTS SCSTAC via e-mail, fax & GTS
  1. **If you received an Exercise Dummy message, when did you receive the message(s)? Please state the time in UTC:**

Majority of countries received the message on October 13th at 00:00 UTC Time. The first message was received instantaneously, and the last message was reported two minutes later (by -email). Some respondents informed that fax presented significant delays. For further details of times registered by each TSP see the tables below:

|  |  |  |
| --- | --- | --- |
|  | **Country** | **Received Time** |
| 1 | Australia | 00:01 UTC (PTWC)  00:01 UTC (NWPTAC) |
| 2 | Brunei Darussalam | 00:00 UTC (PTWC) |
| 3 | Chile | 00:00 UTC (PTWC) |
| 4 | Colombia | 00:00 UTC (PTWC) |
| 5 | Cook Islands | 00:00 UTC (PTWC) |
| 6 | Ecuador | 00:00 UTC (PTWC) |
| 7 | El Salvador | 00:03 UTC (PTWC)  00:00 UTC (CATAC) |
| 8 | Fiji | 12:01(PTWC) |
| 9 | French Polynesia | 00:00 UTC by fax 00:33(PTWC)  00:00 UTC by FAX 14:07(NWPTAC) |
| 10 | Guatemala | 00:00:14 (PTWC)  00:00 UTC (CATAC) |
| 11 | Hong Kong, China | 00:00 UTC (PTWC)  00:00 UTC (NWPTAC)  00:00 UTC (SCSTAC) |
| 12 | Japan | 00:00 UTC (GTS), 00:01 UTC (Email), 00:01 (Fax) PTWC  00:00 UTC (GTS), 00:00 UTC (Email), 00:01 (Fax) SCSTAC |
| 13 | Malasya | 00:00 UTC (PTWC)  00:00 UTC (NWPTAC)  00:00 UTC (SCSTAC) |
| 14 | México | Didn’t received the message. |
| 15 | New Caledonia | 00:00 UTC (PTWC) |
| 16 | New Zealand | 00:02 UTC (PTWC) |
| 17 | Nicaragua | 00:00 UTC (PTWC)  00:00 UTC (CATAC) |
| 18 | Papua New Guinea | Thursday, 10 November 2022 |
| 19 | Perú | 00:00 UTC (PTWC) |
| 20 | Philippines | 00:00 UTC (PTWC)  00:00 UTC (NWPTAC)  00:00 UTC (SCSTAC) |
| 21 | Republic of Korea | 0:02:32 (PTWC)  00:02:32 (NWPTAC)  00:02:32 (SCSTAC) |
| 22 | Russian Federation | 00:00 UTC (PTWC)  00:00 UTC (NWPTAC) |
| 23 | Samoa | Didn’t received the message. |
| 24 | Singapore | 00:00 UTC (PTWC)  00:00 UTC (NWPTAC)  00:00 UTC (SCSTAC) |
| 25 | Solomon Islands | 00:00 UTC (PTWC) |
| 26 | United Kingdom | 00:01 UTC (NWPTAC) |
| 27 | United States | 00:00 (PTWC)  00:00 (NWPTAC) |

* 1. **How did you receive the message(s)?**

Email was the next most common form of receipt (89%) percent of the countries reported they received the message by email.

Followed by Fax (48%) and GTS (44%)

Other method of receipt includes AFTN (15%) and there is no reported message received through EMWIN.

19% of the respondent used other methods.

**Figure 3: Methods of receiving the PTWC Dummy message (more than one option could be chosen).**

**1.5 Did all your country TWFPs receive the message(s) by the same methods?**

**Figure 4: Methods of receiving.**

**Objective 1 Comments**

Several countries stated that objective one PacWave22 was accomplished, among these Papua New Guinea, Fiji, Nicaragua, Perú, Philippines, Philippines, El Salvador, Malasya, Samoa, among others. Countries highlighted that e-mail was the most reliable means of communications between TSP and states members. However, challenges still remains regarding the use of fax.

Messages were well received through multiple channels.

The communication test was received on time, through email and fax.

Test message received fine.

Communication test went well for e-mail & GTS. Fax may be a little delayed - received 0022UTC.

All the alert test messages were received in a timely manner

***Objective 2: To test national communication and cooperation, and readiness within the country.***

***Objective 2a: To test national communication and cooperation within the country.***

* 1. **Dissemination of the warning[[1]](#footnote-1).**

The most of participants in the exercise disseminated the warning message to emergency services (47%) and other national government agencies (53%). At lesser extent local government – provincial/regional level (42%). Followed by a 37% of respondents which indicated that disseminated the message to local government city/district level. In contrast, few respondents (21%) indicated that the warning message was shared with science agencies/universities involved in assessment. Similarly, few respondents (16%) provided the warning message to the public as part of the exercise.

**Figure 5: Where the warning was disseminated to.**

Five countries reported that the dissemination among emergency services was not tested during the exercise (not applicable). One of these explain that the warning was not actually sent out as part of the exercise but would have been distributed to organizations on the National Warning System list. In its replace a training portal was used in the exercise to simulate actions that would be taken during a real emergency.

Emergencies Services and other National Government Agencies that received the messages during PacWave22 were the following:

* **New Caledonia:** Operational rooms for New Caledonia (MRCC and French state) operational rooms for law enforcement (police and gendarmerie), two municipalities, identified to participate to the tabletop exercise (fire fighters), the tsunami expert (IRD), the service of communication (for eventual diffusion to the media).
* **Hong Kong,** China: Distributed the warning 35 government bureau/departments and organizations.
* **El Salvador:** Disseminated the warning to emergency services; four other national government agencies, four Local government at provincial/regional level; two Local government at city/district level tree.
* **Perú:** National Institute of Civil Defense (INDECI) and NMDO.
* **Chile:** 17 National Disaster Management Agency contacts; National Seismological Service; 14 National Tsunami Warning Centers from Colombia, Ecuador, Peru and Chile.
* **Costa Rica:** Disseminated the message to SINAMOT; UNA (NTWC) and CNE (National Emergency Office).
* **Two countries, Ecuador and Thailand** indicated that the PacWave22 was for communication test purposes only.
  1. **Time the warning was sent to agency, agencies or public[[2]](#footnote-2).**

The exercises were performed from September through November of 2022. 15 out of 21 respondents provided information regarding the date or time in which the exercise was done in their country. Six countries skipped this question, thus there is no information provided.

Following are the details:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Country | Day | Time |
| 1 | Chile | 20 of October 2022 | 14:23 UTC |
| 2 | China | 04 of November 2022 | 02:00 UTC |
| 3 | Colombia | 27 of October 2022 | 14:24 UTC |
| 4 | Costa Rica | 13 of October 2022 | 00:00 UTC |
| 5 | Ecuador | 27 of October 2022 | 14:15 UTC |
| 6 | El Salvador | 22 of November 2022 | 15:55 UTC |
| 7 | Fiji | 09 of November 2022 | 23.20 UTC |
| 8 | Hong Kong, China | 11 of November 2022 | 01:05UTC |
| 9 | Mexico | No provided information | 10 minutes after alert |
| 10 | New Caledonia | 21 of November 2022 | 21:31 UTC |
| 11 | New Zealand | PacWave 22 was developed over five dates:   * 24 October 2022 * 27 October 2022 * 31 October 2022 * 01 November 2022 * 08 November 2022 | 20:09 UTC |
| 12 | Perú | 12 October | 19:00 UTC |
| 13 | Russian Federation | No provided information | 00:02 UTC |
| 14 | Solomon Islands | 10 of November 2022 | 23:20UTC |
| 15 | Tonga | 09 of November 2022 | No provided information |

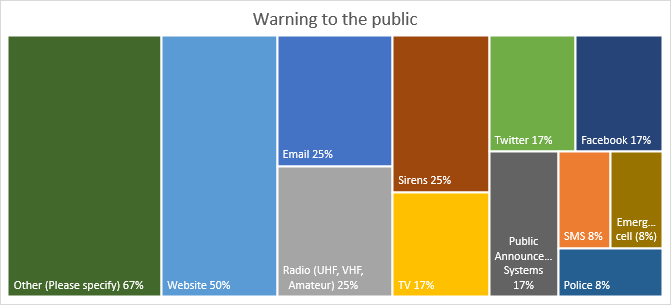
* 1. **How was the message disseminated to the agencies or public[[3]](#footnote-3).**

The message was disseminated by the majority of the participants by e-mail (73%), followed by landline telephone and cell or mobile phone (33% each method). It was also used fax (27%) and other methods (27%). At a lesser extent was used Facebook and SMS (13% each method). Few respondents used website (7%) and none respondents indicated the use of TV and Chatty beetle.

**Figure 6: Warning dissemination methods**

**2.4 Dissemination of the message to the public[[4]](#footnote-4).**

Most of respondents disseminated the message using other methods (67%) and website (50%), followed by email and Radio (25% each method).

The Sirens was used by 25% of respondents and at lesser extents twitter, Facebook, TV Public announcements (17% each methods). The less used methods with an 8% were SMS, Emergency calls and Police.

**Figure 7: methods used to warning to the public.**

Other methods used by countries.

* China: WeChat and Weibo.
* New Caledonia: Town screen (in Noumea).
* El Salvador: WhatsApp and Telegram.
* New Zealand, Hong king and Costa Rica didn’t warn to the public.

**Feedback from agencies[[5]](#footnote-5)**

The next section of the report will address the following: Methods of communication characteristics such as respondents indicated if the methods and messages were or not, timely and appropriate; accurate and clear and if the communication involved participation of NDMO with NTWC. Most respondents 93% considered that the communication methods used during the exercise were timely and appropriate and 80% of respondents submitted positive feedback from NTWC/NDMO, these indicated that messages used during the PacWave22 were accurate and clear. Six respondents skipped these two questions, some of them didn’t disseminate the message to NTWC/NDMO and others didn’t submit an answer.

Around 80% of respondents agreed that the NDMO maintained communication with the NTWC throughout the exercise. 20% participating countries answered negatively, they did not practice communication with NTWC (Figure 10). Six countries out of 21 didn’t reply if these stated communication between NDMO with NTWC and three countries dint practiced communication with the NTWC.

The countries that maintained communication during the exercise between NDMO or equivalent with their NTWC. Five countries clearly mentioned that practice information related to tsunami forecast.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Country | What was communicated between NDMO and NTWC during the event. | Nature of communication between the National Disaster Management organization with WTWC |
| 1 | Chile | Confirmation of Warning bulletins Reception by VHF, from Bulletin 01 up to Bulletin 06. | Information of tsunamigenic origin was transmitted **(Tsunami forecast).** |
| 2 | Colombia | Confirmación de recepción de la información | Specific communication channels were used. The nature of information is not indicated. |
| 3 | Ecuador | Specific channel | Specific communication channels were used. The nature of information is not indicated. |
| 4 | El Salvador | Continuos communication was maintained throughout the event. In order to know the characteristics of this to be able to take actions for saving lives. | Information aimed at **warning the population about their lives at tsunami risk** |
| 5 | Fiji | During the exercise -Verbal (face-to-face dialogue) and Visual and written (infographics via Whatsapp and Email) | Country specify that the communication was transmitted by different platforms and face to face dialogue.  The nature of information is not indicated. |
| 6 | Hong Kong, China | Technical advice was provided, particularly on tsunami forecasts and situation reports. | **Tsunami forecast and situations reports**. |
| 7 | New Caledonia | First PTWC exercise message was sent at 21:06 UTC, the tsunami expert was called by the officer on duty at 21:10 UTC. The expert arrived at the operational centre at 21:25 UTC and stayed throughout the event. | Tsunami experts participated in the exchange of information.  Its presumed that the nature of information was tsunami forecast. |
| 8 | New Zealand | In NZ, the NTWC and the NDMO are the same organisation. | The nature of information is not indicated. |
| 9 | Perú | the communication was made according to our operating protocol | The protocol tested by this country was based on **tsunami of forecast**. Its presumed that the nature of the information was tsunami forecast. |
| 10 | Russian Federation | Internet channel, IP-phone | The nature of information is not indicated. |
| 11 | Solomon Islands | Communication flow is very good | The nature of information is not indicated. |
| 12 | Tonga | Nature of tsunami | Information **of tsunamigenic origin was transmitted** |

**General comments regarding objective 2a**: To test national communication and cooperation within the country.

This question of the questionnaire gathered information from 10 out of 21 countries. Most of the participants tested communication between agencies, five presented opportunities of improvement for internal procedures and one country did a series of exercises in the context of PacWave22. Following are the details:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Country | General comments | Observations / **opportunities for improvement** |
| 1 | Chile | NTWC and NDMO can communicate between them using Radio Channels (VHF and HF), Satellite Communications (Inmarsat and Iridium), Telephone Land Lines (Analog and IP) as well as FAX | Respondents specify the communication’s channels.  This country as a redundant system of platforms that keeps NTWC communicated with NDMO.  Respondent no indicated further details regarding opportunities of improvement. |
| 2 | Ecuador | There is a specific channel between the NTWC and the risk agency through which messages are issued/received | Respondents specify the communication channels used during the exercise. The institutions that participated in the activity indicated that the messages were well received.  No further details were provided regarding opportunities of improvement. |
| 4 | Fiji | Need to do monthly test within countries | **During the exercise, the country identified the need to conduct exercises once a month**.  No further details are specified by the respondents. |
| 5 | French Polynesia | French Polynesia could not organize a tsunami exercise during the period dedicated to PACWAVE22. It corresponds to the period for cyclone/ hurricane preparedness time. A tsunami exercise was during early August in order to train the new NDMO staff and office. | Due to the specific characteristics to which the country is exposed such as cyclone and hurricane, the exercise was not carried out between September and November.  However, an activity was conducted by the country during the month of August. It was indicated that the country's response during the exercise, involved the participation of NDMO staff and Office.  In spite of the calendar adjustment PacWave22 allowed to test internal procedures of NDMO Staff and Office. |
| 6 | Hong Kong, China | Messages were communicated to government bureaux/departments and organisations in a timely manner. | The participation within the country involves government bureau, departments, and organizations.  The exchange of information was considered carried out in a timely manner. |
| 7 | México | None | No information was provided by the respondent. |
| 8 | New Caledonia | Globally, warning was clear and comprehensive for all the actors with good communication and interaction throughout the exercise.  To improve this communication, the possibility of creating a WhatsApp group between operational rooms is mentioned during the hot debrief.  It also appears that it will become necessary to simplify all the administrative process (within our operational room but also between the operational rooms, in particular to apply for assistance from the French state, etc.). | During the exercise, **the country identified the need to improve communication between the operational rooms involved in the procedures tested during the activity.**  **Simultaneously, it was identified to simplify administrative process.**  Particularly the dissemination of information to French State participation during a tsunami event. |
| 9 | New Zealand | NEMA conducted a series of drill exercises with our 24/7 Monitoring, Alerting and Reporting Team, and to cover all shifts/watches, the drill was held five times, using the same scenario each time. A Kermadec (local/regional) scenario was used. In our exercise, messages were not disseminated to other agencies or the public, they were sent through our training environment only. The assessment that these were timely, accurate and clear is based on previous examples of disseminating these messages. |  |
| 10 | Solomon Islands | Objective achieved | No further detailed were indicated by the respondent. |

***Objective 2b: To test national readiness within the country.***

In this section will be addressed the following issues: The NTWC/NDMO has an activation and response process (standard operating procedures) in place for the receipt of tsunami warnings; the NTWC/NDMO knows its specific role response role in the event of a tsunami, the NTWC/NDMO has, prior to the exercise, engaged in tsunami response planning[[6]](#footnote-6).

100% of respondents agreed that activation and response procedures are in place; it was also established that in all the countries the NTWC/NDMO knows its response role in the event of a tsunami. Respondents confirmed that in 100% of the countries the NTWC/NDMO has engaged in prior tsunami response planning. Its important to note that two countries skipped questions related to these.

There are not negative questions registered by the respondents. therefore, its assumed that all of them have planification instruments which contains activation and response from the organizations involved in tsunami response, NTWC/NDMO. Two respondents skipped these questions.

**Figure 11: Activation and response process**

**Figure 12: NTWC/NDMO prior to the exercise, engaged in tsunami response planning.**

**Figure 13: Engaged in tsunami response planning**

Regarding the existence of planning instruments, such as procedures, protocols and/or plans in the participating countries. 16 out of 21 respondents stablished the existence of at least one instrument.

Details are presented as follow:

* 09 Earthquakes.
* 01 Earthquakes and tsunami
* 02 Earthquakes and volcano eruptions
* 02 Earthquake, landslides, and volcanic eruptions
* 02 countries undertake non-source specific tsunami planning.

It’s important to mention that the event of HTHH event, has served as a trigger for each country to progressively decide to incorporate the volcano eruption as a potential hazard that might affect their coast.

Following is background information on the existence of planning instruments or activities aimed to prepare countries response to face tsunami[[7]](#footnote-7):

* NTWC/NDMO has undertaken activities to increase its capacity and capability to support a national tsunami response (for example, training, exercise, etc.);
* The NTWC/NDMO has an appropriate management structure identified and documented to support tsunami response.
* The NTWC/NDMO has a tsunami mass coastal evacuation plan.
* Arrangements to assemble the in-country disaster management group relevant to decision-making on tsunami warning and response were in place before the exercise

A 84% of respondents indicated that has undertaken activities to support a national tsunami response and 16% of respondents claimed that they do not implemented this type of activities; 100% of agrees that their countries has an appropriate management structure identified and documented to support tsunami response. At a lesser extent, almost half of the respondents a 53% responded affirmatively that they have a mass evacuation plan for the coasts of their territories in the event of a tsunami whereas 47% claimed not have one of these instruments.

95% of countries assembled arrangements in decision-making process before the exercise, while 5% claimed they didn’t do this action.

**Figure 14: Activities to support a national tsunami response.**

**Figure 15: NTWC/NDMO structure identified and documented to support tsunami response.**

**Figure 17: Arrangements to assemble the in-country disaster management group relevant to decision-making on tsunami response.**

**Figure 16: Tsunami mass coastal evacuation plan.**

A country tsunami emergency response plan (standard operating procedures) for tsunamis exists in 19 out of 21 countries that answered this question, two countries skipped this question. Following are the details: 100% of the respondents indicated that the SOAP its aimed for regional (1-3 hours arrival time), 95% for a distant (greater than 3 hours and 89% for local sceneries (less than 1 hours)[[8]](#footnote-8).

**Figure 18: A country tsunami emergency response plan (standard operating procedures) for tsunamis exists.**

Next it will be presented if the response plan includes processes to issue Safe-to-Return (All-Clear) notices and if Tsunami exercises are routinely conducted in-country. 84% of respondents indicated that their tsunami emergency response plan includes processes to issue Safe-to-Return (All Clear) notices. Similarly, 84% of respondents confirmed that tsunami exercises are routinely conducted. Three respondents do not conduct regular exercises.

**Figure 19: The country tsunami emergency response plan includes processes to issue Safe-to- Return (All Clear) notices.**

**Figure 20: Tsunami exercises conducted in-country.**

The countries that’ indicated that exercise routinely conducted (16 put of 21) described the type of exercise scenario (local, regional, distant). Tree countries didn’t add more details.

|  |  |  |
| --- | --- | --- |
|  | Country | Exercise description |
| 1 | Australia | Monthly exercises were held between Geoscience Australia and the Bureau of Meteorology as the two partner agencies in operating the Joint Australian Tsunami Warning Centre (JATWC), using earthquake scenarios from regional and distant events. A national tabletop tsunami exercise called Bombara was held on 30 Oct 2022 when over 60 agencies at all levels of government participated and tested the inter-agency tsunami emergency response arrangement. |
| 2 | Chile | October 27th Regional Distant Tsunami |
| 3 | Colombia | Pacific Wave 22 en dos fases uno con escenario distante y el otro con escenario local. |
| 4 | Costa Rica | evacuation/simulation drills in National park Manuel Antonio, Quepos Samara and Tamarindo, soon in Puerto Jimenez, Dominical, Tivives |
| 5 | Ecuador | Local exercise Regional exercise |
| 6 | Hong Kong, China | Pacwave18 Exercise based on a regional scenario |
| 7 | Mexico | September 19, 2022 with a hypothetical scenario consisting of a magnitude 8.1 earthquake located on the coasts of Michoacan and Guerrero, 42 km northwest of La Mira, Michoacan (18,141, -102,707) |
| 8 | New Caledonia | However, we know that evacuation exercices are routinely made in municipalities, at school for example. |
| 9 | New Zealand | The last national exercise was held in 2016 and was based on a near-regional scenario (just over 1 hours travel time). The 24/7 MAR Team (and formerly the Duty Team) regularly exercise tsunami threats from a variety of local, regional and distant sources. NEMA also undertakes regular internal training and exercising, as well as regular engagement with GNS Science, who provide threat advice in the event of a tsunami. |
| 10 | PALAU | Local exercise with Schools and State Governments |
| 11 | Russian Federation | local |
| 12 | Solomon Islands | Community and school Exercise , local scenario |
| 13 | Thailand | IOWave18 scenario with a 9.3 earthquake off the west coast North Sumatra |

**Tsunami preparedness:**

95% of respondents indicated that tsunami-related public education and awareness materials have been developed and disseminated in their country (Figure17).

37% of the respondents indicated the existence of tsunami-related programmes are in place for all levels of educations (figure 18).

**Figure 22: Tsunami related curriculum programmes are in place for all levels of education.**

**Figure 21: Tsunami-related public education and awareness materials have been developed and disseminated.**

**Curriculum Tsunami -related programs educations and levels.**

Only 7 countries out of 21 described if tsunami-related programmes exist /or are available. Each country presents information on how the curriculum is presented in its educational programs.

|  |  |  |
| --- | --- | --- |
|  | Country | Description |
| 1 | Australia | While not required officially, tsunami was included in some geography or science curricula around the country. |
| 2 | Costa Rica | We already had meetings with education ministry, to include in all levels, now they receive in secondary some knowledge about tsunami has a natural hazard, but not preparation at all. |
| 3 | Fiji | Primary and Secondary |
| 4 | Hong Kong, China | Secondary and post-secondary education have tsunami-related curriculum. Educational resources are available on the Hong Kong Observatory's website. |
| 5 | New Zealand | There are curriculum programmes for pre and primary levels, but these are not specifically for tsunami education but apply to all hazards. |
| 6 | Solomon Islands | School develop Tsunami Response plans |
| 7 | Tonga | Not all have it and the few that does needs to be upgraded. |

**Tsunami-vulnerable communities and Evacuation system elements to face and response tsunami.**

There is a range of literature on what elements an evacuation system should contain (MINVU, 2017; INDECI, 2019), but most agree that the following components are necessary to guide people through the evacuation process (2020, UNESCO/IOC. 2020. Preparing for Community Tsunami Evacuations: from inundation to evacuation maps, response plans and exercises. Paris, UNESCO. (Manuals and Guides, 82). The main components of an evacuation system are: Signage, assembly points, evacuation routes. Most of these are disseminated to vulnerable communities through evacuation maps. Evacuation maps become relevant because they allow people exposed to tsunami to leave the area of exposure and go to safe areas.

Most of the countries (74%) participating in this questionnaire do not have elements of an evacuation system, such as evacuation maps, signage, and assembly points. Only 26% respondents confirmed that all tsunami-vulnerable communities have tsunami evacuation maps, signage, and assembly points for evacuation.

**Figure 23: Tsunami related curriculum programmes are in place for all levels of education.**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Countries | Number of communities with maps and signage, gaps, and future plans to fill gaps. | Observation |
| 1 | Australia | New South Wales (NSW) and Queensland (QLD) are the two states that published online their respective state-based tsunami evacuation maps.  Tasmania (TAS) developed the detailed evacuation maps for Hobart and Southeast Tasmania but as far as I know they are not yet publicly available.  Few to hardly any places in Australia have signages and evacuate routes marked on roads. Western Australia (WA) has a project underway to develop tsunami evacuation maps for its state. | Country has evacuation maps but it’s difficult to state the existence of signage. |
| 2 | Chile | 69 Communities with Tsunami Inundation Charts. 08 New communities and 03 Updates are planned for the 2022-2023 period. Tsunami evacuation routes signage is present in almost every coastal community. Nevertheless, the signage need to be updated. | Country has evacuation maps but it’s difficult to state the existence of signage. |
| 3 | Colombia | 2 municipios | Does not provide further information |
| 4 | Costa Rica | Costa Rica has 6 communities tsunami Ready: Ostional, Tamarindo, Samara, Quepos, Uvita y Coco, in process are some as a Hermosa (Carillo), Puerto Jimenez, Tivives, Dominical, Cahuita. Other has signage as Jaco, Santa Teresa, Malpais... And other just maps, and other are working in response plans | Country has communities participating in Tsunami Ready Program. Thus,  Implementation of elements system its a work in progress. |
| 5 | Ecuador | 28 locations | Does not provide further information |
| 6 | French Polynesia | The signage for route evacuation is only under developpement in society archipelagoes where there is the most inhabitants and dense population. THe main island of French-Polynesia is Tahiti that have 75% of the whole country's population, in there we have 20% of communities with signage of evacuation route to safety sites. | Implementation of elements system its a work in progress. |
| 7 | Hong Kong, China | There are many high rise buildings in Hong Kong, hence vertical evacuation could be a way of evacuation. | Does not provide further information |
| 8 | New Zealand | Responsibility for tsunami evacuation maps and signage lies with the regional/local government level. Many at-risk communities have these arrangements in place. Regional CDEM Groups set out their plans to fill gaps in their CDEM Groups Plans, which are prepared every 5 years. |  |
| 10 | Solomon Islands | More than 20 communities | Does not provide further information |

**Type of exercises.**

It was asked to the states members what kind of exercises was developed and reported as part of PacWave22 initiative, 68% of the respondents implemented a tabletop exercise; at lesser extent, 53% practiced drills; followed by orientation and functional exercises (26% each type). In contrast, only 16% of respondents indicated that a Full Scale exercise was trained in their countries. Few countries, a 5%, established that trained other type of exercise, nevertheless, information about what type of exercise was not provided.

**Figure 24: Type of exercise in pacWave2022**

**Conduct community evacuation.**

Out of a total of 21 responders, 8 indicated that they conducted evacuation processes involving the tsunami-exposed community. This is equivalent to 38% of the participating countries, while 52% of the participating states did not train the community during the implementation of PacWave22. Two respondents skipped this question.

**Figure 25: Type of exercise in PacWave2022**

**Figure 21: conduct community evacuation**

States members like Peru, Solomon Islands and Tonga trained tsunami evacuations addressed to Schools. Costa Rica, México, Palau indicated the practice of other type of exercise, but not specify which one. Thailand did a community-based drill.

**Figure 26: Type of exercise in PacWave2022**

**People’s participation is described as follows:**

Of the total number of exercises involving community participation (8), countries were asked to indicate the total number of people participating in each exercise. The numbers of participants presented by the respondents correspond to approximate figures, therefore in 2022, it is estimated that approximately 54,809 people have participated in the exercises. One country didn´t reported figures. Details as follows:

|  |  |  |
| --- | --- | --- |
|  | **Country** | **People’s participation in PacWave22** |
| 1 | Costa Rica | 100 |
| 2 | Mexico | 7541 |
| 3 | Palau | Approximately 50% of each State was evacuated along the hazard zones or coastal areas. Note: Total population ~17, 351 and approximately 50% of coastal communities evacuated at ~8,678 |
| 4 | Perú | 1000 |
| 5 | Solomon Islands | 100 |
| 6 | Thailand | 2500 |
| 7 | Tonga | 178 |
|  | **Total** | **54.809** |

**Implementation UNUESCO/ IOC Tsunami Ready Program**

The Tsunami Ready programme seeks to build resilient communities through awareness and preparedness strategies that will protect life, livelihoods, and property from tsunamis in different regions (IOC-UNESCO, 2022; SINAMOT, 2023). The main goal of the programme is to improve coastal community preparedness for tsunamis and to minimize the loss of life, livelihoods, and property (IOC-UNESCO, 2022). In the survey was asked to the respondents if their country is currently implemented the programme. 58% of the respondents indicated that their country is implementing tsunami ready programs

**Figure 27: Implementation of program UNESCO/IOC community-based Tsunami Ready Programme.**

**Countries statement about Tsunami Ready programme.**

Countries that answered no addressed the issue as follow:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Country | Answer | If No, is your country interested in implementing the Programme? |
| 1 | China | No | yes |
| 2 | French Polynesia | No | Yes |
| 3 | Fiji | No | Yes, we are interested |
| 4 | Australia | No | Yes interested but currently in 'watching' phase only. |
| 5 | New Caledonia | No | New Caledonia is interested in implementing the programme. |
| 6 | Hong Kong, China | No | The feasibility of implementation will be explored. |
| 7 | COLOMBIA | No |  |
| 8 | PERU | No | Yes, our country through our coastal communities intend to participatre in the tsunami ready program |
| 9 | New Zealand | No |  |
| 10 | CHILE | No | Pilot programs are being developed for two coastal communities but re still in the early phases. |
| 11 | Russian Federation | No | yes, interesed |
|  |  |  |  |
| Countries that answered no addressed the issue as follow: | | | |  |
|  | Country | Answer | If yes, is your country interested in implementing the Programme? |
| 1 | Tonga | Yes | begining process as UNESCO will validate tsunami preparedness that as been done |
| 2 | Solomon Islands | Yes | 5 |
| 3 | El Salvador | Yes | Two comunities (La Libertad and Tamanique) |
| 4 | Costa Rica | Yes | Costa Rica has 6 communities tsunami Ready: Ostional, Tamarindo, Samara, Quepos, Uvita y Coco, in process are some as a Hermosa (Carillo), Puerto Jimenez, Tivives, Dominical, Cahuita |
| 5 | MÉXICO | Yes |  |
| 6 | Thailand | Yes | 336 communities |
| 7 | PALAU | Yes | Communities in 16 States that make up the Republic of Palau |

**Objective 2b Comments**

|  |  |  |
| --- | --- | --- |
|  | Country | Comments regarding Objetive 2B |
| 1 | Australia | 2.13. Australian Tsunami Emergency Plan/Handbook stipulates the roles and responsibilities of each agency in the tsunami response. It is available at https://knowledge.aidr.org.au/resources/tsunami-planning-handbook/. In addition, coordination nationally is supported by the Australian Tsunami Advisory Group or ATAG at https://knowledge.aidr.org.au/resources/australian-tsunami-advisory-group/. 2.14. National Evacuation Plan does not apply to Australia where each of the 7 states/territories has jurisdictional right to develop these plans (and they have). 2.19. Tsunami awareness materials were developed by the Australian Tsunami Advisory Group for Australia including the online tool of https://knowledge.aidr.org.au/resources/the-ultimate-guide-tsunami/#/. Each tsunami response agency also publishes on websites and social media or provides hard copy brochures to raise public tsunami awareness on occasions of WTAD, tsunami event anniversaries and exercises/drills. 2.21. NSW evacuation maps can be found at https://www.ses.nsw.gov.au/tsunamisafe/evacuation-map/tsunami-evacuation-map/ QLD evacuation maps can be found at https://www.qfes.qld.gov.au/prepare/tsunami/evacuation-areas |
| 2 | Chile | Coastal community readiness should be actively promoted with local authorities, but have encountered serious financial constraints. |
| 3 | Ecuador | The purpose of the exercise was to test communications between countries in the region |
| 4 | Hong Kong, China | Tsunami Warning Centre and Disaster Management Office as well as all relevant organisations are aware of the risk and impacts of tsunami. Contingency Plan for Natural Disasters and departmental response plans are in place. |
| 5 | New Caledonia | To improve its readyness, New Caledonia is willing : - to train more the duty officers on tsunami risk, - to improve its tsunami risk procedure, - to persue on participating to PacWave exercices, with maybe evacuation exercise for 2024, - to participate to tsunami ready programme in order to develop tsunami evacuation maps, signage, and assembly points for evacuation in the identified test municipalities first and throughout the territory second, - to persue the work to develop culture of risk at schools and among population. This is on the way with the building of a public risk management policy. |
| 6 | Solomon Islands | Test archived however needs to revisit them regularly and expand through out the country |

**Objective 3: *To test regional communication and cooperation.***

**Did your country engage in communication and cooperation with other countries in the region for PacWave20?**

63% of respondents indicated that their countries engaged in communication and cooperation with other countries in the region for PacWave22. 37% didn’t practice cooperation with other states members.

**Figure 28: Engagement in communication and cooperation with other countries in the region for PacWave22.**

The type of cooperation conducted during the exercises was:

* 46% (6) states members shared Data sharing (Seismic, sea level, etc.).
* 62% (8) states members shared Event information sharing.
* 38% (5) states members shared Alert coordination (levels, dissemination)
* 54% (7) states members shared Joint PacWave22 exercise.

**Figure 29: Type of cooperation conducted by countries PacWave22**

Details as follows of the interaction implemented in PacWave22 are:

|  |  |  |
| --- | --- | --- |
|  | **Country** | **Cooperation with other countries.** |
| 1 | Chile | Colombia, Ecuador and Peru |
| 2 | China | South China Sea countries |
| 3 | Colombia | Ecuador, Chile, Perú |
| 4 | Costa Rica | Mexico and Chile |
| 5 | Ecuador | Regional Group (Colombia, Chile and Perú) |
| 6 | Fiji | Tonga, Samoa, Nauru, Niue, French Polynesia |
| 7 | French Polynesia | See PACWAVE22-PICT report |
| 8 | Mexico | EEUU |
| 9 | New Caledonia | Wallis-and-Futuna through the french state operational room. |
| 10 | Perú | Chile, Ecuador, Colombia |
| 11 | Russian Federation | Japan Meteorological Agency (JMA) |

**Did the National Tsunami Warning Centre communicate with other counties during the event?**

50% (18) of respondents answered this question, half of them confirmed that NTWC shared information with other countries, while the other 50% did not implemented this action.

**Figure 30: National Tsunami Warning Centre communicate with other countries during the event PacWave22.**

Following are the details list of which each country shared information:

|  |  |  |
| --- | --- | --- |
|  | **Country** | **List of countries.** |
| 1 | French Polynesia | See PACWAVE22-PICT report |
| 2 | Fiji | Tonga, Samoa, Nauru, Niue, French Polynesia |
| 3 | Ecuador | Colombia Chile Perú |
| 4 | Colombia | Ecuador, Chile, Perú |
| 5 | Perú | Chile, Ecuador, Colombia |
| 6 | Chile | Colombia, Ecuador and Peru |
| 7 | Mexico | EEUU |
| 8 | Russian Federation | USA, Japan |

**Did the National Disaster Management Agency communicate with other countries during the event?**

Only11% (2) respondents indicated that the NDMO communicated with other countries during the event. In contrast, 89% (16) respondents stated that they didn’t shared information from NDMO with other countries. 3 countries skipped this question.

**Figure 31: Communication of the NDMO with other countries during the exercise**

|  |  |  |
| --- | --- | --- |
|  | Country | List of countries shared information |
| 1 | Fiji | Tonga, Samoa, Nauru, Niue, French Polynesia |
| 2 | Mexico | EEUU |

**Was national information shared with other countries during the event?**

33% of respondents indicated national information was shared with other countries during the exercise.

**Figure 32: Sharing of national information with other countries.**

|  |  |  |
| --- | --- | --- |
|  | **Country** | **List of couentries** |
| 1 | China | South China Sea countries |
| 2 | French Polynesia | Tsunami warning level fixed base on early sharing information. |
| 3 | Fiji | Tonga, Samoa, Nauru, Niue, French Polynesia |
| 4 | Colombia | Se compartieron los boletines del NTWC con los NTWC de Ecuador, Chile, Perú |

**What type of national information did you share?**

The information shared its presented as follows:

**Figure 33: Types of national information shared.**

**How did you communicate the information?**

Email was the primary method of communication with other countries (80%). Followed by fax (30%) and Other methods (30%). Then Radio and Satellite Telephone (20%). Finally, Landline telephone and SMS were the methods less used by the members states (20%). No respondents reported the use of Chatty Beetle.

**Figure 34: Methods of communication.**

**OBJECTIVE 3 Comments.**

The following comments were received from countries in this section:

|  |  |  |
| --- | --- | --- |
|  | **Country** | **General comments** |
| 1 | Australia | The answer of NO to this question was due to the fact that - Comms Test is a passive activity to receive test message from TSPs, and - The regional exercise to replicate the HTHH event was participated by two JATWC staff members joining the ad hoc Whatsapp group without actually issuing any national products. |
| 2 | CHILE | Regional protocols establish clear communication channels but do not imply sharing Tsunami threat levels outside of each NTWC jurisdiction. |
| 3 | Ecuador | The purpose of this exercise was to test the communication between the CNATs of the GT-ATPS |
| 4 | New Caledonia | For next PacWave exercice, New Caledonia is willing to have a scenario that could be played at the same time with another french territory, such as Wallis-and-Futuna, and maybe test HF radio communication with neighboring countries like on November with PacWave22-PICTs. |
| 5 | New Zealand | No communication with other countries was undertaken during our exercise. |
| 6 | Solomon Islands | No communication done with other countries apart from National Warning Center to PWTC |

**GENERAL EXERCISE OBSERVATIONS**

**Overall assessment.**

This section gave respondents the opportunity to provide overall comment on the exercise and how it contributed to the development of tsunami response in each country.

* + 100% of countries indicated that have a better understanding of the goals, responsibilities, and roles in case of tsunami emergencies,
  + 94% of country respondents affirmed that the exercise provided an opportunity to improve if gaps in capability and capacity are identified.
  + 41 % answered positively community have a better understanding of their tsunami risk.

**Figure 35: Country stakeholder agencies have a better understanding of the goals, responsibilities (devoirs) and roles in tsunami emergencies; Gaps in capability and capacity have been identified; Community have a better understanding of their tsunami risk and are better prepared for tsunami events; News media participated and covered the exercise; and Estimated people participating in the exercise within the country/territory.**

**.**

**Exercise planning.**

This section gave respondents the opportunity to provide overall comment on the planning of the exercise and their preparation for it.

* Overall all respondents indicated that exercise planning, conduct, format and style were very satisfactory (100%). Exercise planning at the international level went better (94%) than the planning at national (88%) or provincial/local level (88%).
* 100% of respondents indicated that the PacWave22 Exercise Manual provided an appropriate level of detail
* 88% of the respondents indicated tht the IOC Manual & Guides ( How to Plan, Conduct, and Evaluate IOC Tsunami Wave Exercises) and;
* 94% Plans and Procedures for Tsunami Warning and Emergency Management) were useful.
* The IOC Manual & Guides: Preparing for Community Tsunami Evacuations: from inundation to evacuation maps, response plans and exercises was considered useful for 82% of the participants.
* 100% respondents indicated the PacWave22 exercise website pages as useful.
* 83% thought the evaluation form was easy to use.
* 72% of the participants (13 countries) used TsuCAT for exercise planning or hazard assessment during the PacWave22.

Gráfico, Gráfico de barras, Gráfico en cascada

Descripción generada automáticamente

Figure 28: Countries evalu **Figure 26: Methods of communication.**

**Figure 36 The exercise planning.**

**ANNEX VII. LIST OF ACRONYMS**

|  |  |
| --- | --- |
| **CATAC** | Central America Tsunami Advisory Centre |
| **ICG** | Intergovernmental Coordination Groups |
| **ICG/CARIBE-EWS** | Intergovernmental Coordination Group for the Tsunami and other  Coastal Hazards Warning System for the Caribbean and Adjacent Regions |
| **ICG/ITSU** | International Coordination Group for the Tsunami Warning System in  the Pacific (now renamed ICG/PTWS) |
| **ICG/PTWS** | Intergovernmental Coordination Group for the Pacific Tsunami Warning and Mitigation System (formerly ITSU) |
| **INETER** | Instituto Nicaragüense de Estudios Territoriales |
| **IOC** | Intergovernmental Oceanographic Commission (of UNESCO) |
| **ITIC** | International Tsunami Information Center (UNESCO/IOC–NOAA) |
| **JMA** | Japan Meteorological Agency |
| **MTS** | Medium-term Strategy |
| **NDMO** | National Disaster Management Office |
| **NOAA** | National Oceanic & Atmospheric Administration (USA) |
| **NTWC** | National Tsunami Warning Centre |
| **NWPTAC** | Northwest Pacific Tsunami Advisory Center (Japan) |
| **PacWave20** | Exercise Pacific Wave 2020 |
| **PMEL** | Pacific Marine Environmental Laboratory |
| **PTWC** | Pacific Tsunami Warning Center (USA) |
| **SOP** | Standard Operating Procedures |
| **TNC** | Tsunami National Contact |
| **TSP** | Tsunami Service Provider |
| **TsuCAT** | Tsunami Coastal Assessment Tool |
| **TWFP** | Tsunami Warning Focal Point |
| **UNESCO** | United Nations Educational, Scientific & Cultural Organization |
| **SCSTAC** | South China Sea Tsunami Advisory Center (China) |
| **WG** | Working Group |
| **WG-CA** | Working Group on the Central American Pacific Coast Tsunami Warning and Mitigation System |
| **WG-SE** | Working Group on the Southeast Pacific Tsunami Warning and Mitigation System |
| **WG-TOWS** | Working Group on Tsunamis and Other Hazards related to Sea- Level Warning and Mitigation Systems |

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# 

1. 2.1 The warning was disseminated to: other agencies, Science agencies/universities involved in assessment, Local government: provincial/regional level; Local government: city/district level; Public; Not Applicable. [↑](#footnote-ref-1)
2. 2.2 What time was warning sent to the agency or agencies or Public listed in Q2.1? Please note the date and time using 24-hour clock and UTC, e.g., 5 Nov, 14:35 UTC. [↑](#footnote-ref-2)
3. 2.3 How did you send the warning to emergency, national, science, and local government agencies in Q2.1? Tick all that apply. [↑](#footnote-ref-3)
4. 2.4 How did you send the warning to the Public? Tick all that apply. [↑](#footnote-ref-4)
5. Based on feedback from agencies, were the communication methods timely and appropriate?; Based on feedback from agencies, were the message(s) disseminated from the NTWC/NDMO accurate and clear?; Did the national disaster management organisation (or equivalent) maintain communication with the National Tsunami Warning Centre throughout the event? [↑](#footnote-ref-5)
6. These issues were asked as follows: 2.9 The NTWC/NDMO has an activation and response process (standard operating procedures) in place for the receipt of tsunami warnings?; 2.10 The NTWC/NDMO knows its specific response role in the event of a tsunami?; 2.11 The NTWC/NDMO has, prior to the exercise, engaged in tsunami response planning? [↑](#footnote-ref-6)
7. These issues were asked as follow: 2.12 Since your last participation to PacWave, the NTWC/NDMO has undertaken activities to increase its capacity and capability to support a national tsunami response?(for example, training, exercise, etc.);2.13 The NTWC/NDMO has an appropriate management structure identified and documented to support tsunami response? And 2.14 The NTWC/NDMO has a national tsunami mass coastal evacuation plan? [↑](#footnote-ref-7)
8. This question was asked as fllows: 2.16 A country tsunami emergency response plan (standard operating procedures) for tsunamis exists?  Tick all that apply. [↑](#footnote-ref-8)