2024 Capacity Assessment of Tsunami Preparedness in the Indian Ocean – Results from survey data analysis

> Sessional Committee Discussion 18th November 2024



Discussion Team of Sessional Committee

- 1. Dr. Harkunti P. Rahayu (Chair Session)
- 2. Prof. Richard Haigh (Presentation the Data)
- 3. Prof Dilanti Amaratunga (Expert for Data Compilation)
- 4. Dr. Deni Septiadi (Indonesia)
- 5. Dr. Nasser Al Ismaili (Oman)
- 6. Dr. Ranganali S. Mahendra (India)
- 7. Ms. Hidayanti (Indonesia)
- 8. Mr. Gita Priyo Aditya (Indonesia)



Who completed the survey?

- Responses to the survey were coordinated, compiled, and submitted by Tsunami National Contact (TNC) of each Member State.
- The survey had six distinct parts (I-VI). Each part may have needed inputs from different stakeholders based on their national responsibility in the end-to-end tsunami warning and mitigation system.

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•	政府间海洋学委员会					
	http://loc.unesco.org - contac	- 75352 Paris Cedex 07 SP, France t phone: +33 (0)1 45 68 03 18 tariat@unesco.org				
			IOC/RJB 15 May 2024			
To : Tsunami	National Contacts of UNESCO	D-IOC ICG/IOTWMS				
ICG/IOT ICG/IOT ICG/IOT ICG/IOT ICG/IOT	WMS National Tsunami Warni WMS Tsunami Ready Focal P WMS Steering Group WMS Working Group 3 on Tsu WMS IOWave23 National Con WMS IOWave23 National Con	oints unami Ready Implementation tacts				
UNESCA	AP Disaster Risk Reduction Se	ection				
Subject:	URGENT Attention: UNES0 Tsunami Preparedness in I	CO-IOC 2024 Survey of Capa CG/IOTWMS Member States	city Assessment of	🚊 💩 unesco		IESCO-IOC I
Dear Tsunami Nati	onal Contact,			Intergovernmental	Tsunami	Preparednes
of Tsunami Prep	gent assistance in coordinating aredness in the Member S o for the Indian Ocean Tsunan	states of the UNESCO-IOC	C Intergovernmental	Commission		
which is being u (UNESCO-IOC) with	ndertaken by the UNESCO th the support of the UN Econor funding from the Asian Dev	Intergovernmental Oceanog mic and Social Commission fo	raphic Commission r Asia and the Pacific	PART II: Haza	rd Assessm	nent
As the Tsunami N survey described b	ational Contact, you are kind below in consultation with key mitigation system in your count	stakeholders involved in the	end-to-end tsunami	4i) On a scale	of 1 (Very pr	oor) to 5 (Very go
A briefing on the o	verall assessment and guidant	ce on how to complete the su	rvey will be provided	assessment		
on 0700-0900 UTC information on the	22 May 2024. The link to joir assessment.	n the briefing session is provi	ded below with other			Very poor
	Vice-Chairpersons			Capacity to undertake tsu hazard asses		\bigcirc
hairperson utaka MICHIDA, Prof. pecial Presidential Envoy for UN Ocean Decade to University of Tokyo (Atmosphere and Ocean Research Institute) astiwanoba 5-1-5	vice-chairpersons Dr Marie-Alexandrine SICRE Directrice de Recherche Centre national de la recherche scientifique (CNRS) 3 rue Michel Ange 77016 Parie	Mr Juan Camilo FORERO HAUZEUR Executive Secretary Colombian Ocean Commission (COO) Avenida Cludad de Cali No. 51 – 66 Editicio WBC, Oficina 306 1110/11 Bearth. D.C.	Prof. Amr Zakaria HAMOUDA President National Institute of Oceanography and Fisheries (NIOF) Qalibay, Al-Anfoshi		Smont	
778564 Kashiwa APAN	FRANCE	111071 Bogotá, D.C. COLOMBIA	Alexandria EGYPT	4j) On a scale	of 1 (Not a p	riority) to 5 (Ess
xecutive Secretary Ir Vider HELGESEN	Dr Nikolay VALCHEV Director Institute of Oceanology Bulgarian Academy of Sciences	Dr Srinivasa Kumar TUMMALA Director Indian National Centre for Ocean		•		
tergovernmental Oceanographic Commission — UNESCO Place de Fontenoy S352 Paris Codex 07 SP RANCE	Bulgarian Academy of Sciences 40 Parvi May Str. 9000 Varna BULGARIA	Information Services (INCOIS) Pragathi Nagar (BO), Nizampet (SO) Hyderabad 500090 INDIA		tonowing area	is of tsunam	i hazard assessn Not a priority
INTO L				Deckshill of		. tot a priority
				Probabilistic Hazard Asses (PTHA)		\bigcirc

Structure of the survey (from the 4 Pillar of EWALL)

- Basic Information about TNC/NTWC/TWFP
- II Risk Assessment (**Pillar I**) and Reduction (**Pillar IV**)
- III Detection, Warning (**Pillar II**) and Dissemination (**Pillar III**)
- IV Public Awareness, Preparedness and Response (**Pillar IV**)
- V Tsunami Ready Recognition Programme (TRRP) (**Pillar I, III, IV**)

VI Narrative

od), please rate your country's capability to undertake tsunami hazard

CG/IOTWMS National Report on Capacity Assessment of

	Very poor	Poor	Fair	Good	Very good
Capacity to Indertake tsunami nazard assessment	0	0	0	0	\bigcirc

ential), what is the priority level in your country to improve capacity in the

ent?

	Not a priority	Low priority	Medium priority	High priority	Essential
Probabilistic Tsunami Hazard Assessment (PTHA)	0	0	0	0	\bigcirc
Deterministic Tsunami Hazard Analysis	\bigcirc	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Field Studies on Tsunami Impacts	\bigcirc	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Hazard map	\bigcirc	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Inundation map	\bigcirc	\bigcirc	\bigcirc	\bigcirc	\bigcirc
Evacuation map	\bigcirc	\bigcirc	\bigcirc	\bigcirc	\bigcirc

What other areas of capacity in tsunami hazard assessment require improvement?

Sample

Tanzania, Timor-Leste (2)

18 + 2 = 20 in 2018

Australia, Bangladesh, Comoros, France (Indian Ocean Territories), India, Indonesia, Iran, Kenya, Madagascar, Malaysia, Mauritius, Mozambique, Myanmar, Oman, Pakistan, Singapore, Sri Lanka, Thailand (18)

18 + 4 = 22 in 2024

Maldives, Seyshelles, South Africa, United Arab Emirates (4)

Limitations

- Where possible, summary data from the 2018 survey is displayed alongside the 2024 results to aid comparisons.
- Caution should be used when drawing direct comparisons between the results.
 - Differences in the composition of countries responding to the 2018 and 2024 surveys
 - Changes to the personnel who completed the survey on behalf of each country
- It is a self assessment and responses have not been validated

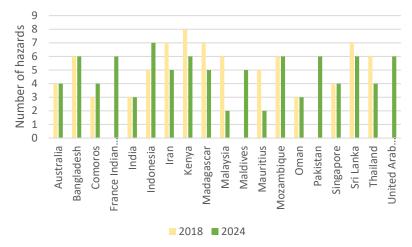


Figure 2: Number of hazards included in a multi-hazard assessment

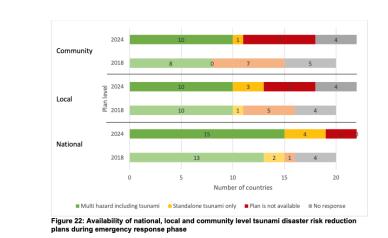
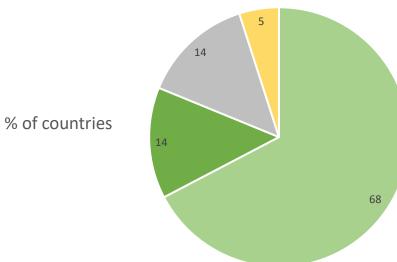


Table 1: Ranking of priority areas for capacity improvement in tsunami hazard assessment

Areas of tsunami hazard assessment	RII	2024 Rank (2018 Rank)
Evacuation map	0.85	1 (1)
Hazard map	0.81	2 (2)
Inundation map	0.81	2 (3)
Deterministic tsunami hazard analysis	0.76	4 (4)
Probabilistic tsunami hazard assessment (PTHA)	0.75	5 (6)
Field studies on tsunami impacts	0.67	6 (5)

Pillar 1





- Single hazard assessment on tsunami AND multi-hazard assessment including tsunami
- Single hazard assessment only on tsunami
- Do not carry out tsunami hazard assessment

Figure 1: Type of hazard assessment

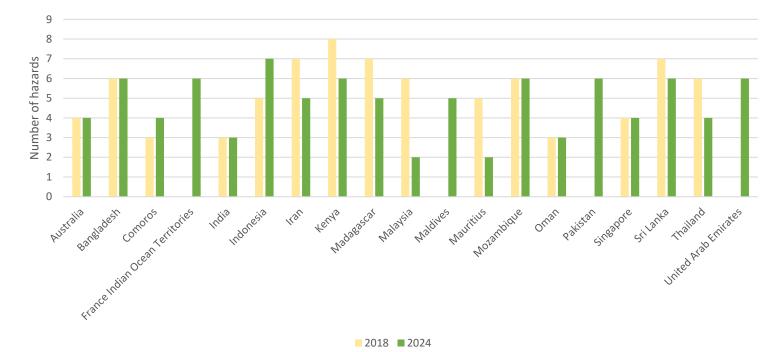


Figure 2: Number of hazards included in a multi-hazard assessment

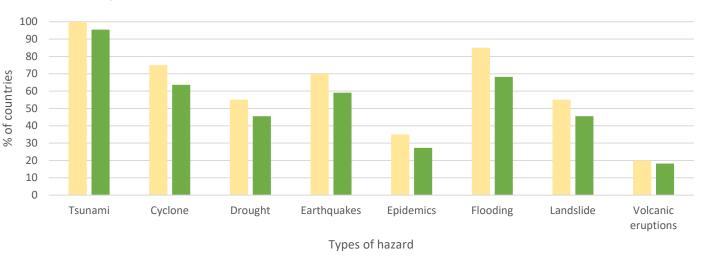
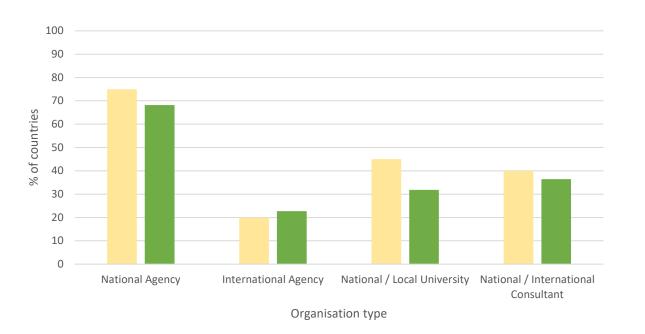
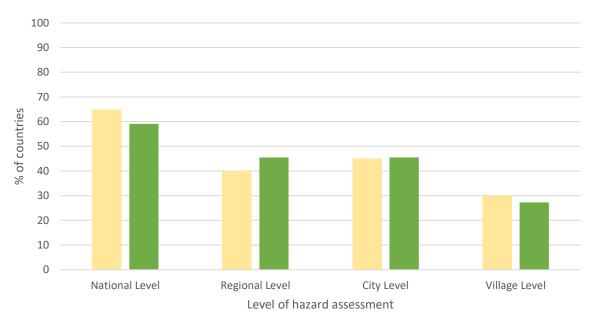


Figure 3: Type of hazard(s) included in multi-hazard assessment





2018 2024

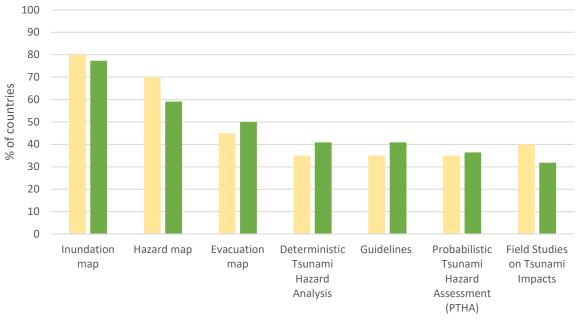
Figure 4: Organisation(s) responsible for the tsunami hazard assessment

2018 2024

Figure 5: Level at which tsunami hazard assessment is carried out



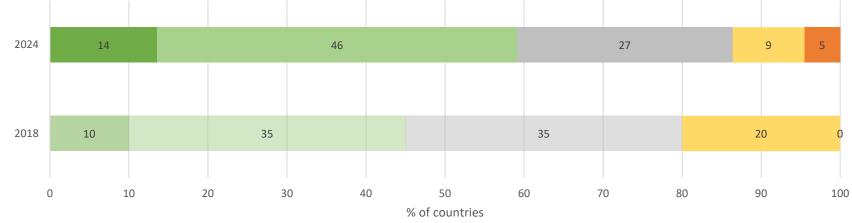
Figure 6: Data types used for tsunami hazard assessment



Tsunami hazard assessment product type

2018 2024

Figure 7: Products from tsunami hazard assessment



■ Very good ■ Good ■ Fair ■ Poor ■ Very poor

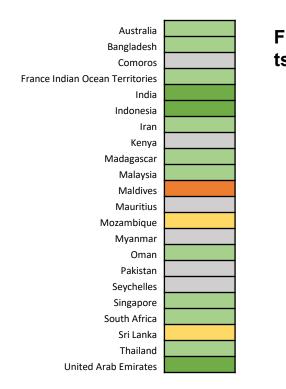


Figure 9: Capacity to undertake tsunami hazard assessments

Areas of tsunami hazard assessment	RII	2024 Rank (2018 Rank)
Evacuation map	0.85	1 (1)
Hazard map	0.81	2 (2)
Inundation map	0.81	2 (3)
Deterministic tsunami hazard analysis	0.76	4 (4)
Probabilistic tsunami hazard assessment (PTHA)	0.75	5 (6)
Field studies on tsunami impacts	0.67	6 (5)

Table 1: Ranking of priority areas for capacity improvement in tsunami hazard assessment

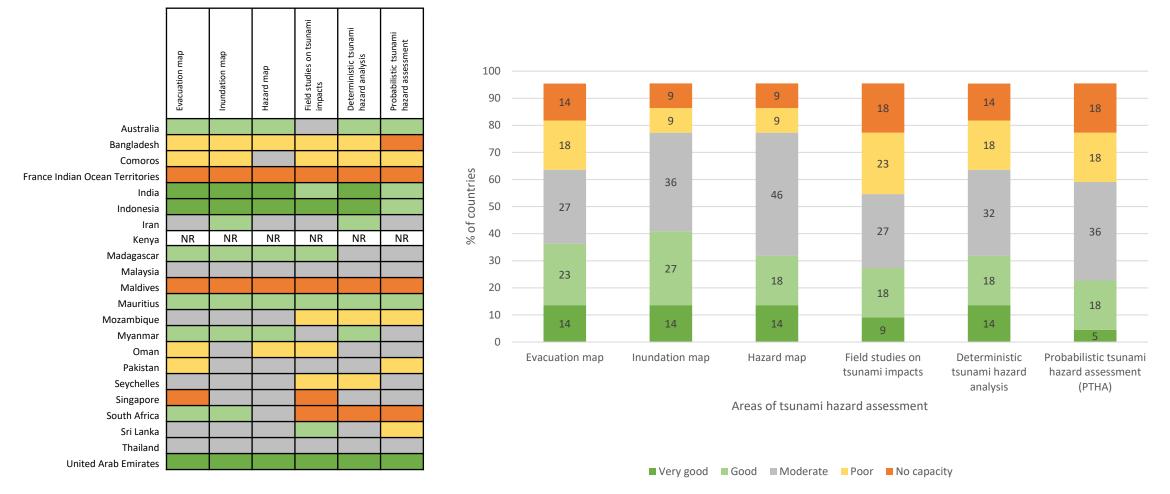
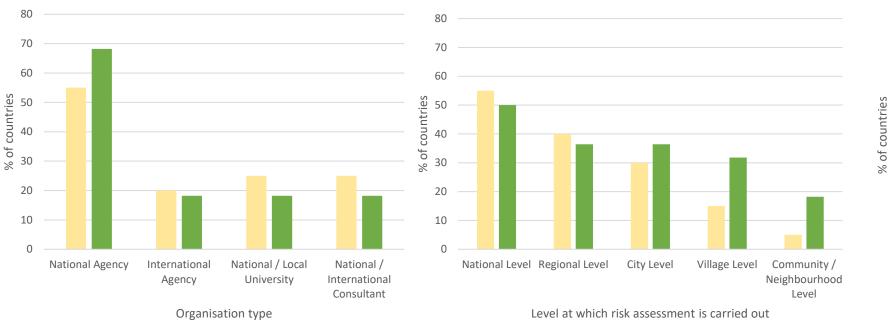


Figure 10: Capacity to give training and/or consultancy on tsunami hazard assessment to other countries

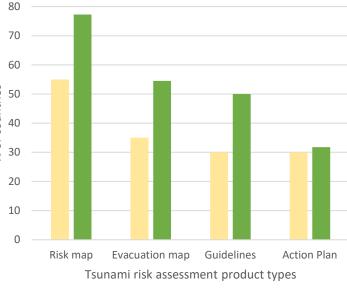


2018 2024

Figure 13: Organisation(s) responsible for the tsunami risk assessment

2018 2024

Figure 14: Level at which tsunami risk assessment is carried out

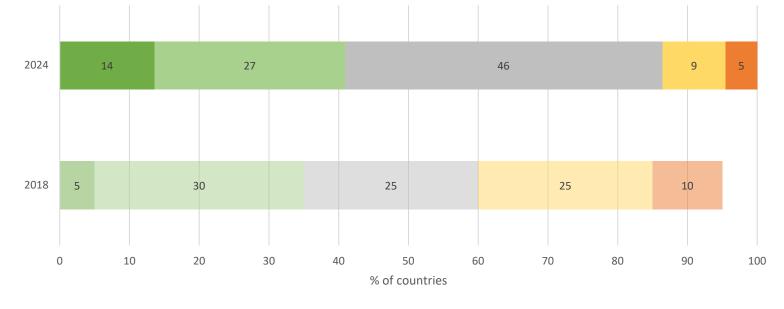


^{2018 2024}

Figure 15: Types of product to emerge from the tsunami risk assessment

Figure 16: Capacity to undertake tsunami risk assessment

Australia Bangladesh Comoros France Indian Ocean Territories India Indonesia Iran Kenya Madagascar Malaysia Maldives Mauritius Mozambique Myanmar Oman Pakistan Seychelles Singapore South Africa Sri Lanka Thailand United Arab Emirates



■ Very good ■ Good ■ Fair ■ Poor ■ Very poor

Priority level	RII	2024 Rank (2018 Rank)
Tsunami risk assessment at city level	0.82	1 (1)
Tsunami risk assessment at national level	0.79	2 (4)
Tsunami risk assessment at regional level	0.78	3 (5)
Tsunami risk assessment at village level	0.75	4 (2)
Tsunami risk assessment at community / neighbourhood level	0.74	5 (3)

Table 2: Ranking of priority areas for capacity improvement in tsunami risk assessment

2. RISK ASSESSMENT AND REDUCTION – RISK ASSESSMENT

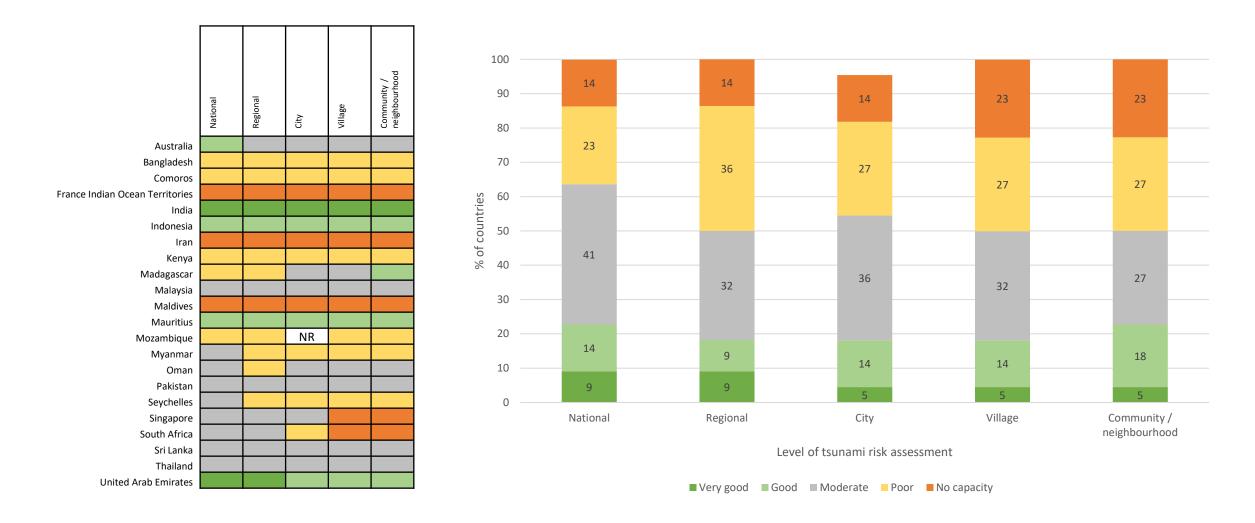


Figure 17: Capacity to give training on tsunami risk assessment

Pillar II

3. DETECTION, WARNING AND DISSEMINATION – DETECTION AND WARNING

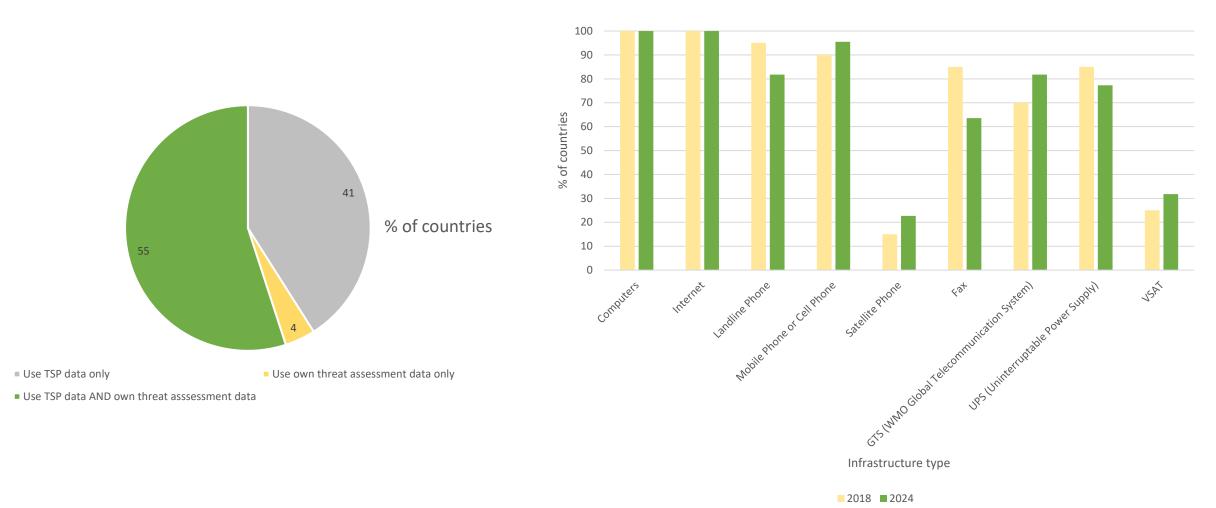
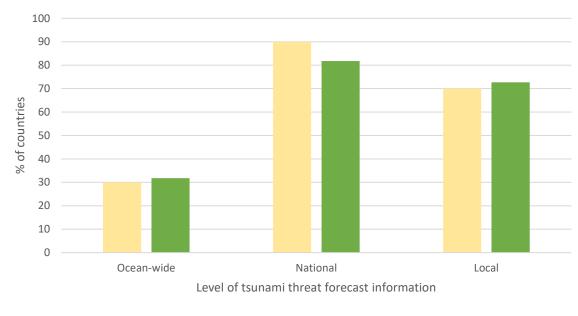


Figure 26: Data use for the Coastal Forecast Zones (CFZ) of a country's coastline to determine national threats

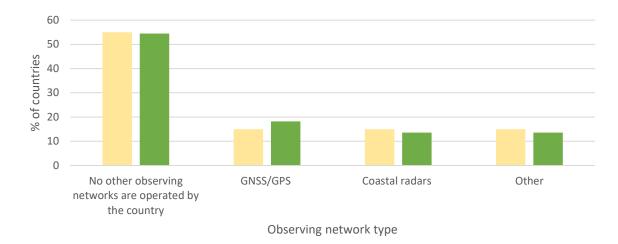
Figure 27: Infrastructure availability to support 24x7 operations

3. DETECTION, WARNING AND DISSEMINATION – DETECTION AND WARNING



2018 2024

Figure 28: Level of tsunami threat forecast information is produced by the responsible organisation

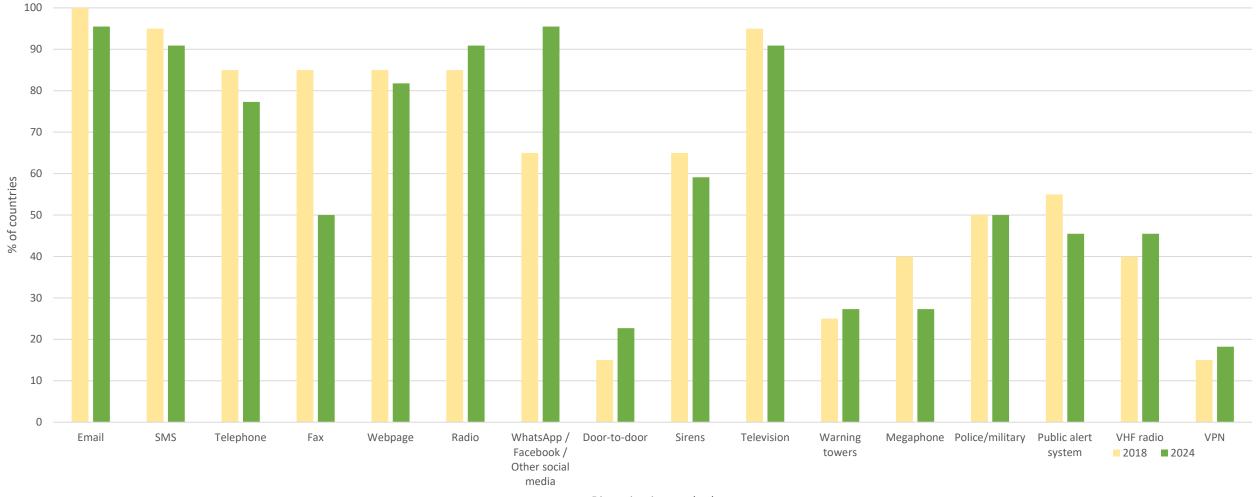


2018 2024

Figure 29: Other observing networks operated and used for tsunami early warning

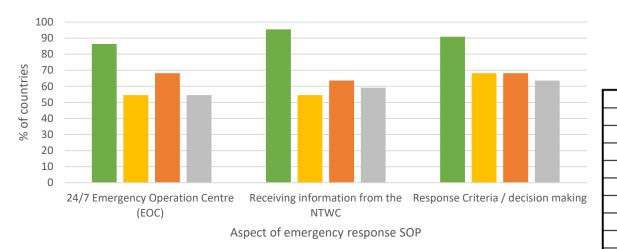
Pillar III

3. DETECTION, WARNING AND DISSEMINATION – DISSEMINATION



Dissemination method

Figure 30: How tsunami information is disseminated



■ SOP addresses this aspect of emergency response

Support is required to improve aspect of emergency response SOP

■ Support is required to develop HR in aspect of emergency response

 \blacksquare Support is required to develop infrastructure for aspect of emergency response

Figure 31: Availability of, and support required to develop upstream emergency response SOP

			A	SPECT O	F UPSTR	EAM EN	/IERGEN	CY RESP	ONSE SC)P			
ISE	24/7	Emerge	ncy Oper	ation	Receivi	ng inforr	mation fr	rom the	Resp	onse crite	eria / de	cision	
5L		Centre	(EOC)			NT	wc		making				
	SOP addresses this aspect	Support required to develop/improve SOP	Support required to develop human resources	Support required to develop infrastructure	SOP addresses this aspect	Support required to develop/improve SOP	Support required to develop human resources	Support required to develop infrastructure	SOP addresses this aspect	Support required to develop/improve SOP	Support required to develop human resources	Support required to develop infrastructure	
Australia	•	0	0	0	•	0	0	0	•	0	0	0	
Bangladesh	•	•	•	•	•	•	•	•	•	•	•	•	
Comoros													
France Indian Ocean Territories	•	0	0	0	•	0	0	0	•	•	•	•	
India	•	0	•	0	•	0	0	0	•	0	0	0	
Indonesia	•	•	•	•	•	•	•	•	•	•	•	•	
Iran	0	•	•	•	•	•	0	0	•	•	•	•	
Kenya	•	•	•	•	•	•	•	•	•	•	•	•	
Madagascar	•	•	•	•	•	•	•	•	•	•	•	•	
Malaysia	•	0	•	0	•	0	•	0	•	•	•	0	
Maldives	٠	•	•	•	•	•	•	•	•	•	•	•	
Mauritius	٠	0	0	0	•	0	0	0	•	0	0	0	
Mozambique	٠	•	•	•	•	•	•	•	•	•	٠	•	
Myanmar					•	•	•	•					
Oman	٠	•	•	•	•	•	•	•	•	•	٠	•	
Pakistan	٠	0	•	•	•	0	•	•	•	•	٠	•	
Seychelles	•	•	•	•	•	•	•	•	•	•	•	•	
Singapore	•	0	0	•	•	0	0	0	•	0	0	0	
South Africa	•	•	•	•	•	0	•	•	•	•	•	•	
Sri Lanka	٠	•	•	•	•	•	•	•	•	•	٠	•	
Thailand	•	•	•	•	•	•	•	•	•	•	•	•	
United Arab Emirates	•	0	0	0	•	0	0	0	•	0	0	0	
	• = Y	es	O = No	Bl	ank = No	o Respo	nse			20			

20

4. PUBLIC AWARENESS, PREPAREDNESS AND RESPONSE

- STANDARD OPERATING PROCEDURES

- STANDARD OPERATING PROCEDURES

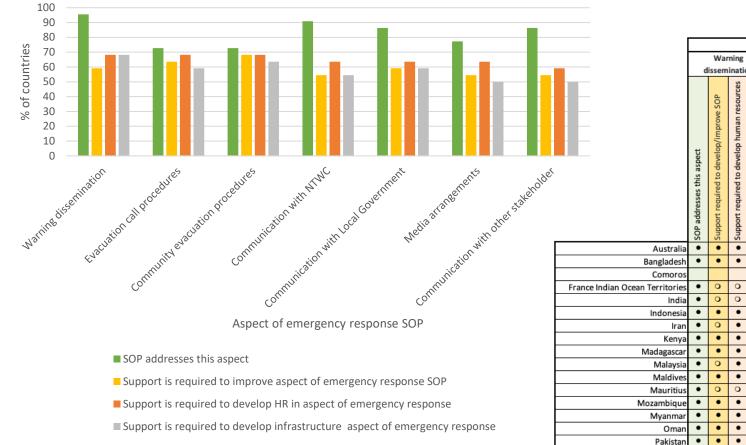


Figure 32: Availability of, and support required to develop downstream emergency response SOP

									A	SPEC	TOF	DOW	NSTR	EAM	EMER	GENO	Y RES	PON	SE SO	Р								
		War	rning		E١	/acua	tion ca	all		Comn	nunity	'	Com	munio	ation	with	Com	muni	caton	with	Med	ia arra	ingem	ents	Com	munic	ation	with
	d	lissem	inatio	n		proce	dures			evac	uation			NT	wc		local government			ent					othe	er stal	kehol	lers
	SOP addresses this aspect	Support required to develop/improve SOP	Support required to develop human resources	Support required to develop infrastructure	SOP addresses this aspect	Support required to develop/improve SOP	Support required to develop human resources	Support required to develop infrastructure	SOP addresses this aspect	Support required to develop/improve SOP	Support required to develop human resources	Support required to develop infrastructure	SOP addresses this aspect	Support required to develop/improve SOP	Support required to develop human resources	Support required to develop infrastructure	SOP addresses this aspect	Support required to develop/improve SOP	Support required to develop human resources	Support required to develop infrastructure	SOP addresses this aspect	Support required to develop/improve SOP	Support required to develop human resources	Support required to develop infrastructure	SOP addresses this aspect	Support required to develop/improve SOP	Support required to develop human resources	Support required to develop infrastructure
Australia	•	•	•	0	•	•	•	0	•	•	•	•	•	•	•	0	•	•	•	0	•	•	•	0	•	•	•	0
Bangladesh	٠	•	•	٠	٠	٠	•	•	٠	•	•	•	٠	•	•	•	٠	•	•	•	٠	•	•	٠	٠	٠	•	٠
Comoros																												
nce Indian Ocean Territories	٠	0	0	0	٠	0	0	0	٠	0	0	0	٠	0	0	0	٠	0	0	0	٠	0	0	0	٠	0	0	0
India	٠	0	0	0	•	0	•	0	٠	0	٠	0	٠	0	0	0	٠	0	0	0	٠	0	0	0	٠	0	0	0
Indonesia	٠	٠	•	٠	٠	•	•	٠	٠	•	٠	•	٠	٠	٠	•	•	٠	٠	•	٠	٠	٠	٠	٠	٠	•	٠
Iran	٠	0	•	٠	٠	0	0	0	٠	•	0	0	٠	0	0	0	•	0	0	0	٠	0	0	0	٠	0	0	0
Kenya	٠	٠	•	٠	٠	٠	•	•	٠	•	٠	•	٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	•	٠	٠	٠	•	٠
Madagascar	٠	٠	٠	٠	•	•	•	٠	٠	٠	٠	•	٠	٠	٠	•	•	٠	٠	•	٠	٠	٠	٠	٠	٠	•	٠
Malaysia	٠	0	•	٠	٠	0	•	0	٠	0	٠	0	٠	0	٠	0	•	0	٠	0	٠	0	•	0	٠	0	•	0
Maldives	٠	٠	•	٠	0	٠	•	•	0	•	•	•	٠	٠	٠	•	٠	٠	٠	•	٠		٠	٠	٠	٠	•	٠
Mauritius	٠	0	0	0	٠	٠	0	٠	٠	•	0	٠	٠	0	0	0	•	0	0	٠	٠	0	0	0	٠	0	0	0
Mozambique	٠	•	•	•	•	٠	•	•	٠	•	•	•	•	•	•	•	•	•	•	•	٠	•	•	٠	٠	•	•	٠
Myanmar	٠	•	•	•																								
Oman	٠	•	•	٠	٠	٠	•	•	٠	•	•	•	٠	•	٠	•	٠	•	٠	•	٠	•	•	•	٠	•	•	٠
Pakistan	٠	٠	•	•	0	٠	•	•	0	٠	٠	•	٠	•	٠	•	•	•	•	•	٠	•	•	٠	٠	0	0	0
Seychelles	٠	•	•	٠	0	٠	•	٠	0	•	٠	•	٠	•	•	•	•	•	•	•	0	•	٠	٠	٠	٠	•	٠
Singapore	٠	0	0	0	٠	0	0	0	٠	0	0	0	٠	0	0	0	•	0	0	0	٠	0	0	0	٠	0	0	0
South Africa	٠	0	0	٠	0	٠	٠	٠	0	•	٠	•	٠	0	٠	•	٠	٠	•	٠	0	٠	٠		0	٠	٠	٠
Sri Lanka	٠	٠	•	٠	٠	٠	•	٠	٠	•	•	•	٠	•	•	•	٠	•	٠	•	0	•	٠	٠	٠	•	•	٠
Thailand	٠	•	•	٠	٠	٠	•	•	٠	•	•	•	٠	•	•	•	•	•	•	•	٠	•	•	٠	٠	٠	•	٠
United Arab Emirates	•	0	0	0	•	0	0	0	•	0	0	0	•	0	0	0	•	0	0	0	•	0	0	2	•	0	0	0

Yes Q = No Blank = No Response

PILLAR IV A

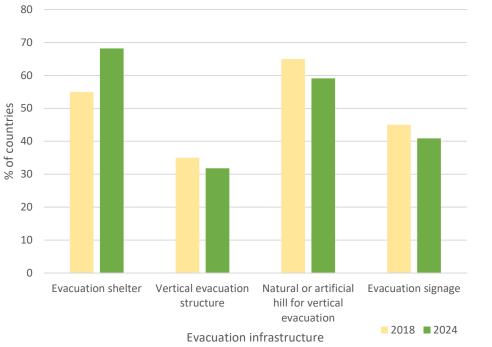


Figure 34: Availability of evacuation infrastructure

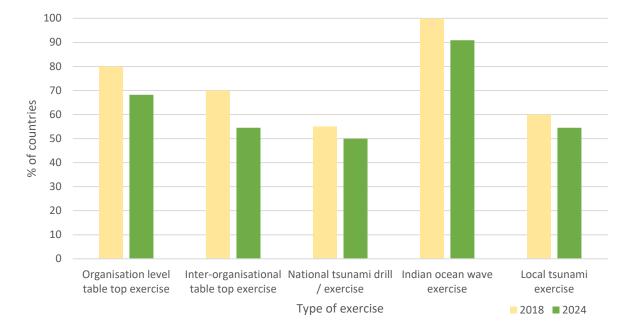
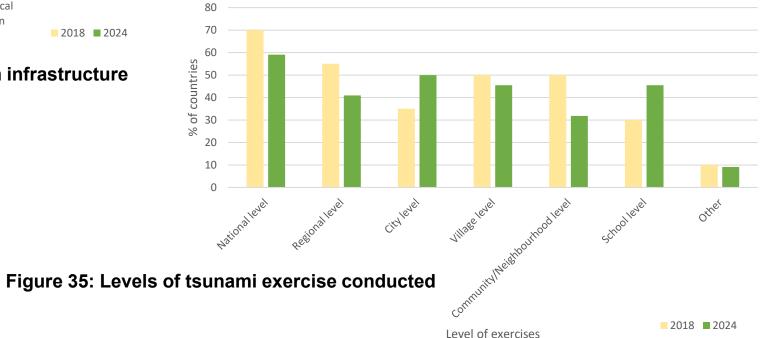
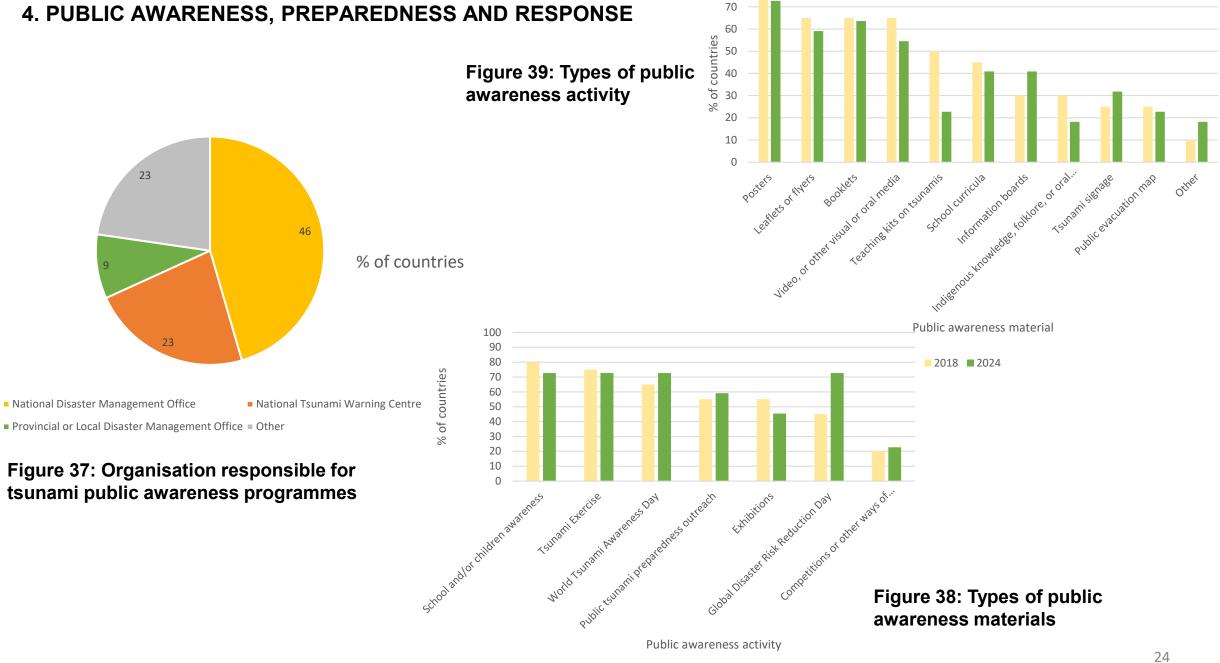


Figure 36: Types of tsunami exercise conducted





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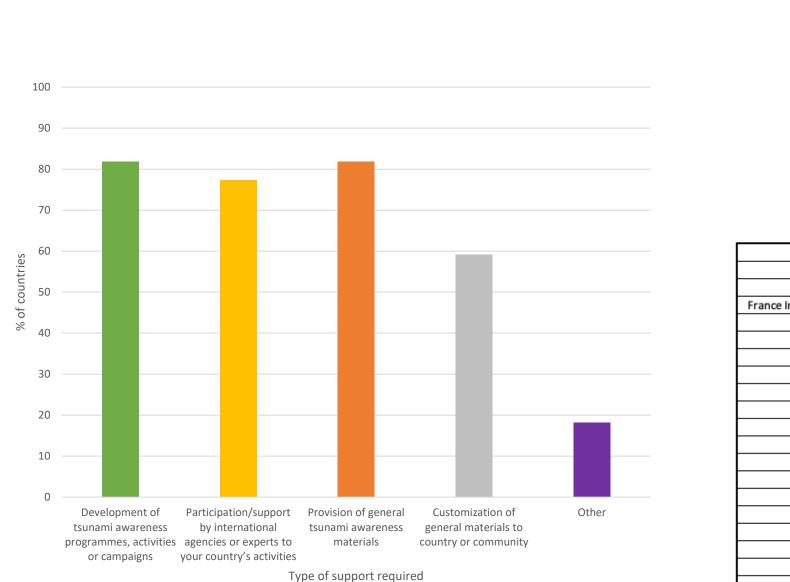


Figure 40: Support required for public awareness activity

	Sup	port required	l for public av	vareness acti	vity
	Provision of general tsunami awareness materials	Customisation of general materials to country or community	Development of tsunami awareness programmes, activities or campaigns	Participation/support by international agencies or experts to your country's activities	Other
Australia	•	•	•	•	•
Bangladesh	•	•	•	•	0
Comoros	•	•	•	•	0
nce Indian Ocean Territories	0	0	0	0	0
India	•	0	•	0	0
Indonesia	•	•	•	•	•
Iran	•	0	•	•	0
Kenya	•	•	•	•	0
Madagascar	•	•	•	•	0
Malaysia	•	•	•	•	0
Maldives	•	•	•	0	0
Mauritius	•	•	•	•	•
Mozambique	•	0	•	•	0
Myanmar	•	•	•	•	0
Oman	•	•	•	•	0
Pakistan	0	0	0	•	0
Seychelles	•	•	•	•	0
Singapore	0	0	0	0	0
South Africa	•	0	•	•	•
Sri Lanka	•	•	•	•	•
Thailand		0		-	0
United Arab Emirates	0	0	0	o ₂₅	0

PILLAR IV B

2. RISK ASSESSMENT AND REDUCTION - POLICIES

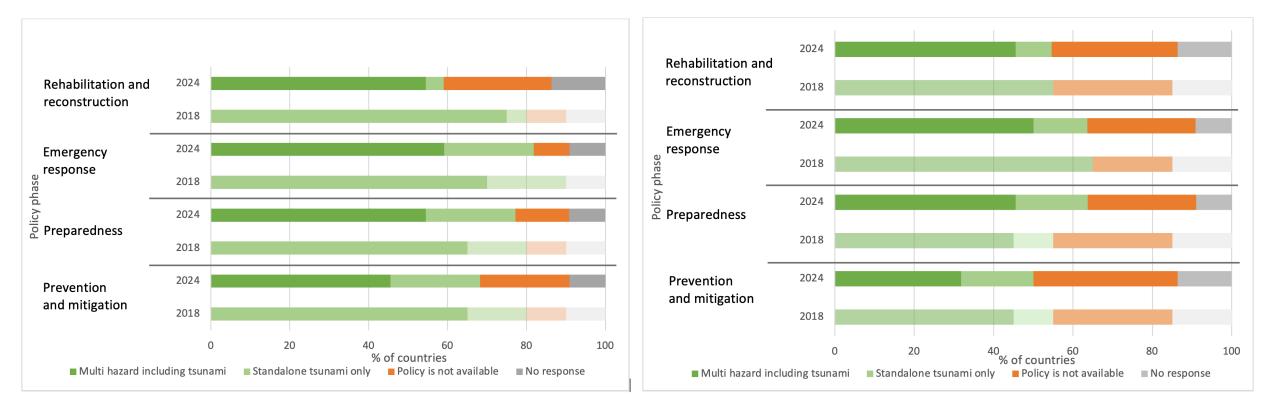
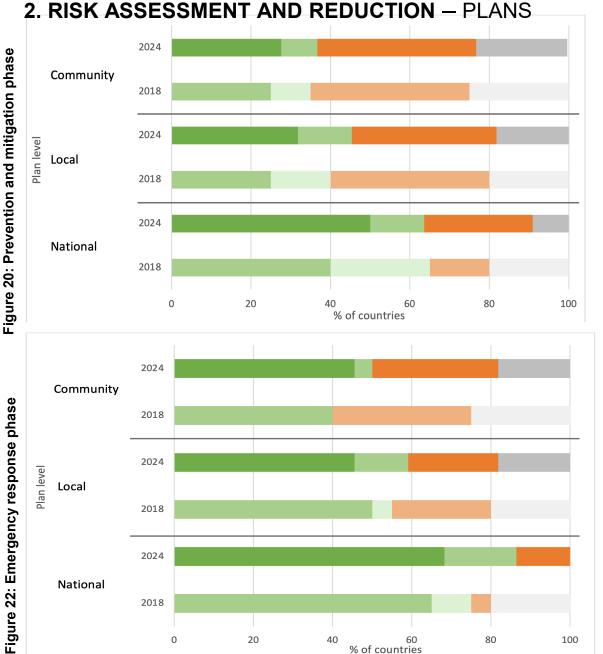


Figure 18: Types and phases of national tsunami policy

Figure 19: Types and phases of local tsunami policy



Availability of national, local and community level tsunami disaster risk reduction plans during different phases

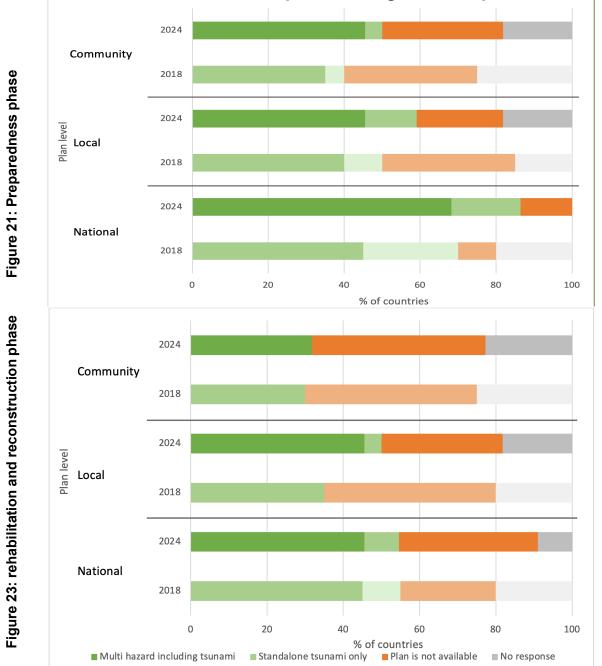


Figure 20: Prevention and mitigation phase

2. RISK ASSESSMENT AND REDUCTION - GUIDELINES

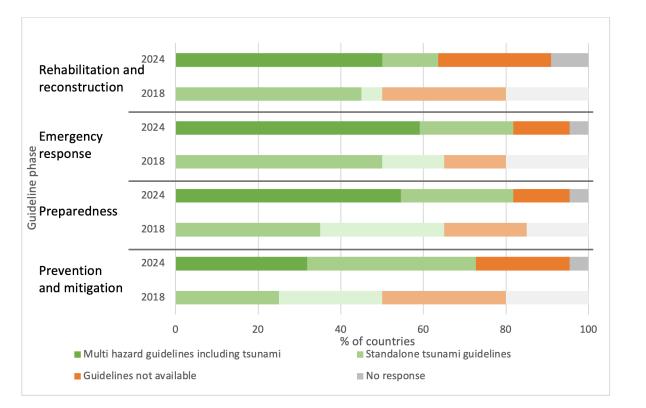


Figure 24: Types and phases of national tsunami guidelines

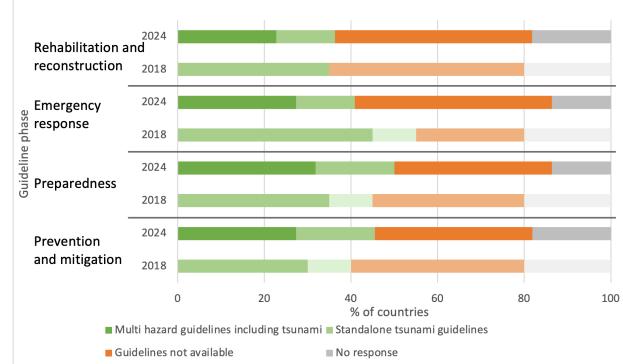


Figure 25: Types and phases of local tsunami guidelines

TRRP

5. UNESCO-IOC Tsunami Ready Recognition Programme (TRRP)

Table 3: Number of villages, cities/districtsand provinces/state levels at risk to tsunami

13 countries are already participating in TRRP

8 are not currently doing so

Of those, 6 have plans to do so in the near future, while 2 do not

Country	Village	City / District	Province / State
Australia			
Bangladesh		14	
Comoros	50	20	3
France Indian Ocean Territories	36		
India	3174	73	13
Indonesia	5744	255	26
Iran	50	6	2
Kenya			4
Madagascar			
Malaysia			3
Maldives	172	5	198
Mauritius		6	
Mozambique			
Myanmar	1000	70	5
Oman	60	23	7
Pakistan	0	2	2
Seychelles		27	
Singapore	0	0	0
South Africa			3
Sri Lanka		14	5
Thailand	509	27	6
United Arab Emirates			2

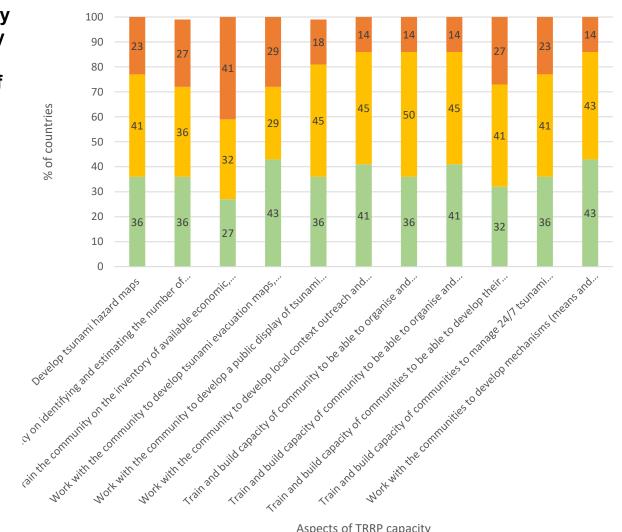
5. UNESCO-IOC Tsunami Ready **Recognition Programme (TRRP)**

Figure 42: Summary of national capacity according to different aspects of the TRRP

						Aspect	of TRRP					
	Develop tsumami hazand maps	Train the community on identifying and estimating the number of people that live in the tsunami hazard zone	Train the community on the inventory of available economic, instructural, political, and social resources to reduce strumant risk at the community level	Work with the community to develop trumami evacuation maps, plans and procedures at the community level	Work with the community to develop a public display of tsumani information	Work with the community to develop local context outreach and public education materials	Train and build capacity of community to be able to organise and implement outreach and education activity	Train and build capacity of community to be able to organise and implement tsumami exercises	Train and build capacity of communities to be able to develop their community Emengency Operation Plan	Train and build capacity of communities to manage 24/7 stumant emergency response operation	Work with the communities to develop mechanisms (means and procedures) to receive 24/7 warning	Work with the communities to develop mechanisms (means and pocedures) to disseminate 24/7 warning to the community
Australia		10	F = P	2.0	20	2.9	F- 9	F 9	- B	F 8	2.0	240
Bangladesh												
Comoros												
France Indian Ocean Territories												
India												
Indonesia												
Iran												
Kenya												
Madagascar												
Malaysia												
Maldives												
Mauritius												
Mozambique												
Myanmar												
Oman												
Pakistan												
Seychelles												
Singapore												
South Africa												
Sri Lanka												
Thailand												
United Arab Emirates												

Yes, it can be easily done through mobilising national experts and funding Yes, it can be partially done through mobilising national experts and funding, but also needs some international technical expertise No, there is a strong need for technical support organised through IOTIC and/or ICG/IOTWMS activities

Figure 41: Country responses on national capacity according to different aspects of the TRRP

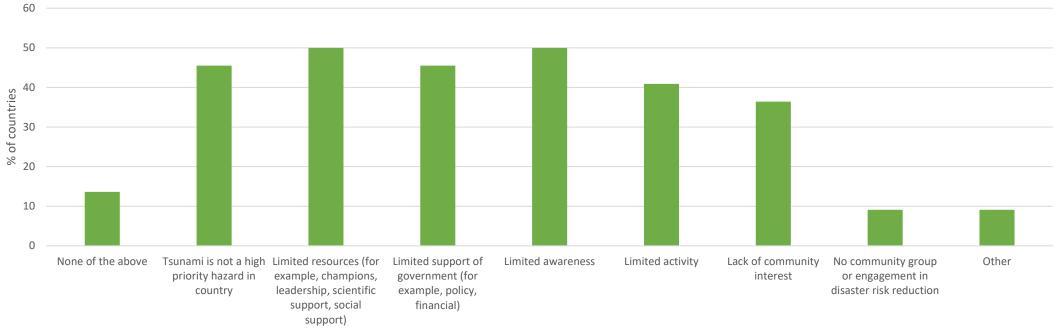


Aspects of TRRP capacity

No, there is a strong need for technical support organised through IOTIC and/or ICG/IOTWMS activities

- Yes, it can be partially done through mobilising national experts and funding, but also needs some international technical expertise
- Yes, it can be easily done through mobilising national experts and funding

5. UNESCO-IOC Tsunami Ready Recognition Programme (TRRP)



Challenges that inhibit TRRP or similar

Figure 43: Challenges that inhibit the implementation of TRRP or similar national initiatives

Thank You....