TSUNAMI DANGER SIGNALLING EVALUATION

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Introduction

The European Center on Urban Risks (CERU) has been developing projects related to information and public awareness of seismic and tsunami risks since 2012.

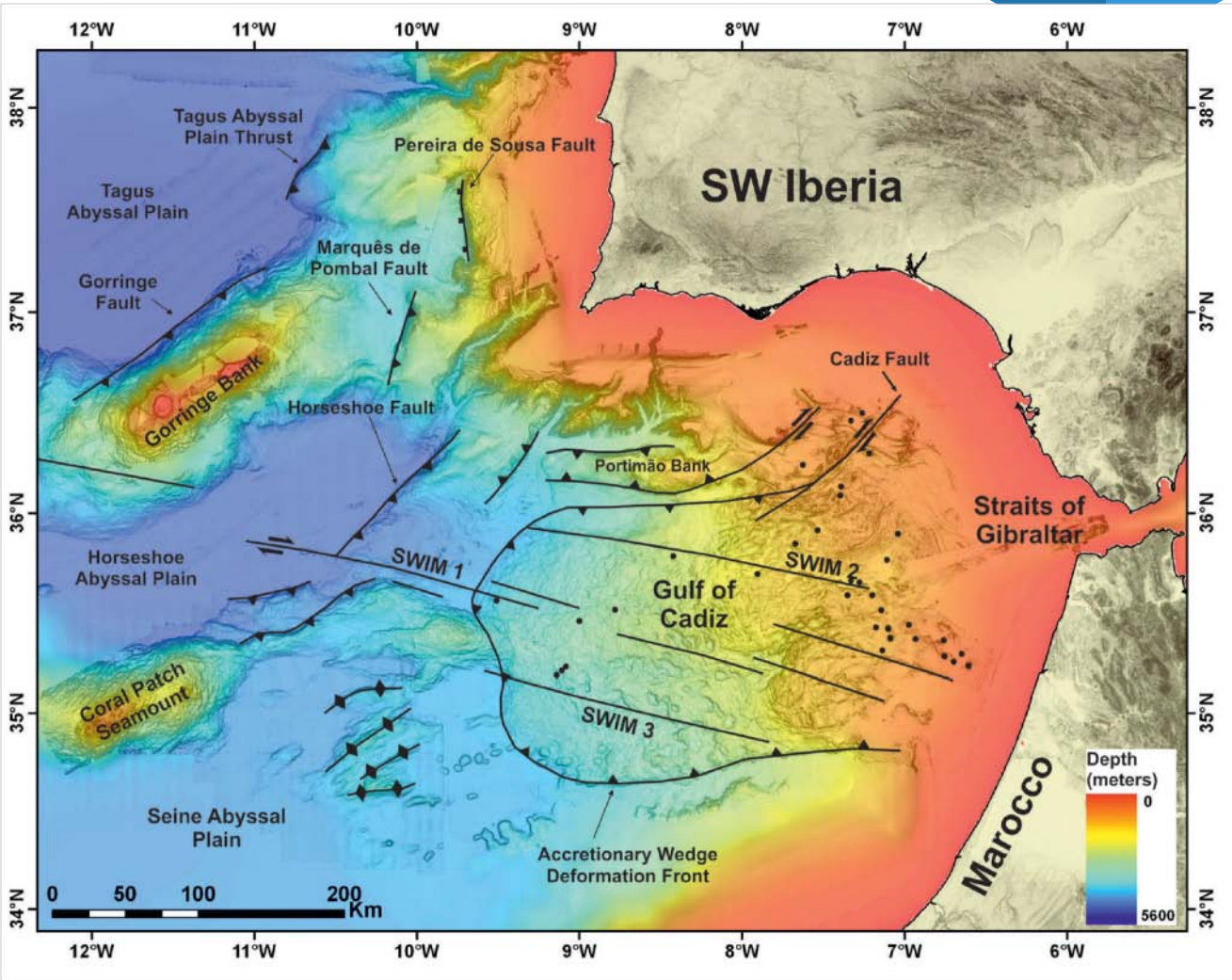
In the framework of these projects, in November 2015, a set of signs on tsunami warning and evacuation routes was implemented at Praia da Batata, in Lagos.

In September 2016, a survey was conducted to investigate the impact and effectiveness of these signs and to evaluate the tsunami risk awareness to the people present in the beach.

The preliminary analysis of the responses to the questionnaire will be presented.

Previous studies

➢ Earthquake and tsunami hazard in SW Iberia

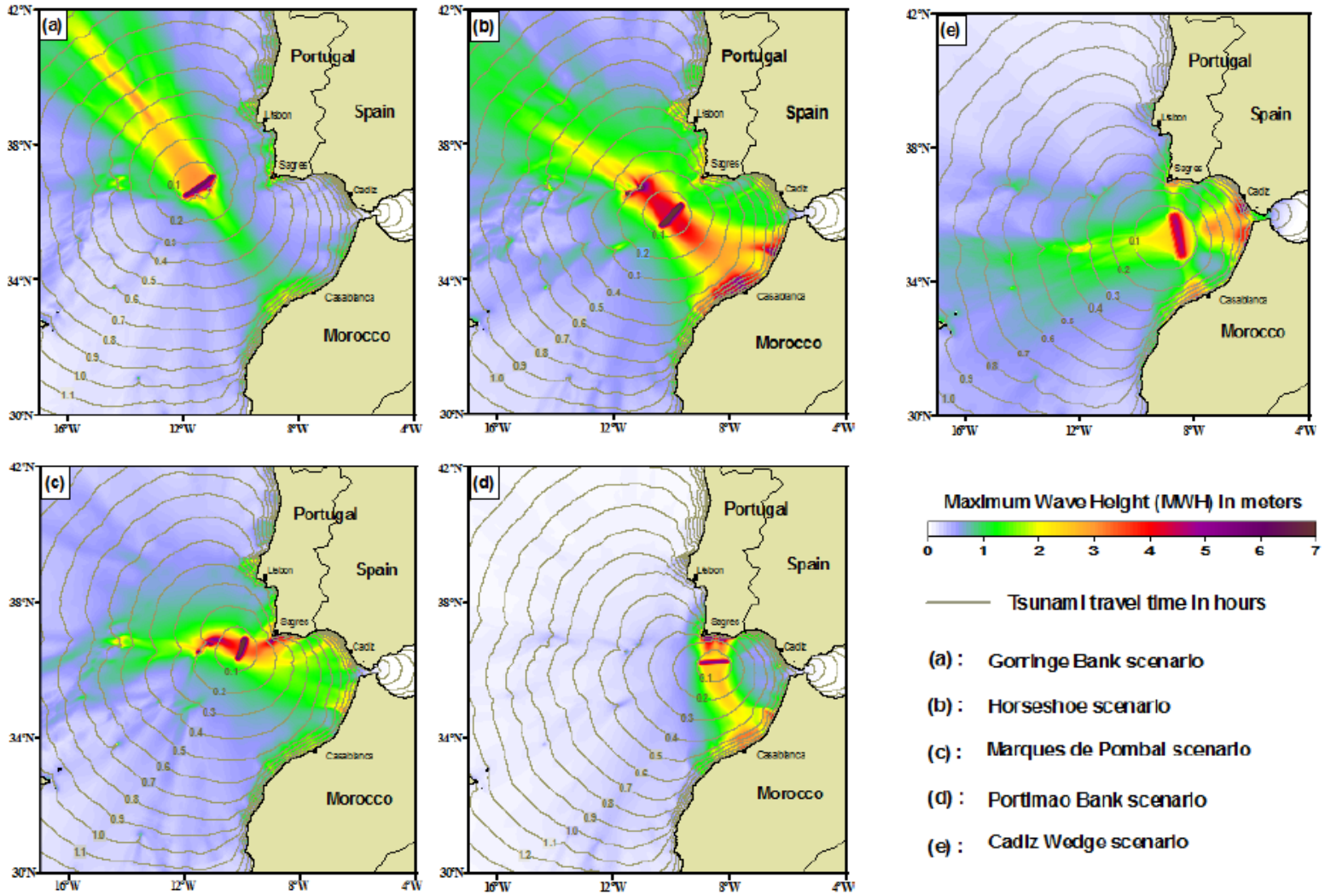


(Duarte et al., 2015)

Previous studies

- Earthquake and tsunami hazard in SW Iberia

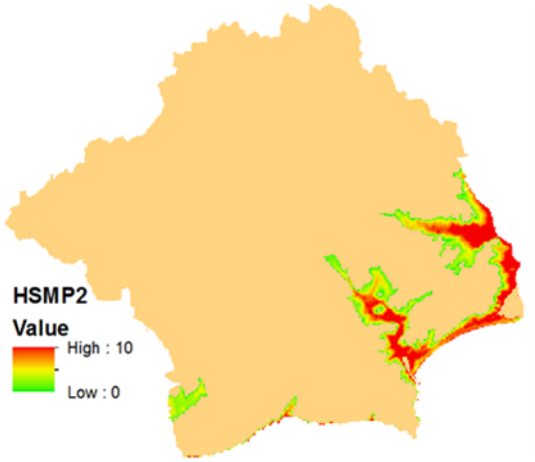
- Numerical simulation of tsunami propagation

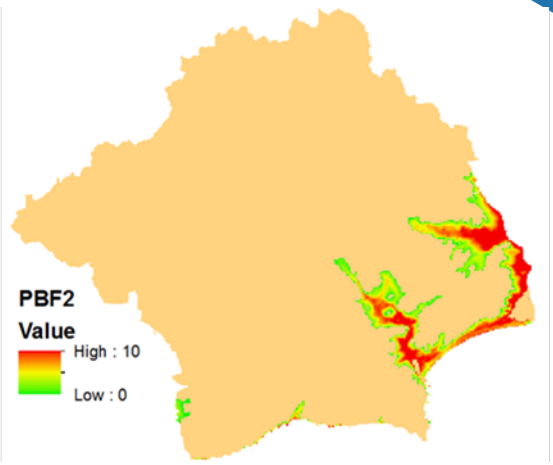


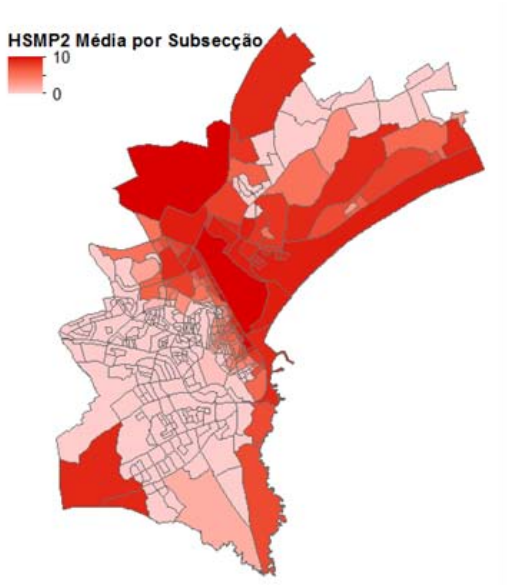
(Omira et al., 2009)

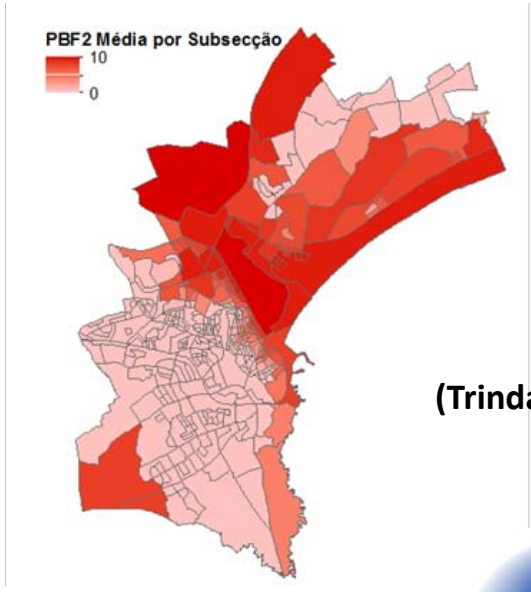
Previous studies

- Earthquake and tsunami hazard in SW Iberia
- Numerical simulation of tsunami propagation
- Inundation scenarios





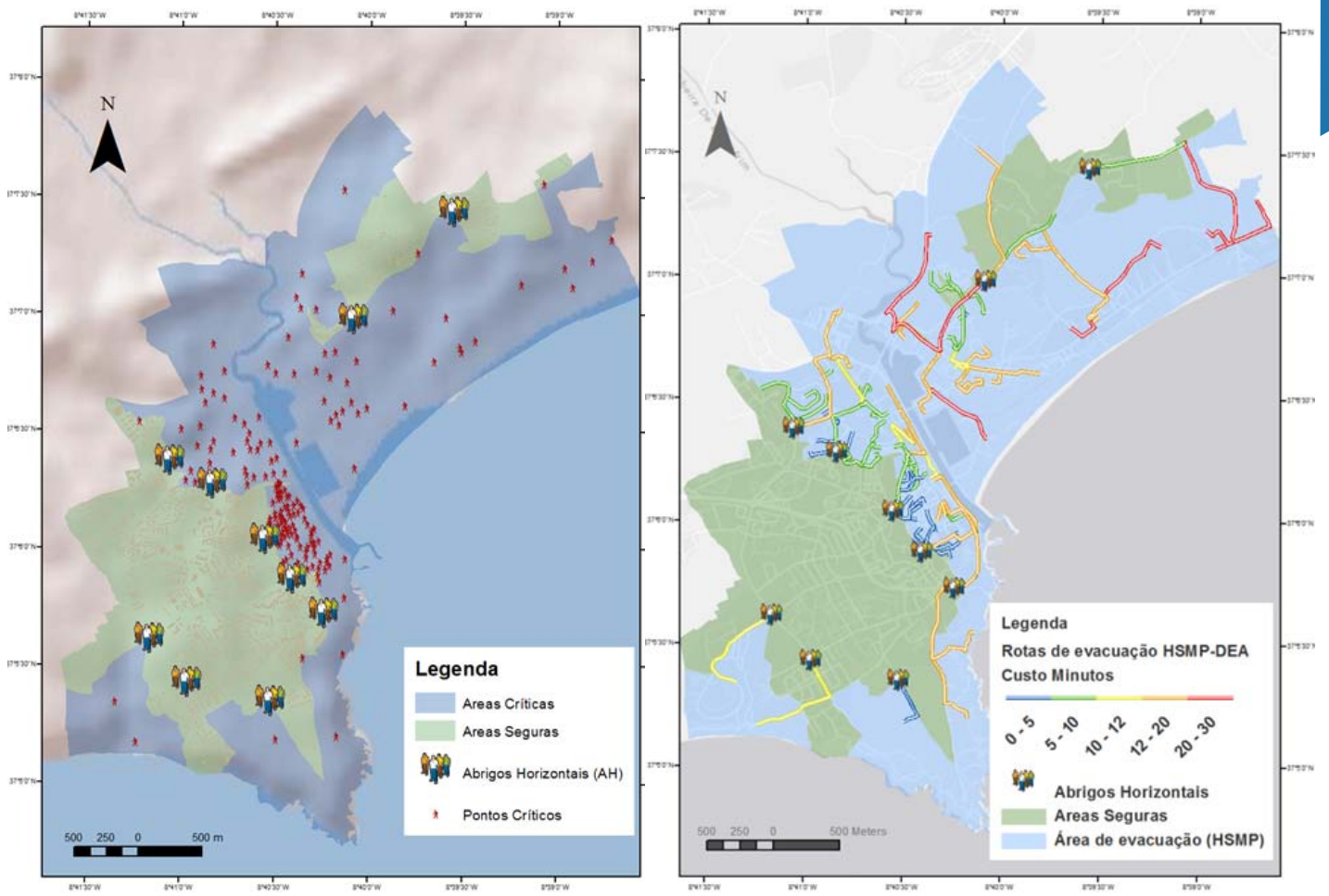




(Trindade et al., 2014)

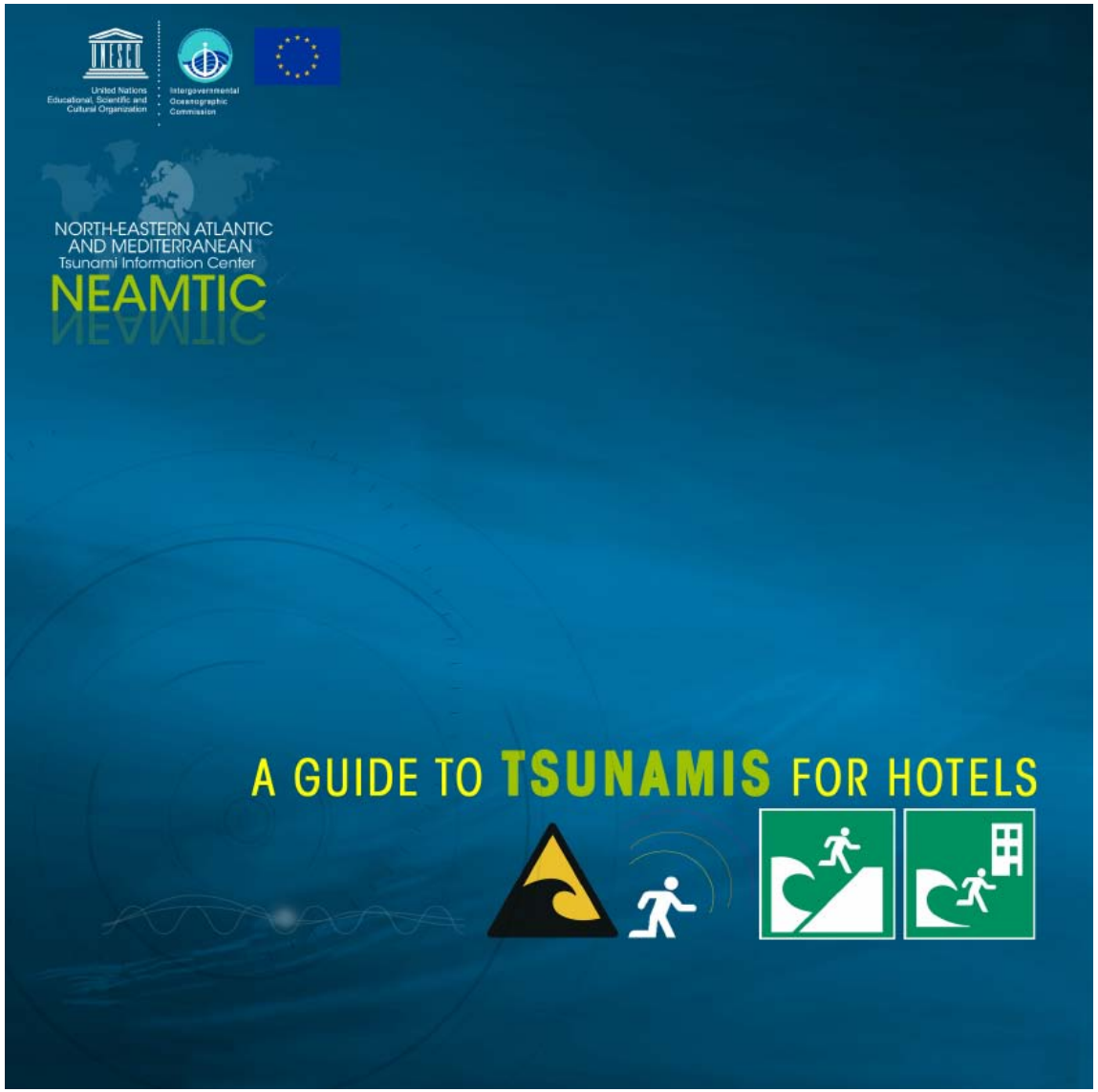
Previous studies

- Earthquake and tsunami hazard in SW Iberia
- Numerical simulation of tsunami propagation
- Inundation scenarios
- Evacuation modelling
- Tsunami Signaling



(Trindade et al., 2014)

Tsunami warning signs and evacuation routes



Source

UNESDOC

1/1

Title:	A Guide to tsunamis for hotels: tsunami evacuation procedures
Series:	IOC. Manuals and guides
Series (vol/issues):	69
Author:	Kodijat, Ardito
Corporate author:	IOC; Tsunami Information Centre for the North-Eastern Atlantic and Mediterranean
Imprint:	2012
Publ Year:	2012
Collation:	40 p., illus.
Original Language:	English
Document code:	IOC/2012/MG/69
General notes:	Incl. bibl. (Electronic version only)
Main descriptors:	tsunami; disaster prevention; hotel industry; buildings; safety measures; Atlantic Ocean; Mediterranean Sea; guides
On line:	Yes
	ENG
Nature of contents:	guides,guidebooks,handbooks
Document Type:	UNESCO document
Catalog Number:	226428
Source code:	sc

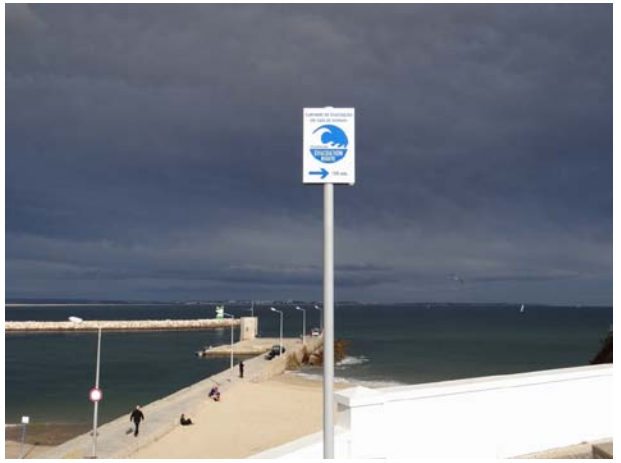
http://unesdoc.unesco.org/Ulis/cgi-bin/ulis.pl?catno=226428&set=53DECB0F_2_51&gp=0&lin=1&ll=6

Tsunami warning signs and evacuation routes

- Choosen signs

Tsunami warning signs and evacuation routes

Implementation in Praia da Batata



Survey on emergency signaling assessment

Questionnaire

1. DESCRIPTION OF THE PARTICIPANT

Q1 AGE < 20 ☐ 21-40 ☐ 41-60 ☐ >60 ☐

Q2 GENDER M ☐ F ☐

Q3 QUALIFICATIONS

PRIMARY SCHOOL ☐ HIGH SCHOOL ☐ UNIVERSITY ☐ STUDENT ☐

Q4 LIVING IN LAGOS ☐ OUTSIDE LAGOS (COUNTY or COUNTRY)_____

2. SIGNALLING ASSESSMENT AND RISK KNOWLEDGE

Q5 DO YOU KNOW WHAT IS TSUNAMI? YES ☐ NO ☐

Q6 DO YOU KNOW THAT YOU ARE IN A BEACH WHERE A TSUNAMI CAN OCCUR? YES ☐ NO ☐

Survey on emergency signaling assessment

Questionnaire

Q7 DID YOU NOTICE THE INFORMATIVE PANEL THAT IS IN THE BEACH? YES ☐ NO ☐

Q7a IF YES, DO YOU THINK IT IS USEFUL? YES ☐ NO ☐

Q8 DID YOU NOTICE ON THE EVACUATION SIGNS? YES ☐NO ☐

Q8a IF YES, DO YOU THINK IT IS USEFUL? YES ☐ NO ☐

Q9 IF AN EARTHQUAKE OCCURS WHILE YOU ARE ON THE BEACH:

1. YOU MUST LEAVE THE BEACH IMMEDIATELY ☐
2. YOU MUST WAIT FOR AUTHORITIES INSTRUCTIONS ☐
3. YOU DON'T KNOW WHAT TO DO AND YOU STAY ON THE BEACH ☐

Survey on emergency signaling assessment

Questionnaire

Q9a IF YOU ANSWERED 1:

A. YOU MUST FOLLOW THE INDICATED EVACUATION ROUTE AND WAIT AT THE MEETING POINT ☐

B. YOU MUST LOOK FOR YOUR CAR (TO ABANDON THE BEACH AREA) ☐

C. YOU DON'T KNOW WHERE TO GO ☐

Q10 HAVE YOU SEEN THE EVACUATION ROUTE AND MEETING POINT? YES ☐NO ☐

Q11 IN GENERAL, DO YOU THINK THAT THESE KIND OF SIGNS ARE USEFUL? YES ☐NO ☐

Q12 DO YOU FEEL SAFER FOR BEING INFORMED? YES ☐NO ☐

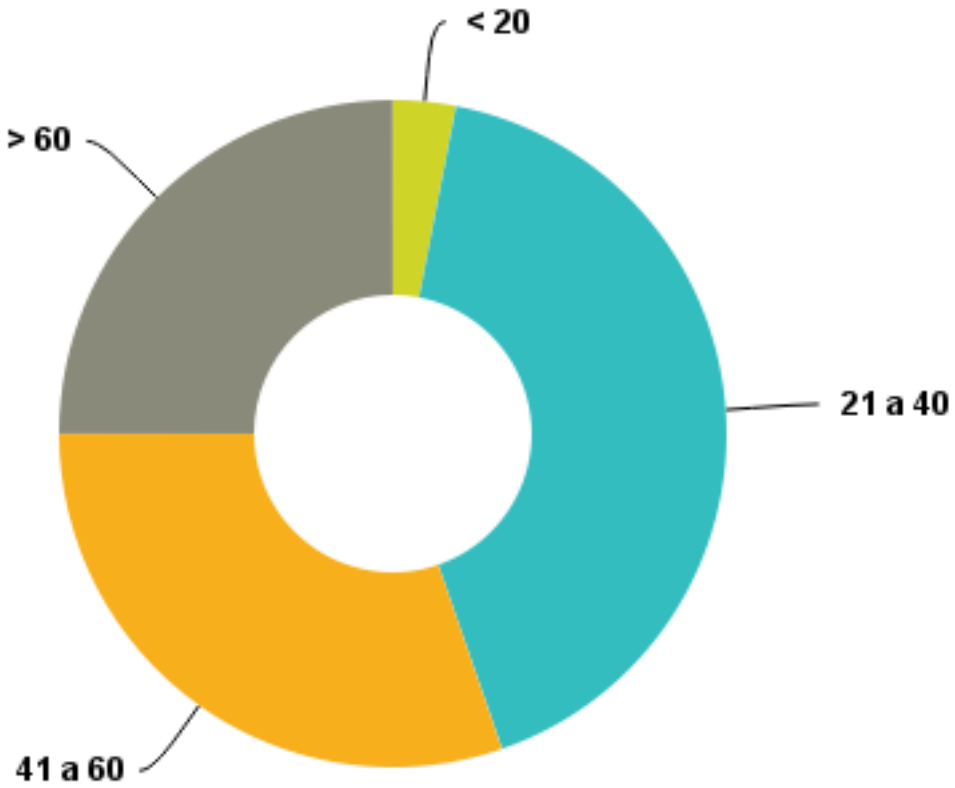
Q13 COMMENTS

_____

Survey on emergency signaling assessment

Questionnaire - Analysis

Q1 - Age

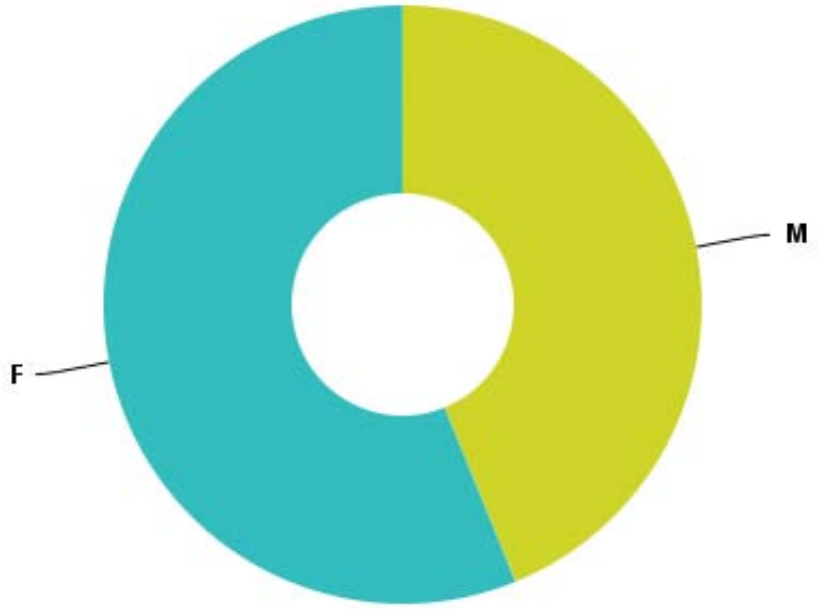


Answer Choices	Responses	
< 20	3.03 %	4
21 - 40	41.67 %	55
41 - 60	30.30 %	40
> 60	25.00 %	33
TOTAL		132

Survey on emergency signaling assessment

Questionnaire - Analysis

Q2 - Gender

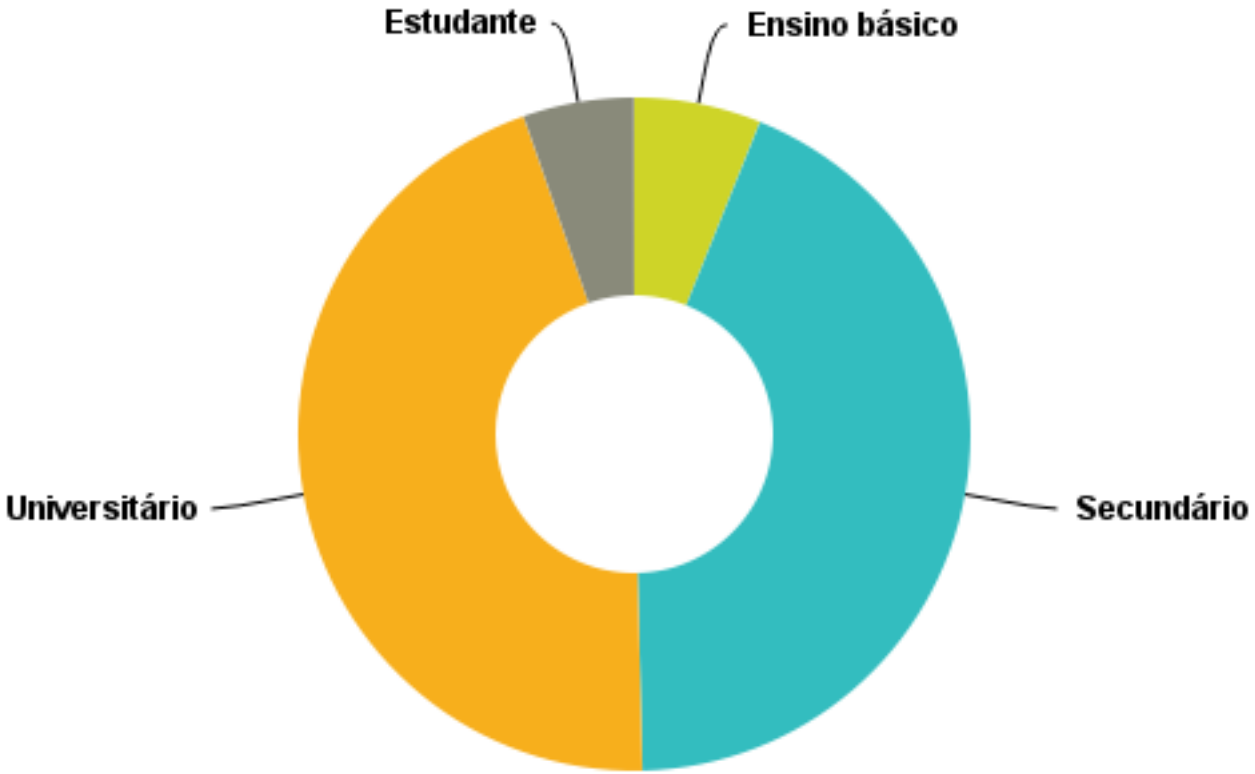


Answer Choices	Responses	
Male	43.85 %	57
Female	56.15 %	73
TOTAL		130

Survey on emergency signaling assessment

Questionnaire - Analysis

Q3 - Qualifications

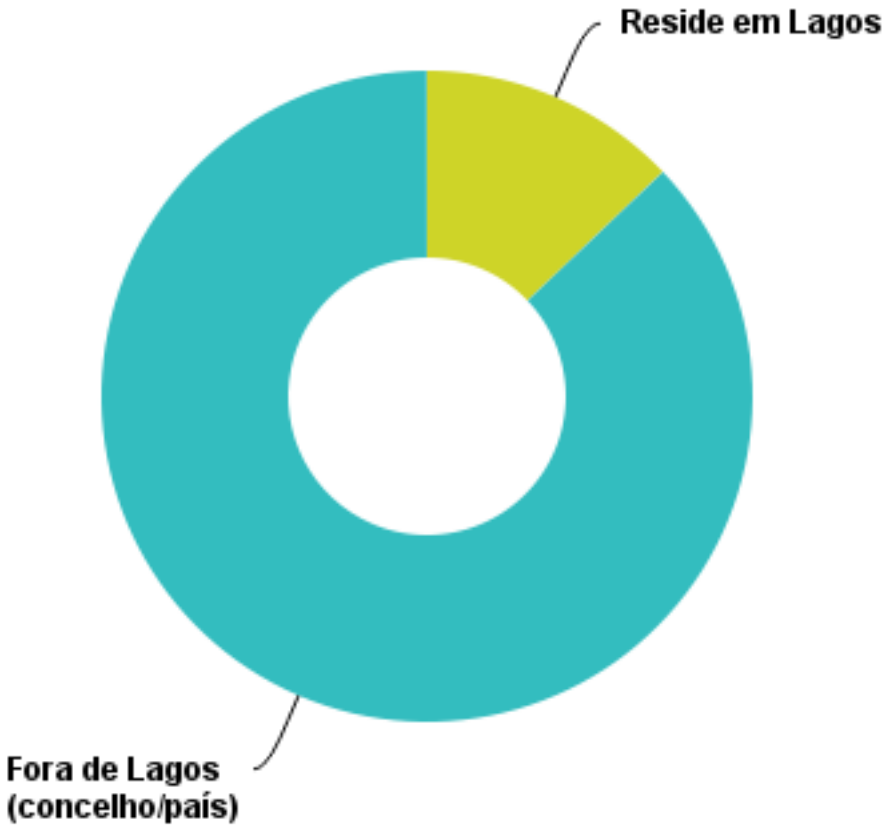


Answer Choices	Responses	
Primary School	6.11 %	8
High School	43.51 %	57
University	45.04 %	59
Student	5.34 %	7
TOTAL		131

Survey on emergency signaling assessment

Questionnaire - Analysis

Q4 – Residence



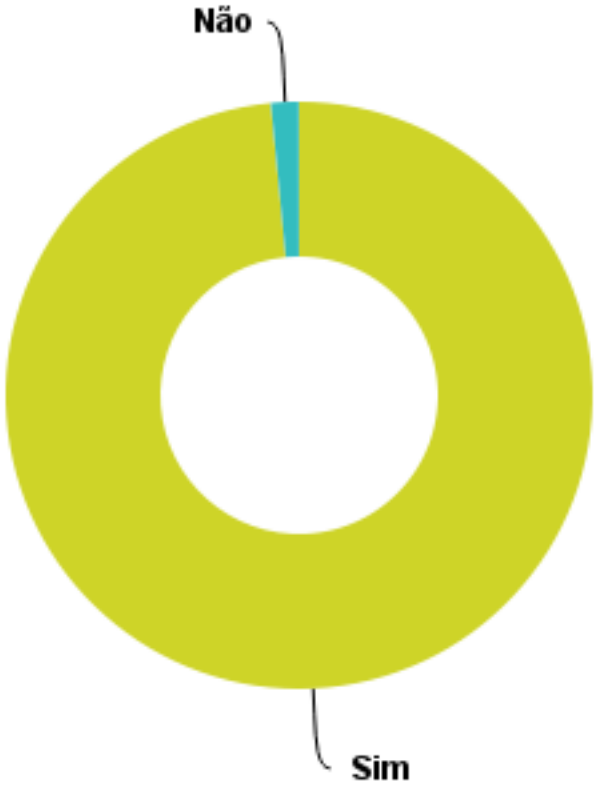
Answer Choices	Responses	
Lagos	12.90 %	16
Outside Lagos	87.10 %	108
TOTAL		124

Lagos non-resident:
47 National (Portuguese)
61 Foreign

Survey on emergency signaling assessment

Questionnaire - Analysis

Q5 – Do you know what is a tsunami?

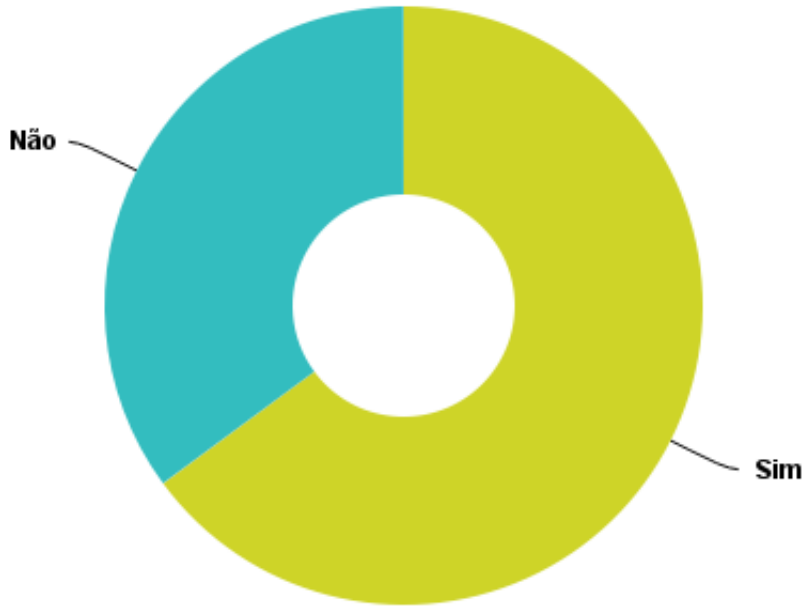


Answer Choices	Responses	
Yes	98.47 %	129
No	1.53 %	2
TOTAL		131

Survey on emergency signaling assessment

Questionnaire - Analysis

Q6 – Do you know that you are in a beach where a tsunami can occur?



Answer Choices	Responses	
Yes	64.89 %	85
No	35.11 %	46
TOTAL		131

Survey on emergency signaling assessment

Questionnaire - Analysis

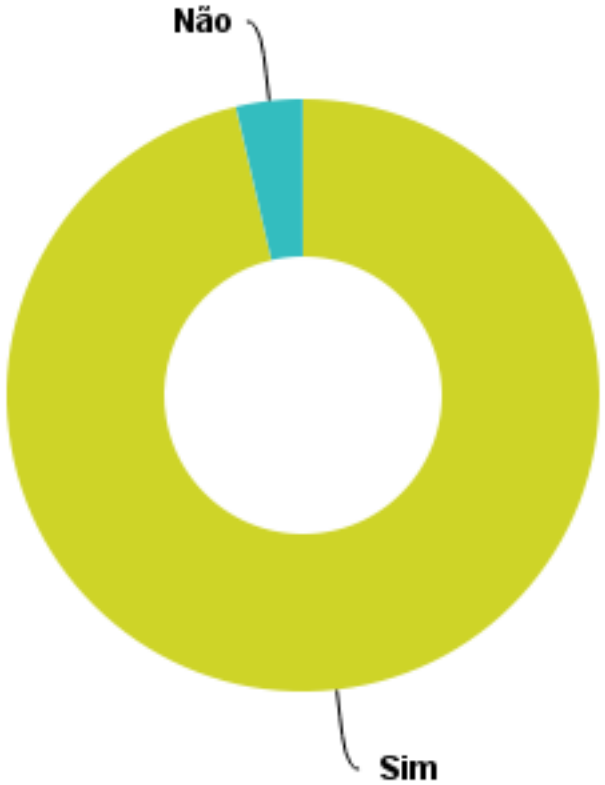
Q7 – Did you notice the informative panel that is in the beach?

Answer Choices	Responses	
Yes	40.46 %	53
No	59.54 %	78
TOTAL		131

Survey on emergency signaling assessment

Questionnaire - Analysis

Q7a – If yes, do you think it is useful?

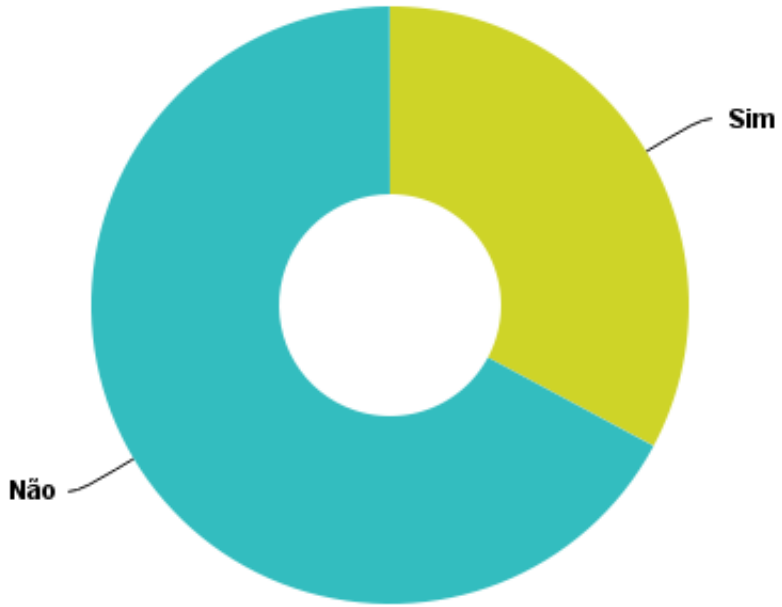


Answer Choices	Responses	
Yes	96.36 %	53
No	3.64 %	2
TOTAL		55

Survey on emergency signaling assessment

Questionnaire - Analysis

Q8 – Did you notice on the evacuation signs?



Answer Choices	Responses	
Yes	32.81 %	42
No	67.19 %	86
TOTAL		128

Survey on emergency signaling assessment

Questionnaire - Analysis

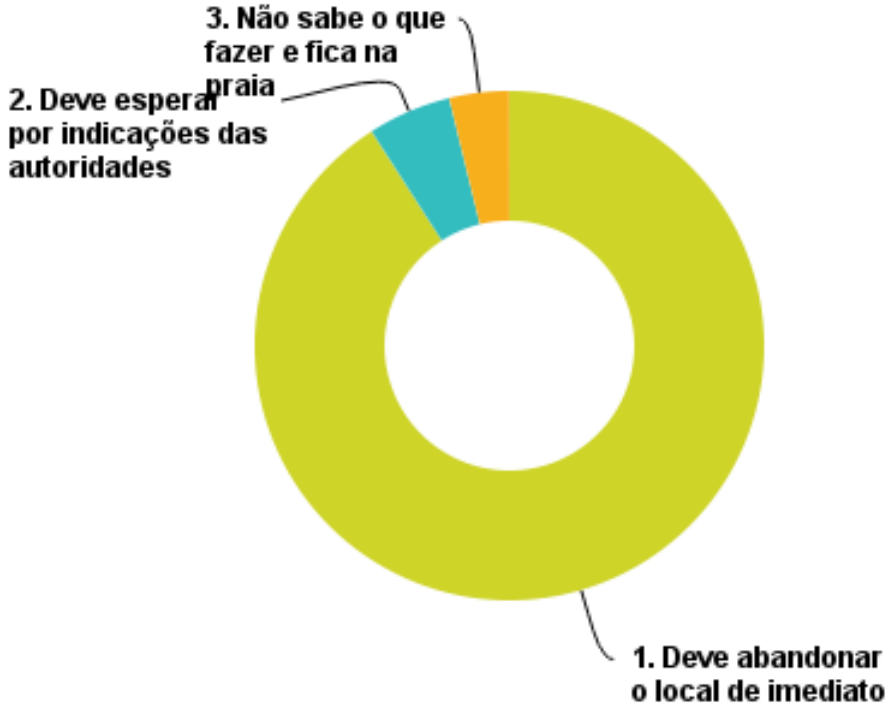
Q8a – If yes, do you think it is useful?

Answer Choices	Responses	
Yes	95.92 %	47
No	4.08 %	2
TOTAL		49

Survey on emergency signaling assessment

Questionnaire - Analysis

Q9 – If an earthquake occurs while you are on the beach…

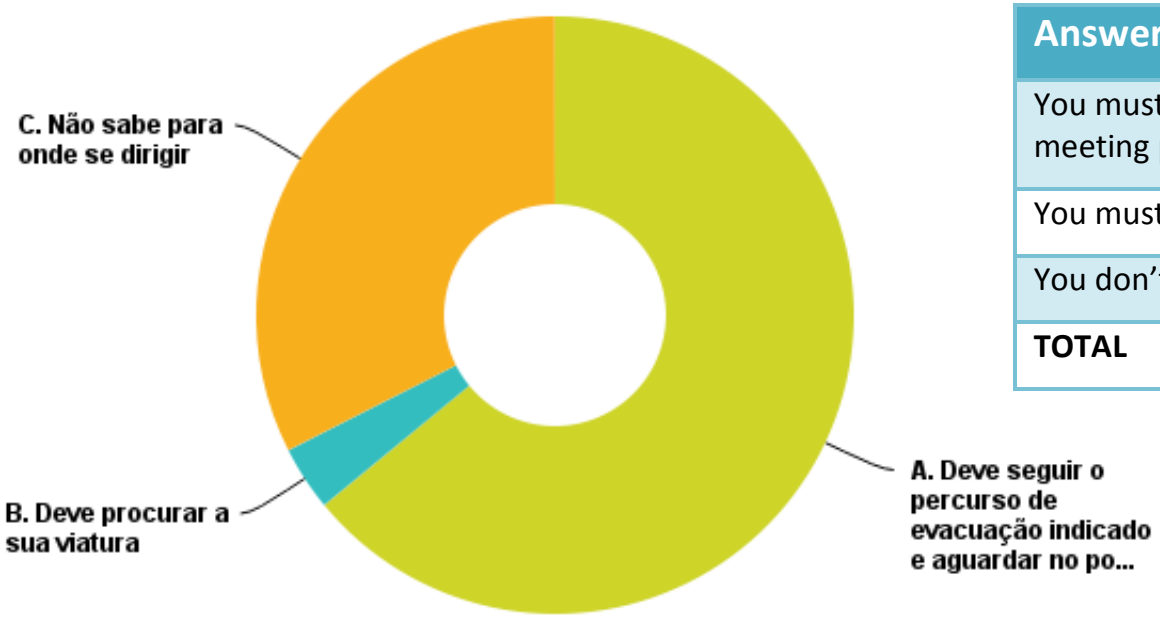


Answer Choices	Responses	
You must leave the beach immediately	90.91 %	120
You must wait for authorities instructions	5.30 %	7
You don't know what to do and you stay on the beach	3.79 %	5
TOTAL		132

Survey on emergency signaling assessment

Questionnaire - Analysis

Q9a – If you answered 1:

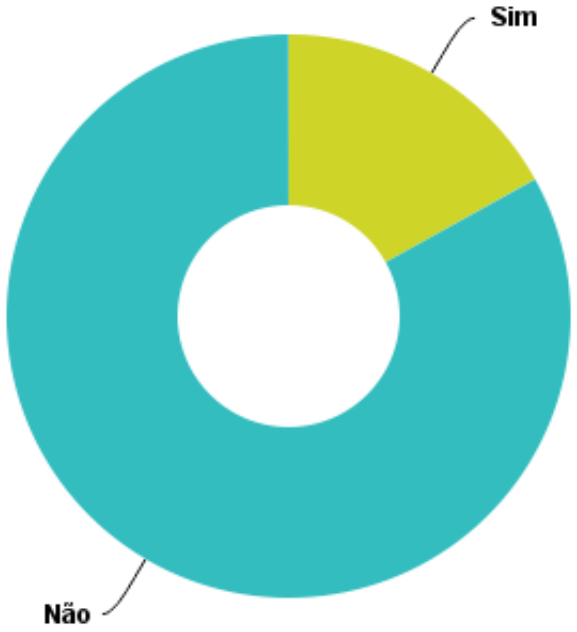


Answer Choices	Responses	
You must follow the indicated evacuation route and wait at the meeting point	64.04 %	73
You must look for your car (to abandon the beach area)	3.51 %	4
You don't know where to go	32.46 %	37
TOTAL		114

Survey on emergency signaling assessment

Questionnaire - Analysis

Q10 – Have you seen the evacuation route and meeting point?

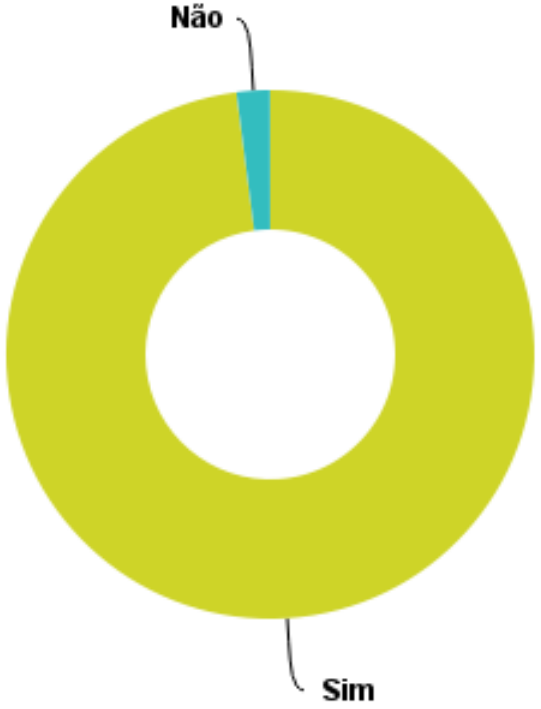


Answer Choices	Responses	
Yes	16.92 %	22
No	83.08 %	108
TOTAL		130

Survey on emergency signaling assessment

Questionnaire - Analysis

Q11 – In general, do you think this kind of signs are useful?



Answer Choices	Responses	
Yes	97.96 %	96
No	2.04 %	2
TOTAL		98

Survey on emergency signaling assessment

Questionnaire - Analysis

Q12 – Do you feel safer for being informed?

Answer Choices	Responses	
Yes	90.70 %	117
No	9.30 %	12
TOTAL		129

Survey on emergency signaling assessmer

Questionnaire - Analysis

Q13 – Comments

➢ 3 of the inquired persons said that the signalling were not much visible and they gave some suggestions to put it in a better place, more visible from different points of the beach and/or at the different beach exit sites

<u>Additional notes</u>

- 2 of the inquired persons were beach lifeguards
- 2 of the inquired persons said that they will go to check the evacuation route when leaving the beach
- 1 of the person said that he/she will look for information later, when leaving the beach
- 3 of the inquired persons said that they know that they are in a beach where a tsunami can occur because they saw the signs

Survey on emergency signaling assessment

Conclusions

- The knowledge on the existence of tsunamis is widely reported among the population

  (most likely due to the occurrence in the last decades of two very mediated and severe tsunamis, as result of the Sumatra (2004) and Tohoku (2011) earthquakes.)

- The fact that an earthquake can and should be considered as a warning sign (or alert) of tsunami is generally known.

  In the case of Lagos and, in general, in the Algarve region, this knowledge is very important because the time elapsed between the occurrence of the earthquake and the arrival of the tsunami is very short (~20 min.) and it is necessary that people know the correct procedures to adopt even before the tsunami alert given by the authorities.

- However, the general awareness of the tsunami risk problem is moderate

  (It should be noted that while risk perception is a necessary condition for its mitigation, it is not sufficient to induce adequate protective behaviors.)

Survey on emergency signaling assessment

Conclusions

- On the other hand, responses to the survey at Praia da Batata show that the population is very receptive to improve their preparedness for a tsunami emergence and their knowledge on the adequate preventive and self-protective measures.

- Almost all people consider this signage useful and feel safer because they are aware of the risks in the region.

- It is necessary to invest in additional initiatives to improve the impact and efficiency of the signage installed in Praia da Batata.

  As suggested by the participants in the survey, these measures may only involve the installation of signage in a more visible location.

- Finally, it should be emphasized that the results and conclusions drawn from this survey should be used to more effectively implement tsunami warning signs and evacuation routes on other Portuguese beaches.

Thank you for your attention

Field Team