Critique of a published paper:

“Local risk awareness and precautionary behaviour in a multi-hazard region of North Morocco”

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In the November 2020 issue of the *International Journal of Disaster Risk Reduction* (IJDRR), it was published an article which addressed local risk awareness and precautionary behaviour in north Morocco. Regrettably, the article provides a distorted picture of the reality in the study area. Thus, it cannot achieve the goals suggested by the authors nor can have practical consequences or improvement of knowledge.

First of all, the authors cite only six specific and spatially limited references despite the richness of the regional scientific libraries of hundreds of published works (e.g. thesis and articles in both digital and hard copies, in Arabic, French, Spanish, and English) (e.g. [1-13]). Thus, this lack of in-depth analysis of the local bibliography leads the authors to distort the general characteristics and specificities of the study area. For instance:

- The sub-section 1.2 only shows imprecise, vast generalities applicable almost everywhere,
- The so-called "three areas with different geographical and physical characteristics" is an unreferenced idea which, in fact, is a pure imagination of the authors,

- Oued Laou is an urban municipality [14-16] contrary to what the authors say in sub-section 4.4,
- The authors disregard dozens of official reports from national and regional administrations
- making the numbers and information they give, at best, obligatorily revisable,
- I deeply doubt that the authors have made an exhaustive tour of the study area given the poorly distributed points of what they call "sample" (Fig. 2), the few poorly made and unrepresentative images (Fig. 1), and the oddly short (November 2018) and not detailed duration of the survey: when was it carried out precisely and according to what plan/schedule? given the extension of the territory (16,000 km²), and the multiplicity of the chosen survey points, in an area subdivided into 8 provinces comprising 146 municipalities (17 urban and 129 rural) [14, 15].

My main concern is that the methodology section contains serious structural deficiencies and flaws that make any result or conclusion meaningless. Sadly, the authors failed to define a clear sampling methodology and, therefore, they do not provide any explanation on key parameters of the sampling theory (i.e. identification of the population in accordance with the objectives, degree of precision desired, methods of measurement, organization of fieldwork, selection of the sample, ...) [17]. Obviously, they cannot scientifically explain the sample size (391) nor the distribution. Accordingly, what are the used formulas? and what are the differences at geographical, cultural, and social levels? And where are the so-called "historical hazard records"? The reader should make sure that he or she knows the specific method of sampling and method of estimation for which the formula has been established [17].

Random sampling, by definition, is a method of selecting n units out of N such that everyone out of N has an equal chance of being drawn [17]. After the estimation of sample size, the selection should be based on tables of random numbers, according to the most suitable type of sampling. In the case of an area where there are many differences of all types (as indicated by the authors), the suitable type is the stratified sampling with different intensities in different parts of the area [17]. In any case, the population to be sampled (the sampled population) should coincide with the population about which information is wanted (the

target population), which is not respected here. Actually, none of the abovementioned was respected in the paper. Therefore, it is clear that the conclusions drawn from the sample cannot apply to the target population. Moreover, the uncertainty should be reduced by taking larger samples and by using superior instruments of measurement. Unfortunately, the sample is not representative of all points of view:

- The total size (391 out of 3.8 million inhabitants) is smaller than the size of the smallest neighborhood,
- The general distribution only considered urban municipalities while most of the area is rural,
- The partial distribution is bizarre (e.g. the second-lowest partial size of inhabitant is in Tangier, where most of the inhabitants live, over a million),
- The proportions are very small (e.g. $391/3.800.000 = 0,0001$).

The authors do not show details of the questionnaire nor raw data, which reinforces doubts about the survey. Not only this, but the mode of carrying out the survey is absolutely questionable: standing in the street approaching volunteers ("possible participants" according to the authors) is an inappropriate approach for this scientific level, neither for accuracy nor for adequacy with the suggested objectives.

They said that four native speakers (students from the Faculty of Science of Tetouan) carried out the survey but, strangely, no indication is provided on the quality or expertise of the supervisor, not on training, guidance, or mentoring. First, I am well situated to tell that at the mentioned Faculty the curriculum does not include either the methods or the sampling practices. If the original questionnaire (in French) was translated into Arabic (according to the authors), how were the ideas transmitted to the very abundant Amazigh population, and to the thousands of illiterates who speak only the Moroccan dialect? Without a doubt, serious flaws in the transmission of ideas had taken place in both directions (supervisor to investigators, then investigators to population and vice versa), especially with the lack of adequate training.

The authors are contradictory when they say that women were not open to participation while they indicate 9 lines below that 44% of participants were women.

The content of the survey, as briefly summarized, dealt with the risk awareness of the participants, their beliefs about climate change, and their attachment to their municipalities. These are questions of perception, not behaviours; another big flaw of the authors.

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