

2003年アルジェリア北部の地震 報告6 : DAMAGE REPORT OF HOSPITALS IN NORTH ALGERIA

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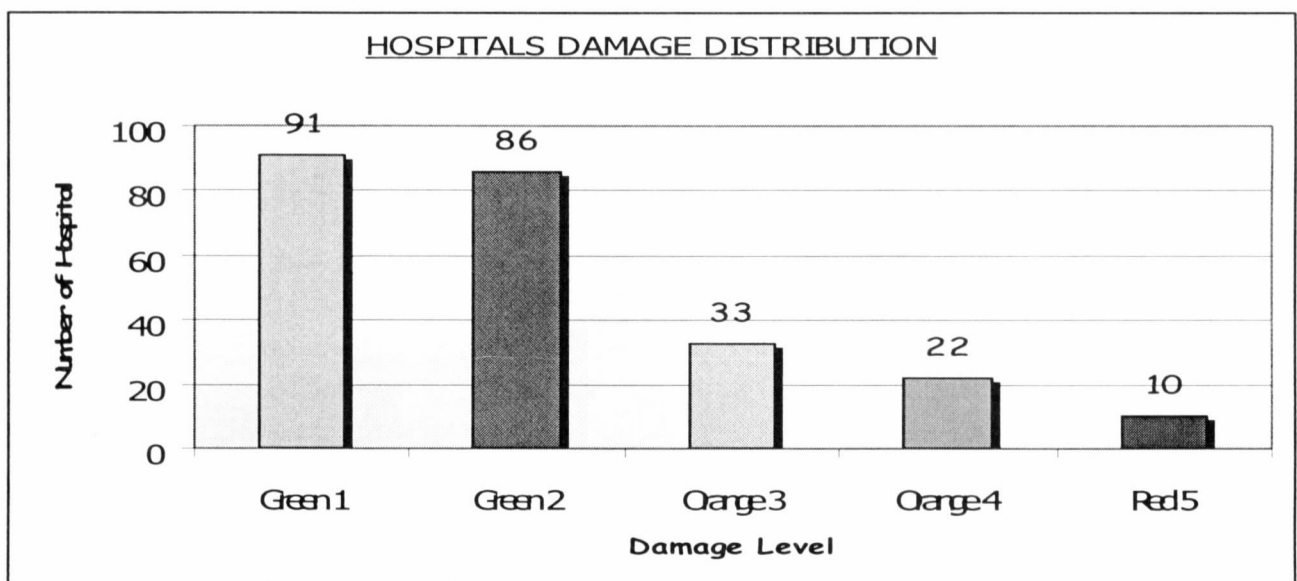
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1- INTRODUCTION

After the earthquake of Algeria on the 21st May 2003, many hospitals suffered a great damage. The authors visited two hospitals, in north Algeria one of which had severe damage. We conducted interviews with the staff of these hospitals and here we present the results. The purpose of the interviews is to assess the impact of structural and/or architectural damage and lifeline and the effect organizational disruption on life saving.

At first we will examine the damage level at all hospitals that were affected by the earthquake and then we will present the results of the interviews that have been completed.

2- DAMAGE LEVEL TO HOSPITALS



Colour	Damage Level
Green 1	Displacement of furniture
Green 2	Slight damage to non-structural element
Orange 3	Slight damage to structural elements and severe damage to non-structural elements
Orange 4	Considerable damage to structural elements Very severe damage to non-structural elements Cracks on "X" shape for RC Walls, bursting of joint beam-column
Red 5	Total collapse, Very severe deformation Repair cost higher than the building itself

Fig. 1 Damage distribution

3- INTERVIEWS RESULTS

We divided the interview into sections, which examine the interactions that lifeline damage, structural/non-structural damage and organizational disruption have on human life saving. The following results are presented in that order.

Thenia Hospital

Overview

The hospital is composed of 2 parts. The original part was built in 1870 and the second part was added in recent years. The older part of the hospital suffered very severe damage. Masonry was used for the structure of the oldest buildings.

The interview was carried out in two ways, talking to staff and distributing questionnaires. In total four people were interviewed:

- 1- Two doctors, and
- 2- Two administration staff.



Fig. 2 Damage to emergency wing



Fig. 3 Severe damage to the structure



Fig. 4 Severe cracks in walls

Lifeline damage & Human life

In this first hospital the electrical power was cut for approximately 12 hours. During the first hours, candles were used until emergency power began to operate. The gas and water supplies were cut off for more than 2 days; however alternative sources were used such as water tanks shown in fig.5 have been used. Telecommunications were also cut, and there was no alternative source for replacement. This damage made the treatment difficult or even impossible; personnel stated that they could not work in the hospital under such difficult conditions.

Damage to lifelines is in particular affected human life saving. It delayed their treatment and also hindered the transfer of casualties to other hospitals.



Fig.5 Water Tank

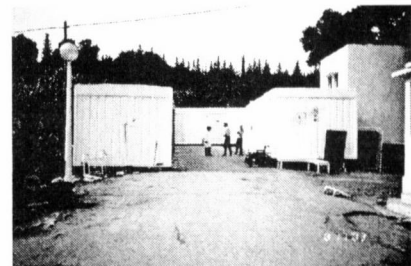


Fig. 6 Prefabs were brought to treat injuries in

Structural/non-structural damage & Human life

The building had itself suffered severe damage. The staff we interviewed stated that noticed a lot of damage to its elements and they confirmed the affect of the damage on their work tasks. Medical equipment had fallen, was broken and made the area inaccessible.

The staff could not move patient and the majority had to be treated in prefabricated buildings as seen in fig.6 above. The prefabs were equipped with electricity and air conditioners.

Organizational aspects & Human life

In this hospital none of the staff were prepared for such a huge disaster. All of them stated that the situation would have been made better had they undergone some training or preparation. The number was not sufficient; even before the earthquake, and many more staff could not work due to injury or road closure caused by the earthquake.

CHU Algiers Centre

Overview

This hospital is the biggest in Algiers, according to some sources it is the biggest in the whole country. It is an old hospital, built by the French during their colonization of Algeria. The facility is composed of many buildings. Every section or/and sometimes sections share the same building. As we observed the hospital suffered only slight damage; therefore it did not stop functioning after the earthquake. Many patients were been treated in it and any casualties had severe injuries and could not be treated in the facility were transferred to other hospitals. These transfers were done in two steps: the first was done at the affected sites by medical teams, and the second was within the hospitals. According to a member staff there was no plan for rescue or treatment. The doctors had to decide the location where the patient would be treated.

The interview was conducted in the same way as in the previous hospital. A total of five people were interviewed:

- 1- Two residents
- 2- Two IDE
- 3- Assistant

Lifeline damage & Human life

In this second hospital, the electricity and telecommunications were cut for more than 12 hours. The staff stated that the electricity was replaced by alternative sources alternative sources. However for telecommunication not all the buildings had alternative sources. The water supply and gas were cut in some areas, and alternative sources were used. Some interviewed, stated that equipment had fallen down, and was damaged or rent un-operable (as seen in Fig.7).

As in the previous hospital, the damage affected the tasks of most personnel: the quality of treatment decreased, the staff could not work in such conditions and the radiology service stopped functioning due to damage to its equipment.

Life saving was affected in the form of delay in treating patients and difficulty in transforming injured patient to other hospitals.

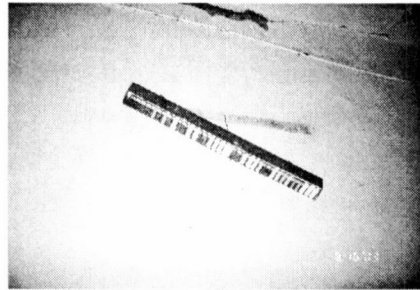


Fig.7 damage to an electric lamp

Structural/non-structural damage & Human life

Some medical equipment had fallen down, broke and made some areas inaccessible. Structural damage was noticed by those interviewed, and they confirmed an affect on their work tasks. They stated that moving patients was made difficult because of the damage.

Organizational aspects & Human life

Among the five interviewed people, only one person (1 year of work) had attended training and he stated that it was not enough to prepare for such a disaster. The rest did not attend any kind of training or preparedness. They declared that the situation would have been better if they had had any kind of training. The number of personnel was also a problem for some people. Some of the personnel were affected by the earthquake and others couldn't go to the facility because the roads were closed. Some of those interviewed said that the number was insufficient even before the earthquake.

4- COMMENT AND CONCLUSION

The table which presents Hospital Damage Distribution, while being useful in viewing clearly the damage to structural elements, is not so useful to use in our study as it does not relate directly to the figures for life-saving.

The colour coded classifications of Green1- Red5 do not serve any role with a hospital because even if a vital piece of equipment is displaced it may be damaged and this can result in one or many patients not having access to the necessary treatment that may require. Therefore it is better classification, which is more relevant to life-saving.

As regards the questionnaire, due to time constraint it was only possible to interview a limited number of staff in only two hospitals however it is hoped even this small scale questionnaire will provide a valuable alternative view of hospitals in areas of the world where earthquake preparedness is not yet as advanced and highly valued as in others.

Although both hospitals suffered damage to their elements it should be noted that even through the CHU hospital is over 70 km away from the epicentre that it suffered considerable damage and even if this was not visibly evident to us at the time of our visit it was reported

clearly by staff member through our interviews. Replacement services were not available straight away, it even necessary to wait for time before there "emergency" services were set up. This needs immediate attention. Also needing immediate attention is the lack of training and organization among the hospitals personnel. Only one interviewee stated having training had training and even added that it was not sufficient.