

1 **Psychological impact of the Alhaouz earthquake: Study in** 2 **the municipality of Ouled Berrehil, Morocco**

3 **Abstract**

4 The Alhaouz earthquake, which struck Morocco in September 2023, has sparked
5 increasing interest in its psychological repercussions on affected individuals. This
6 study aims to analyze the psychological impact of this disaster in the Ouled Berrehil
7 commune.

8 The study was conducted one week after the earthquake and included forty-seven
9 victims. A semi-structured questionnaire was used to collect socio-economic and
10 medical information, while the Peritraumatic Distress Inventory and Peritraumatic
11 Dissociative Experiences Questionnaire were administered to assess psychological
12 responses.

13 The results revealed a significant correlation between material damage and housing
14 need with participants' emotional distress. Additionally, a link between family and
15 associative support with dissociative reactions was observed. These findings
16 highlight the importance of social support and material assistance in managing the
17 psychological impact of natural disasters.

18 This study underscores the urgency of post-disaster interventions integrating
19 psychological and social aspects to support the resilience of individuals affected by
20 traumatic events such as the Alhaouz earthquake. These findings provide valuable
21 insights to guide crisis management policies and mental health interventions in
22 regions affected by natural disasters.

23 **Key words:** Peritraumatic distress, Natural disasters, Psychosocial support

24

25 **Introduction:**

26 Earthquakes cause major material destruction and lasting psychological trauma,
27 requiring prolonged mental health support for victims. [1].

28 On 8 September 2023, an earthquake struck the High Atlas Mountains in Morocco:
29 3,000 people lost their lives and around 5,500 others were injured [2].

30 According to the United Nations Office for the Coordination of Humanitarian Affairs
31 (UNOCHA), the disaster affected approximately 500,000 people across the region,
32 including isolated and hard-to-reach communities [3].

33 The affected area included the historic city of Marrakech, as well as rural areas in the
34 provinces of Al Haouz, Taroudant and Chichaoua [4].

35 The Al Haouz earthquake caused profound psychological suffering, exacerbated by
36 the loss of relatives, the destruction of homes and a feeling of insecurity.
37 Understanding its impact on mental wellbeing is essential to supporting victims and
38 guiding prevention and assistance policies.

39 **Objectives:**

40 This study examines the peritraumatic and dissociative responses of victims of the Al
41 Haouz earthquake based on their sociodemographic characteristics, exposure to
42 damage, and social support, in order to guide the development of strategies to
43 strengthen resilience and recovery.

44 **Materials and Methods:**

45 The study was a cross-sectional analytical study conducted in the rural area of the
46 municipality of Ouled Berrehil, located in Morocco, which was directly affected by the
47 Al Haouz earthquake that occurred on 8 September 2023.

48 Forty-seven earthquake victims were interviewed on 17th September 2023, one
49 week after the event, enabling their immediate reactions to be analysed. The
50 interviews, conducted in Arabic and Amazigh by mental health professionals with the
51 assistance of non-governmental organisations, took place face-to-face in sometimes
52 difficult conditions. A preliminary explanation was provided to participants to ensure
53 confidentiality, anonymity, and voluntary participation.

54 A semi-structured questionnaire was designed to collect socio-economic and
55 medical data, exploring in depth the psychological impact of the earthquake,
56 particularly peritraumatic distress and dissociation.

57 - Peritraumatic Distress Inventory (PDI): a questionnaire composed of 13 items to be
58 answered on a 4-point Likert scale (0 = not at all, 4 = extremely true). The results are
59 added together to give a total score ranging from 0 to 52. A score of ≥ 15 is used to
60 identify individuals in significant distress [5]. The questionnaire includes two
61 subscales: experiences of life-threatening situations (six items) and negative
62 emotions (seven items) [6].

63 - Peritraumatic Dissociation Experiences Questionnaire (PDEQ): a questionnaire
64 consisting of 10 items assessing the presence of dissociative symptoms during or
65 immediately after a traumatic event. Items are rated on a Likert scale (1 = not at all

66 true, 5 = extremely true) and added together to create a total score ranging from 10
67 to 50. A score ≥ 15 indicates individuals with peritraumatic dissociation [7].

68 The data were analysed using IBM SPSS 21 programme.

69 **Ethics Statement:** This research protocol was reviewed and approved by the Ethics
70 Committee of the Faculty of Medicine and Pharmacy of Tangier, Abdelmalek
71 Essaadi University (Approval number: XXX).

72 Given the post-disaster emergency context, the high illiteracy rate in the affected
73 rural areas, and the need to avoid adding administrative burden on survivors, verbal
74 informed consent was obtained from all participants. This procedure, including the
75 use of verbal consent, was explicitly approved by the Ethics Committee. Participation
76 was voluntary, anonymity was assured, and no personal identifiers were collected.

77 The study adhered to the ethical principles of the Declaration of Helsinki.

78 **Results:**

79 **Descriptive results:**

80 The average age of participants was 51 years with a standard deviation of 18.972
81 years. The majority of participants were women (70.2%). The majority of participants
82 were married (63.8%) with an average number of children per family of 3.

83 A significant proportion of participants were illiterate (68.1%). The vast majority of
84 participants (93.6%) lived in temporary tents. 70.2% of participants reported
85 receiving family support, and 42.6% reported receiving assistance from associations.
86 Regarding exposure to the earthquake, 2.1% reported injuries within their family, and

87 17% lost family members. As for material damage, 40.4% of respondents reported
 88 partial destruction of their homes, and 17% reported total destruction.

89 10.6% of participants expressed an immediate need for clothing, 19.1% reported a
 90 need for food, and 57.4% expressed an urgent need for housing.

91 The median scores of the assessment tools show the levels of distress and
 92 dissociation. The PDI median score was 25, and the PDEQ median score was 20
 93 (Table I).

94 **Table I: Summary table of results.**

	Sample	PDI (25[21 - 33])		PDEQ (20[13 - 28])	
		Value	P-Value	Value	P-Value
Gender					
Female	33		0,226		0,825
Male	14				
Age	51,57 +/- 18,97	-0,046	0,76	0,149	0,317
Educational level					
Illiterate	32	0,018	0,902	0,027	0,859
Primary school	9				
Middle school	3				
High school	2				
University	1				
Marital status					
Single	9		0,792		0,304

Divorced	1			
Married	30			
Widowed	7			
Children	3[1 - 4]	-0,255	0,084	0,102 0,496
Property damage				
None	15		0,013	0,174
Cracks	5			
Partial destruction	19			
Total destruction	8			
Displacement				
No	3		0,107	0,665
Yes	44			
Local housing				
Tent	44		0,107	0,665
Household	3			
Dégât humain				
None	38		0,452	0,386
Family member injured	1			
Family member deceased	8			
immediate need for Housing				
No	20		0,045	0,983
Yes	27			
Immediate need for Food				
No	38		0,059	0,076

Yes	9		
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Immediate need for Clothing

No	42	0,271	0,137
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Yes	5		
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Family Support

No	14	0,514	0,004
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Yes	33		
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Association Support

No	27	<0,001	0,004
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Yes	20		
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96 **Analytical results:**

97 The results of the analysis confirmed the existence of a statistically significant
98 association between material damage experienced and the PDI score ($p = 0.013$).

99 Similarly, an immediate need for housing was significantly linked to the PDI score (p
100 $= 0.045$).

101 In terms of social support, a significant association was observed between family
102 support and the PDEQ score ($p = 0.004$). Furthermore, community support showed a
103 significant relationship with both the PDI score ($p < 0.001$) and the PDEQ score ($p =$
104 0.004) (Table I).

105 A positive correlation was observed between material damage and human damage
106 ($p = 0.024$). Similarly, a significant positive correlation was found between the

107 participants' current housing situation and displacement ($p < 0.001$). Finally, a
108 positive correlation was identified between the PDI and the PDEQ ($p = 0.001$).

109 **Discussion:**

110 Previous studies show that psychological distress increases with material losses,
111 and that immediate residential insecurity after a disaster is a major stress factor [8,9].
112 The work of Galea et al. (2005) indicates that residential insecurity is strongly
113 correlated with post-disaster psychological distress. The urgent need for housing can
114 increase psychological vulnerability [10].

115 The results confirm the protective role of family support in reducing dissociative
116 reactions, improving communication, and potentially attenuating derealization during
117 crises. In addition, research shows the effectiveness of community-based
118 interventions in reducing post-disaster psychological distress [11,12,13].

119 The correlation between material damage and human casualties is consistent with
120 the literature [14]. Studies show that post-disaster displacement is often linked to
121 precarious housing conditions [15]. The correlation highlights the complexity of post-
122 earthquake housing needs and mobility, underscoring the urgency of targeted
123 interventions [10]. The correlation between emotional distress and dissociative
124 reactions is consistent with the trauma theory, highlighting the interrelationship
125 between these two dimensions [16].

126 The results highlight the need for a holistic post-disaster approach, aligned with
127 recommendations for integrated interventions [17], and taking into account the
128 complexity of psychological responses to disasters.

129 The interventions aimed at strengthening family and community support are
130 consistent with previous research by Galea et al. (2005) on the importance of social
131 support in post-disaster resilience, taking into account the variability of individual
132 responses [17].

133 Emphasizing the immediate need for housing underlines the importance of rapid
134 action for well-planned reconstruction policies, highlighting the variability of individual
135 responses to material losses [15].

136 Further studies with larger samples are needed to generalize the findings. The
137 unique characteristics of each disaster may influence psychological responses.
138 Comparative research with other seismic contexts is needed.

139 **Conclusion:**

140 Understanding the links between material losses, social support, and mental health
141 is crucial for effective post-disaster interventions. The results show a major
142 psychological impact of the Alhaouz earthquake, highlighting the need for targeted
143 interventions addressing the psychological and social dimensions of victims.

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149 access to the affected areas.

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