Additional file 1

Study instruments: English-language versions

Assessed Adaptive Capacity of Healthcare Facilities for Air-Pollution Episodes in Dust-Storm-Prone Khuzestan, Iran: A Cross-Sectional Study

Final version | 6 August 2026

Purpose and translation note

This additional file contains English-language versions of the two researcher-developed instruments used in the study: (1) a 40-item facility adaptive-capacity assessment and (2) a 20-item questionnaire assessing managers' perceived preparedness. The instruments were originally administered in Persian. The English versions are provided for publication transparency and reproducibility and have not undergone separate psychometric validation; they should therefore not be regarded as independently validated English-language instruments.

For the 40-item adaptive-capacity instrument, the administered response options were "Yes," "No," and "Do not know." The English version presented here reflects the response format used during data collection and subsequent analysis.

Item numbering, wording, and domain allocation in the English version correspond to the variables used in the final analytical dataset. Minor wording adjustments were made only where necessary to provide a clear and faithful English translation of the administered instrument.

No participant names, facility identifiers, or other direct identifiers are included in this supplementary file.

Instrument 1. Facility adaptive-capacity assessment

Objective: To assess whether a health centre or hospital has the organisational, infrastructural, monitoring, communication, workforce, response, and collaborative capacities required to reduce exposure to air pollution and manage its health consequences.

Administration: The instrument was completed by trained assessors using a manager interview, review of available plans and records, and direct verification where applicable. Response options were Yes, No, and Do not know.

Scoring note: For the verified analysis, Yes was coded 1; No and Do not know were coded 0 because the analytical export did not preserve these two non-affirmative categories separately. Each domain score was calculated as the number of affirmative items divided by the domain maximum and multiplied by 100. Scores therefore ranged from 0 to 100, with higher values indicating a greater proportion of assessed capacities present. No favourable/unfavourable threshold was applied because no validated or adequately documented prespecified cut-off was recoverable.

County	_____
Institution name	_____
Institution type	Hospital / County health centre
If hospital	Number of active beds: _____
If county health centre	Number of comprehensive health service centres covered: _____

Item	Statement	Yes	No	Do not know
Policies and governance				
1	The health centre or hospital has specific plans to address the health consequences of air pollution.	☐	☐	☐
2	The health centre or hospital regularly updates health policies related to air pollution.	☐	☐	☐
3	The health centre or hospital effectively complies with laws and regulations related to air pollution.	☐	☐	☐
4	The health centre or hospital's policies specifically address protection of vulnerable groups, such as children, older adults, and patients with cardiovascular disease, from air pollution.	☐	☐	☐
5	The health centre or hospital allocates sufficient resources to manage increases in air-pollution-related illness.	☐	☐	☐
6	The health centre or hospital has effectively prepared its systems for emergencies caused by air pollution.	☐	☐	☐
7	The health centre or hospital actively participates in implementing government policies to reduce air pollution.	☐	☐	☐
Infrastructure and resources				
8	The health centre or hospital is equipped with the equipment and technologies required to manage air-pollution-related illnesses, such as respiratory support devices and appropriate ventilation systems.	☐	☐	☐
9	The health centre or hospital is adequately equipped to receive patients with illnesses caused or exacerbated by air pollution.	☐	☐	☐
10	The health centre or hospital has explicit protocols for the diagnosis and treatment of air-pollution-related illnesses.	☐	☐	☐
11	The health centre or hospital is prepared for increased patient volumes during air-pollution emergencies.	☐	☐	☐
12	The health centre or hospital has ventilation systems capable of limiting the entry of outdoor air pollution into indoor spaces.	☐	☐	☐
13	The health centre or hospital has sufficient resources to provide health services during air-pollution emergencies.	☐	☐	☐

Item	Statement	Yes	No	Do not know
Staff training and empowerment				
14	Health-centre or hospital staff receive regular training in the management of air-pollution-related illnesses.	☐	☐	☐
15	Physicians and nurses have been adequately trained to diagnose and treat respiratory and cardiovascular illnesses related to air pollution.	☐	☐	☐
16	Health-centre or hospital staff receive regular training on methods to reduce patients' air-pollution risks.	☐	☐	☐
17	The health centre or hospital provides training programmes to increase staff awareness of the consequences of air pollution and methods of prevention.	☐	☐	☐
18	The health centre or hospital has the capacity to manage high patient volumes during air-pollution emergencies.	☐	☐	☐
Air-quality monitoring and evaluation				
19	The health centre or hospital regularly receives air-quality data from reliable sources.	☐	☐	☐
20	The health centre or hospital uses air-quality data to set priorities for health-service provision.	☐	☐	☐
21	The health centre or hospital actively monitors air-quality conditions across different areas of the province.	☐	☐	☐
22	The health centre or hospital uses warning systems to notify patients during air-pollution episodes.	☐	☐	☐
23	The health centre or hospital effectively communicates air-quality updates to staff and patients.	☐	☐	☐
24	The health centre or hospital uses air-quality data to adjust working hours and patient intake on polluted days.	☐	☐	☐
Public awareness and communication				
25	The health centre or hospital provides air-pollution awareness programmes for patients and their families.	☐	☐	☐
26	The health centre or hospital educates patients and the public about air-pollution risks and preventive measures.	☐	☐	☐
27	The health centre or hospital provides targeted air-pollution information programmes for vulnerable groups, such as patients with respiratory or cardiovascular disease.	☐	☐	☐
28	The health centre or hospital advises patients on methods to reduce exposure to air pollution, such as using an appropriate mask or avoiding outdoor activity.	☐	☐	☐
29	The health centre or hospital effectively informs patients and staff about air-pollution emergencies, such as elevated pollutant levels.	☐	☐	☐
30	The health centre or hospital has programmes for timely dissemination of air-quality information, particularly during emergencies.	☐	☐	☐
Response and recovery capacity during air-pollution emergencies				
31	The health centre or hospital has specific protocols for responding to air-pollution emergencies.	☐	☐	☐
32	The health centre or hospital can respond to large patient volumes during air-pollution emergencies.	☐	☐	☐
33	During severe air pollution, the health centre or hospital effectively reallocates resources and equipment to meet increased needs.	☐	☐	☐
34	The health centre or hospital responds rapidly to changes in air-quality conditions and adjusts resources effectively.	☐	☐	☐
35	During an air-pollution emergency, the health centre or hospital effectively provides health services to vulnerable groups, including patients with respiratory or cardiovascular disease, older adults, and children.	☐	☐	☐
36	The health centre or hospital has protocols to assess and follow the long-term health consequences of air pollution.	☐	☐	☐
37	The health centre or hospital uses air-quality data to evaluate the effectiveness of its health-service response during emergencies.	☐	☐	☐
Intersectoral collaboration and participation				
38	The health centre or hospital collaborates with governmental and non-governmental organisations to manage air-pollution emergencies.	☐	☐	☐
39	The health centre or hospital actively participates in provincial or county working groups and committees concerned with air-pollution management.	☐	☐	☐
40	The health centre or hospital collaborates with other agencies, such as municipalities and environmental authorities, to reduce air pollution.	☐	☐	☐

Domain item ranges: policies and governance, 1–7; infrastructure and resources, 8–13; staff training and empowerment, 14–18; air-quality monitoring and evaluation, 19–24; public awareness and communication, 25–30; response and recovery, 31–37; intersectoral collaboration, 38–40.

Instrument 2. Managers' perceptions of facility preparedness

Objective: To assess managers' perceptions of their facility's ability to reduce exposure to air pollution and manage related health consequences.

Instructions: For each statement, select one response: 1 = Strongly disagree; 2 = Disagree; 3 = Neither agree nor disagree; 4 = Agree; 5 = Strongly agree.

Scoring used in the archived analysis: the five administered response categories were recoded from 1–5 to 0–4 by subtracting 1 from each response. The 20 recoded items were summed to obtain a total score from 0 to 80. Higher scores indicate stronger perceived preparedness. No items are reverse scored, and demographic items are not included in the total. For presentation on the original response scale, 20 may be added to the archived total; this constant transformation does not change group differences, standard deviations, correlations, or inferential tests.

Section A. Demographic and professional information

Sex	**Male / Female**
Age	<30 years / 30–40 years / 41–50 years / >50 years
Highest educational qualification	High-school diploma / Bachelor's degree / Master's degree / Doctoral degree
Management experience	<5 years / 5–10 years / 11–15 years / >15 years
Facility type	Teaching hospital / Non-teaching hospital / County health centre / Rural health centre
Province of employment	_____

Section B. Preparedness statements

Item	Statement	1	2	3	4	5
1	The facility I manage has the equipment required for continuous monitoring of indoor air quality.	☐	☐	☐	☐	☐
2	The ventilation and air-filtration systems in my facility are adequate to reduce exposure to air pollution.	☐	☐	☐	☐	☐
3	Staff at this facility have received the necessary training on strategies to reduce the effects of air pollution.	☐	☐	☐	☐	☐
4	This facility has explicit protocols for days with severe air pollution.	☐	☐	☐	☐	☐
5	The facilities and equipment at this facility are adequate to provide services to patients with health problems caused or exacerbated by air pollution.	☐	☐	☐	☐	☐
6	There is effective cooperation between this facility and environmental organisations in managing air pollution.	☐	☐	☐	☐	☐
7	This facility has appropriate educational programmes to increase service users' awareness of air-pollution risks.	☐	☐	☐	☐	☐
8	Sufficient financial resources are available to improve this facility's systems for responding to air pollution.	☐	☐	☐	☐	☐
9	This facility can identify and record cases of air-pollution-related disease.	☐	☐	☐	☐	☐
10	National guidelines for managing the health effects of air pollution are effectively implemented in this facility.	☐	☐	☐	☐	☐
11	Staff at this facility are sufficiently aware of occupational risks associated with exposure to air pollution.	☐	☐	☐	☐	☐
12	The physical infrastructure of this facility is appropriate for protecting patients and staff from air pollution.	☐	☐	☐	☐	☐
13	This facility can effectively expand its services when air pollution increases.	☐	☐	☐	☐	☐
14	Early-warning systems for days with severe air pollution are available in this facility.	☐	☐	☐	☐	☐
15	The management of this facility gives appropriate priority to air-pollution-related issues.	☐	☐	☐	☐	☐
16	There is appropriate intersectoral coordination between this facility and other relevant organisations during air-pollution emergencies.	☐	☐	☐	☐	☐
17	This facility uses new technologies to reduce exposure to air pollution.	☐	☐	☐	☐	☐
18	The facility's performance in responding to air pollution is evaluated periodically.	☐	☐	☐	☐	☐
19	This facility has preventive programmes to reduce the effects of air pollution on staff health.	☐	☐	☐	☐	☐
20	This facility has the capacity to manage increased patient visits on days with severe air pollution.	☐	☐	☐	☐	☐

Response anchors: 1, Strongly disagree; 2, Disagree; 3, Neither agree nor disagree; 4, Agree; 5, Strongly agree.