



Climate change REsilience framework for health SYStems and hospiTALs

DA1.2 - [Capacity Assessment Matrix]

Contractual Delivery Date: 01/02/2022	Actual Delivery Date: 13/06/2022
Type: Report	Version: v1.0
Dissemination Level: Public Deliverable	

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LIFE RESYSTAL is a project that has received funding from the LIFE programme, the EU's funding instrument for the environment and climate action, under grant agreement LIFE20 CCA/GR/001787.



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For delivery	Cyprien Butin	ACTERRA	01/09/2022

Document Log			
Issue	Date	Comment	Author / Organization
V0.0	13/06/2022	Draft version submitted for review to all partners	ACTERRA with HCWHE support
V0.5	03/08/2022	Version with Polibari profile added and review of the first batch of comments	ACTERRA
V.1.0	01/09/2022	Final version	ACTERRA



Executive summary

This deliverable was produced as part of action A1.2 of the LIFE RESYSTAL project, which aims to assess the capacities and training needs of each pilot hospital. An adaptative capacity assessment matrix (or checklist) was designed. It covers the different dimensions of hospital's climate resilience: governance & leadership, crisis management, buildings and infrastructure. Interviews were then conducted with targeted members of the communities of practice of each hospital, and climate resilience capacity profiles were produced.



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Table of abbreviations	
Abbreviations	Meaning
ARS	Agence Régionale de Santé
CCA	Climate Change Adaptation
CH MILLAU	Hospital Center of Millau
CoP	Community of Practice
HCWHE	Health Care Without Harm Europe
NCSR	National Center for Scientific Research Demokritos
NHOSP	General State Hospital of Nikaia “Agios Panteleimon”
NGO	Non-Governmental Organization
PCAET	Local Climate, Air and Energy Action Plan
POLIBARI	University hospital complex of the polyclinic of Bari and the Giovanni XXIII hospital
RINA-C	RINA Consulting
SERGAS	Galician Health Service
UCAM	University of Cambridge



University Hospital Complex of the Polyclinic of Bari and the Giovanni XXIII hospital Rapid Climate Resilience Capacity Assessment Profile



Background information

Azienda Ospedaliero Universitaria Consorziale Policlinico di Bari, also known as Policlinico di Bari, is a hospital established in 1996 in the city of Bari, Apulia region, Italy¹. It consists of two campuses: the polyclinic itself, located in the Picone district, and the Giovanni XXIII Children’s Hospital (*Ospedale Giovanni XXIII*), located in the city’s outskirts and which was integrated in 2005. It is also the head office of the Faculty of Medicine and Surgery of the University of Bari. The hospital has public legal status and administrative autonomy. It collaborates with the National Health Service and the University of Bari.²



Entrance of the Faculty of Medicine and Surgery of the University of Bari (Source: Proger, 2017)



Location of the two campuses of the hospital (Policlinico di Bari & Giovanni XXIII) (Source: orangesmile.com)

¹ It is also known by its Italian name Puglia.

²2020-2022 Performance Plan - AOU Consorziale Policlinico di Bari, Regione Puglia, 2019, URL : <https://www.sanita.puglia.it/documents/36067/387885/Piano+Performance+2020-2022+All.1+delib.+0188-20+E+ditabile.pdf/eb494abc-8d65-4915-ba8a-a974ea273def>



Here are some key figures³: The employee headcount was at 4,169 in 2019, comprising 3,822 hospital staff and 347 university staff. The hospital used an average 1,050 beds in 2019, of which 81 were day hospital beds.

Climate hazards

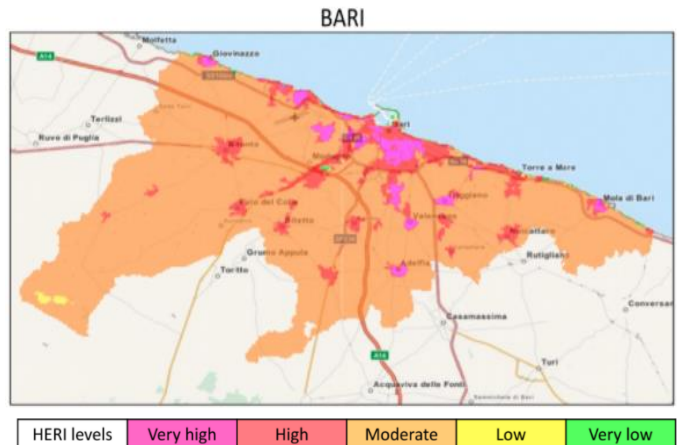
According to participants in the kick-off meeting, the main climate hazards that the city of Bari is facing are heatwaves. Other hazards include (i) extreme rainfall events (including storms); (ii) floods; and (ii) increase of average temperatures throughout the year (not just in the summer).

The tropicalization of climate, related to the fact that the same volume of rain is distributed in a smaller series of more intense events, involves a double threat: (i) scarcity of water resources and (ii) destructive floods whose effect is reinforced by urbanization and the soil sealing effects (Alessandro Pagano and Valeria Donno).

External risk factors

The elderly in Bari are particularly vulnerable from heatwaves as can be seen on the map⁴. High influx of such vulnerable patients to the hospital may compromise the capacity of the health system.

In addition, medium- and long-term impacts may be observed with to the degradation of the utilities supplying the hospital (in case of power cuts, etc.) and dependent infrastructure (roads, supply chain).



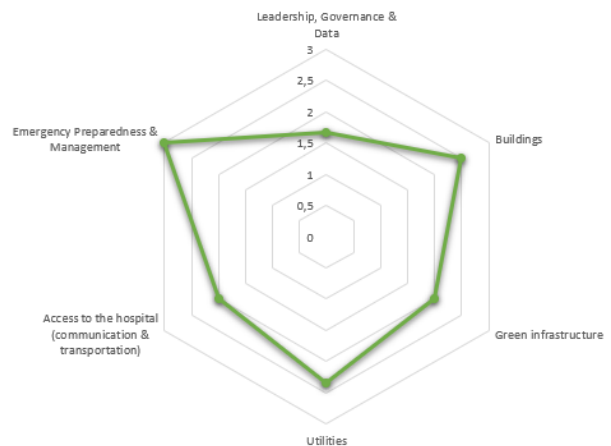
Lessons learned: existing capacities and prospects

Polclinico di Bari has only marginally adapted its organization to climate resilience challenges. Yet, it has a lot of resources: some buildings were recently renovated, it has a lot of green areas.

The way forward

Within this context, one main challenge for the hospital will be to raise awareness of medical and management staff on climate change challenges while explaining that (i) investing on adaptation will be much less costly that repairing after the event has occurred; 2) climate change impacts should be included in the hospital's crisis doctrine.

The hospital's resilience capacity is analyzed for each dimension identified i.e. (i) Governance, Leadership and data, (ii) Site location, buildings and infrastructure and (iii) emergency preparedness and management.



1- Governance, Leadership and Data

<p>Score: 1.6 (Marginal)</p> <p>This score indicates that the hospital has only marginally adapted its organization to climate change challenges and that it is not supported neither technically nor financially to do so.</p>
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³ Ibid.

⁴ This map has been elaborated from the HERI index (Heat Risk Index for the Elderly).

1-1 Organizational capacity

Since 2019, a series of measures were taken to rationalize the hospital’s costs and increase and increase care delivery through an optimization of human resource, the establishment of a pool of nurses dedicated to the assistance of operational departments, etc.⁵

Vis-à-vis climate adaptation, there is no program or specific action that has been taken by the hospital. Yet, several studies were conducted over the territory of Bari about climate change. In addition, an energy efficiency program was elaborated by the hospital.

1-2 Enabling environment

To cope with natural disasters, a fire brigade and civil protection group exist (vigili del fuoco / protezione civile). Moreover, the Regional Department of health is tasked to assess health community vulnerabilities that will likely increase patient influx during an extreme weather event. There is no funding support provided to the hospital on climate change (except maybe for the energy efficiency aspect).

1-3 Mechanisms to Collect and Monitor Data

Some buildings are equipped air handling unit (*Unità Trattamento Aria – UTA*⁶) which monitor various factors including temperature, humidity, air quality.



PoliMap – How to get around the Polyclinic (Source: StudentiPer,

2- Buildings

Score: 2.5 (Between Marginal and Functional)

This score indicates that the hospital may be functional, but not in terms of the air conditioning system. The buildings are not well isolated and cannot withstand extreme temperatures. However the storage capacity is extended, and the supplying system is also reliable, in particular thanks to logistical reorganization.

Construction work on the hospital began in 1936, but World War II hampered the work. The post-war period was dedicated to the reconstruction of the city and the rebuilding of the polyclinic. Today, Policlinico di Bari is composed of 32 buildings, the most recent ones being from 2010⁷.

⁵ Ibid.

⁶ It is a device used to regulate and circulate air as part of a heating, ventilating, and air-conditioning (HVAC) system

⁷ [Archiviato](#) il 12 settembre 2012 in [Internet Archive](#). - Unità del Policlinico



Old buildings are not properly thermally isolated except the ones – built between the 1930s and 1950s – which benefited from a renovation program to make them more functional and, above all, compliant with current legislation: Surgical Clinics, Ophthalmology and Otorhinolaryngology Clinic, New Operating Unit of Dialysis and Nephrology.⁸

3- Green infrastructure

Score: 3 (Functional)

This score indicates that the hospital benefit from a fine density of green areas that are equally distributed green spaces within the campus. The hospital played a leading role by installing permeable paving and green roofs as part of a renovation program.

As we can see on the map and in the pictures, there are many green spaces and these are equally distributed over the campus of the Policlinic.



Ground plan of the Policlinico di Bari site, buildings, accesses and green areas. (Source : Viva Bariviva.it, 2019)



Infopoint of the Policlinico of Bari (Source: Google image, Max xAM, dec 2017)



Faculty of Medicine (Source: Google image, Max xAM, dec 2017)



Hospital's trees (Google image, Max xAM, 2017)



Main entrance (Source: Teamsystem, 2012)



Green spaces (Source: nicola fraddosio 2020: Francesco Cardone.

⁸Proger, Management. Engineering. People., 2017, *Policlinico di Bari*. URL : <https://www.proger.it/progetto/policlinico-di-bari/>



Moreover, there are ongoing plans to install permeable paving near the Police Station Bari Picone (*Stazione dei carabinieri*) and green roofs in the Asclepios III building⁹ which will host native and drought tolerant species. It has been reported that the surface of green spaces has increased over the past 5 years thanks to the renovation program¹⁰.

3-1 Food supply

The hospital chooses local food suppliers to promote short food supply chains, which limits the risks of supply chain disruption. There is an organic food procurement policy which promotes quality of the land, health of the inhabitants/patients.

4- Utilities

Score: 2.3 (between marginal and functional)

This score indicates that the operating parameters without essential utilities are relatively effective during extreme weather events.

4-1 Energy

In the hospital, the main heating and hot water source is fuel oil. All critical facilities are equally equipped to operate without grid power for extended outages. Photovoltaic panels have been installed on the building Asclepios III and provide part of the building with electricity since its renovation. The food refrigeration equipment is on emergency power and there are external connections for portable emergency generators. The cooling system of the hospital can operate without grid power.

4-2 Water and sewage

The hospital has 1500 m³ emergency water storage on-site and this storage can last for 36 hours. There are floor drains below flood elevation outfitted with drain plugs.

4-3 Waste management

The hospital measures the amount of waste generated, but this data is not available at the moment.



Photovoltaic panels on the roof of the Asclepios III building (Source: Google image, Maxar Technologies, 2022)

5- Communication, information, and access to the hospital

Score: 3 (Functional)

This score indicates that the hospital is relatively well equipped in terms of communication means. As it has an urban campus, it is relatively easily accessible even during extreme weather events.

5-1 Access to the hospital and evacuation routes

The main entrance to the Polyclinic is in Piazza Giulio Cesare and can be reached by public transport. There is also an internal free-of-charge bus service using electric buses (Shuttle H) with a frequency of 10 minutes, and parking area,

⁹Di redazione – 2021, *New Asclepios at Bari General Hospital, architect De Pineda: "Hospital of the future"* – VIDEO, URL : <https://www.borderline24.com/2021/05/12/nuovo-asclepios-al-policlinico-di-bari-larchitetto-de-pineda-ospedale-del-futuro/>

¹⁰ Fiorella Barile, *Policlínico di Bari, si cambia: parcheggi, navette, pista ciclabile, verde, area fitness e teatro*, Vita de citta, November 2019, Viva Bariviva.it URL : <https://www.bariviva.it/notizie/policlinico-di-bari-si-cambia-parcheggi-navette-pista-ciclabile-verde-area-fitness-e-teatro/>



and a bicycle path inside the campus. Concerning extreme weather event, unfortunately the hospital does not have assessed evacuation routes.

5-3 Emergency communication means and back-up storage

The hospital uses a landline telephone and mobile phone systems. Some medical records are centralised in digital format online, others in paper format.

6- Emergency Preparedness & Management

Score: 3 (Functional)

This means that the crisis management capacities of the hospital are good.

6-1 Response system

The hospital has a crisis unit and crisis management plan called PEIMAF (*Procedura Gestione Letto in Condizioni di Sovraffollamento*) that is regularly updated. A copy of the PEIMAF has been shared by the hospital. Members of the crisis unit are: (i) Hospital General Director; (ii) Medical Director; (iii) Technical Department Director; (iv) Director of anesthesia and intensive care Unit; (v) Director of emergency department; (vi) Director of Medicine and surgery, acceptance and urgency Unit; (vii) Contact person Nursing health directorate; (viii) Prevention and protection service manager; (ix) Director of Transfusion medicine Unit; (x) Nursing coordinator of medicine and surgery, acceptance and urgency Unit; (xi) Director of Legal Medicine Unit; (xii) Focal point of the Clinical risk management Unit; (xiii) Director of Pharmacy Unit; (xiv) Administrative secretary.

In case a climate-related emergency happens, the hospital is informed by the Territorial Emergency Operations Center (of the Puglia Region).

Following a crisis event, a review of the crisis management plan is scheduled within 10 days after the start of the incident, through a briefing possibly involving all crisis operators involved. It is done through department review sessions, reviewing documentation collected during rescue operations, and using the indicators provided to assess quantitatively the incident (pp. 18-19). Such review sessions were performed during the Covid-19 crisis.

6-2 Exposed locations and locations for anticipated patient surge

Rain and heatwaves have a dramatic impact on emergency management as the Policlino di Bari is made of independent buildings which can make difficult to go from one building to another, and as such hazard can make access to the hospital itself take more time.

The average daily occupancy (daily number of occupied beds) was 80-90% in 2019 (for about 1,050 beds).

The hospital has inventoried and assessed additional areas on campus or off-campus for treating lower acuity patients within the campus (not outside it).

6-3 Personnel

To mobilize additional personnel during normal operation of the hospital, the following procedure is followed: an official recruitment request is sent to the Crisis Unit's mailing list and is simultaneously forwarded on the Unit's WhatsApp group. In case of an emergency, there is a procedure according to which the hospital switchboard operator, after alerting the medical management, alerts all available physicians and activates the cascade call, following the directions according to the level of emergency, and activates the crisis unit by sending multiple SMS messages and verifies their reception. Hence, there is no specific tool or software to recall staff.

6-4 Healthcare supplies

The hospital has sufficient supplies and resources to continue providing care during one or more climate-related emergencies.



Sources and limitation

Data was collected from written responses to the questionnaire as well as two interviews conducted with Alessandra Campobasso, technical staff of the engineering department. ACTERRA did also a desk review to collect information on the hospital.

Since the questionnaire was filled in English, and that the language was not always clear, some data would need to be double-checked by the hospital staff to avoid any misinterpretation.