

## **Living in a Semi-basement in the Era of Floods. Italian Laws Cause Inequalities in Health Protection**

Dear Editor,

in the last few years, a number of meteorological catastrophic events involved some sections of Italy (e.g., Sardinia Region and the city of Rome), determining severe flooding in semi-basements and causing not only problems to their occupants, but even casualties and deaths. Long-term health effects linked to the deterioration of indoor environmental quality are also to be expected. (1) The frequency and intensity of extreme meteorological phenomena have increased in the last few years, and will probably keep growing even more in the future due to global climate changes. (2) Italy is going across a dwelling crisis phase, especially in its larger urban areas, (3, 4) and this is leading to the residential use of spaces not normally considered as living environments: (5, 6) among them, semi-basements (more or less adapted) constitute a not negligible portion of the new housing market. (6, 7) It has to be considered that this problem fits into a context of poor attention to land use management and control of water flow, including drainage systems. We know that keeping semi-basements habitable could be helpful to optimize the use of land, considering that they could provide significant additional living space (often at lower price!), but the above-mentioned recent tragedies emphasize just one aspect of the unhealthy characteristics of these environments when used as living spaces.

We can affirm that semi-basements, especially those occupied by low-income people, are usually wetter than higher-floored dwellings, and have both scarce illumination and insufficient natural ventilation, due to their partially underground walls. These are key aspects to ensure adequate drying and removal of dangerous airborne contaminants, such as cigarette smoke and radon. (8, 9) If we consider that the large majority of the population spends up to 90% of its lifetime indoor, and Italians in particular spend more than 60% of that time at home, (9) we can easily understand how strong may be the connections between an unhealthy living space and human health. (9, 11, 12) The effects on health of such a peculiar indoor environment are multiple and related to relevant social and sanitary costs: microclimate modifications induced by dampness are a risk factor in the development of acute and chronic illnesses such as allergic rhinitis, asthma, eczema, respiratory infections, (13) and chronic disabilities in adulthood. (14) Exposure to radon, a radioactive noble gas, which is carcinogenic if inhaled (Group I according to the IARC classification) (15) and which constitutes the second cause of lung cancer, (16) is higher in semi-basements. The effects on health of an inappropriate living context can have a significant influence, not only on the physical, but also on the mental health, as well as on social aspects. (8, 10, 17)

A recent study (7) evidenced how Italian legislation deals with this problem, analysing laws and codes issued at a national, regional and municipal level. In Italy, in fact, the Local Health Authority is committed to the Mayor, while the laws on some topics, among which health and building regu-

lations, can be released by both the national Parliament and the Regional Councils. The first and unique Italian law that refers to semi-basements used as living space (7, 18) dates back to 1896! This law states “*no room whose walls are, in whole or in part of their height, located underground is allowed to be used for permanent habitation by one or more persons*”. The same law declares that exceptions can be made if additional requirements are met: this represents an ancient trace of how much Italian lawmakers love to introduce exceptions!

On a regional level, we can observe that five regions (among them Sardinia) permit the use of semi-basements also as habitations, sometimes imposing additional requirements, but anyway less restrictive than the ones imposed by the national law. (7)

The analysis of the Municipal Building Codes of the ten largest Italian cities also provides a picture of wide inequalities among the different areas of the country. Only two Codes (Rome and Florence) allow the use of semi-basements as living spaces, (7) while in the others the situation is partial and unclear, e.g. quoting only new-built dwellings (Palermo) or limiting their use within the old downtown (Genoa). (7)

Law enforcement is a key part of Public Health protection of indoor environments. (19, 20) The Working Group for Hygiene of Built Environment (Gruppo Igiene Ambiente Costruito - GIAC), established by the Italian Society of Hygiene, Preventive Medicine and Public Health (Società Italiana di Igiene, Medicina Preventiva e Sanità Pubblica – SItI), expresses its concern for the present inequalities in housing requirements on the national scale and asks national and local Authorities to make the necessary corrections, offering, if needed, the Society’s technical support, in order to avoid, or at least to strongly restrict, the usage of semi-basement as living space, particularly in the more vulnerable areas of the country. At the same time, as argued by WHO, (21) the GIAC recommends to implement, well in advance, primary prevention actions to reduce the effects of floods. These actions should – at least - include land use management; control of water flow and drainage systems; flood defences and barriers; tree planting; design and architectural strategies.

An encouraging news has been recently published, that the Italian Government is proposing the Parliament a bill that provides for a unique national building code in which it intends to pay particular attention to the needs of wellness and sustainability (22).

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