

# Knowledge and training needs on built environment and indoor health of Italian public health residents: a national survey

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## Keywords

Residency • Public health • Post-graduate medical education • Building hygiene • Indoor environment

## Summary

**Introduction.** *The Working Group for Hygiene of Built Environment and the National Council of Residents of the Italian Society of Hygiene, Preventive Medicine and Public Health conducted a nation-wide survey to evaluate the knowledge and training needs on Built Environment and Indoor Health of Italian public health residents.*

**Results.** *The compliance was very high (52,4%), covering the*

*totality of Italian postgraduate schools. The results underline a severe lack of theoretical formation and practical training, but also diffuse discrepancies across the country, and show a strong interest of residents on this topic.*

**Conclusions.** *The authors propose to adopt a national core curriculum, and suggest some strategies to improve learning.*

## Introduction

In Italy, the physicians who intend to become Public Health Officers in the different fields (Environment, Infectious and chronic diseases, Nutrition, etc.) must attend a post-graduate school (residency) named "School of Hygiene and Preventive Medicine", at the end of which they can participate to public competitions to enter Public Health positions [1]. After a 6-year School of Medicine, they must pass a nation-wide selection and choose among one of the 32 schools, which are open within the Schools of Medicine (only 4 Medical Schools in Italy do not offer this postgraduate curriculum).

Each school of Hygiene is free to organize and manage classes and internships following a general guideline delivered jointly by the MIUR (Ministry of Education, University and Research) and the Ministry of Health. The activities are to be allocated in 5 academic years [1]. According to international studies, in the most economically developed countries nowadays people spend up to 90% of their lifetime in indoor environment, making it one of the major (positive or negative) determinants of health worldwide. [2-5] The occurrence and re-occurrence of pathologies related to the quality of built environment, exacerbated by the severe current socio-economic crisis, upholds once more the ultimate

importance of domestic environment as primary living space [2, 7-9]. It appears therefore crucial to appropriately train highly educated and evidence-based health professionals, with regards to human-built environment and, in particular, residences [3, 10, 11].

The Working Group (WG) for Hygiene of Built Environment (Igiene Ambiente Costruito - IAC), established by the Italian Society of Hygiene, Preventive Medicine and Public Health (Società Italiana di Igiene, Medicina Preventiva e Sanità Pubblica - S.It.I.) developed a survey to evaluate the possible educational discrepancies between the Schools of Hygiene of the country. The present study is the result of the cooperation between the IAC-WG and the S.It.I. National Council of Residents. This research aimed at comparing the training needs of Italian residents with the educational courses on offer in the different Italian schools of Hygiene, in order to propose new approaches and solutions for the harmonization of the training in the field of indoor environment.

## Methods

The research was designed as a cross-sectional study, and was addressed to the residents of all Italian post-graduate Schools of Hygiene and Preventive Medicine.

Using Google Docs, a short questionnaire was prepared. The study was approved by the Executive Scientific Council of the Italian Society of Hygiene, Preventive Medicine and Public Health in January 2014. The questionnaire, anonymously administered and available for online completion, consisted of section:

- demographic and academic information;
- residents' curriculum regarding building hygiene and indoor environment, and their attitude towards the topic;
- five multiple choice questions, aimed at investigating residents' knowledge about building hygiene and indoor environment, focused on dwellings as main living space [2, 3, 7, 12].

Among the questions, elaborated by the IAC-WG scientific board, [13] issues that are relevant for indoor health were explored, such as natural lighting and insulation, indoor spread of infectious diseases [8, 14-17], but also practical questions to evaluate the familiarity with laws and regulations currently in force in Italy, and others which may be enforced in a near future, European Union Directives included.

The survey was publicized through the National Mailing List and Facebook page of the National Council of Residents.

Filled questionnaires were collected at the Department of Public Health, Experimental and Forensic Medicine of the University of Pavia, and analysed using Excel 2010. To calculate a denominator, the research team estimated the number of residents on the basis of the five Ministerial Decrees that every year set the number of residents for each university. [18-22] This number is probably overrated, due to dropouts and parental leaves. The overall proportion of right answers was calculated; it was also stratified by knowledge questions. Chi-squared was used to compare the proportions of correct answers by each question among residents who were trained or not trained in built environment hygiene.

## Results

All the 704 residents of the 32 Italian postgraduate Schools of Hygiene and Preventive Medicine were enrolled and received the questionnaire, and 369 (52.4%) chose to participate; participation rate of the different Schools ranged from a minimum of 23.5% to a maximum of 100% (Fig. 1).

Female gender was prevalent, accounting for 66.9% of responders. Table I shows the residents' characteristics. Among the responders, 281 (76.1%) consider the training on "building hygiene" a very relevant issue, while others are little (83 subjects: 22.5%) or not at all (5 subjects: 1.4%) interested. With regards to the training on "building hygiene", 106 (28.7%) report a specific course (frontal teaching) in their curriculum, 101 residents (27.4%) had some lessons within a broader course, and 162 (43.9%) report that these themes were not included at all in their curriculum.

Fig. 1. Participation rates by Universities.



Tab. I. Characteristics of the respondent residents.

Gender	#	%
Male	122	33.1
Female	247	66.9
<b>Year of course</b>		
I year	63	17.1
II year	74	20.0
III year	96	26.0
IV year	73	19.8
V year	63	17.1
<b>Frontal teaching in building hygiene</b>		
In a specific course	106	28.7
Some lessons within a broader course	101	27.4
None	162	43.9
<b>Internship in building hygiene</b>		
I did an internship	82	22.2
No yet, but I will	70	19.0
I will not do an internship	217	58.8
<b>Interest toward building hygiene</b>		
Much	281	76.1
Little	83	22.5
None	5	1.4
Total	369	100.0

In terms of internship, only 152 residents (41,2%) report they did or will do an internship in this field during the post-graduated school, while 217 (58.8%) think they will never do that.

Table II summarizes the theoretical and practical curriculum of residents. 126 residents (34.1%) will never receive any kind of training in building hygiene.

Table III shows the percentage of correct answers provided for each question by the 369 responders. The lowest percentages of correct answers are those regarding the questions on normative topics, while health risks related to housing seem to be better known. The average proportion of correct answers is 3.78/5 (75.6%).

Considering that 82/369 (22.2%) residents have already had an internship in "Building Hygiene", using Chi-squared, the proportion of correct answers were compared with those of residents that had not followed any kind of training (lessons or internships) on this topic before the survey (141 residents), and this to verify if there were differences between the two groups.

Table IV shows the percentages of correct answers per each question in both groups; the overall proportions of

correct answers are significantly different (78,2% vs. 71,3%;  $p = 0.010$ ); more in depth, the significant differences regard overcrowding (97,6% vs. 87,2%;  $p = 0.007$ ) and housing regulation (75,6% vs. 62,4%;  $p = 0.042$ ).

## Discussion

The nation-wide response is relatively good (52.4%), but it is not possible to affirm that this research provides a reliable result for all schools, due to the wide heterogeneity in schools coverage. In fact, response rate was very inhomogeneous, and in some universities the answer rate was really low (Fig. 1).

43.9% of respondent residents are not provided with classes on building hygiene and indoor health, both *ad hoc* or within a wider course (e.g. environmental health). We also observed that only 82 residents (22%) attended an internship and, among the remaining 288, only 70 will attend it in the future. These two data are quite worrying, because on a national scale almost 58.8% of the residents are not gaining any practical experience in building hy-

Tab. II. Curriculum in building hygiene reported by residents.

	Internship in building hygiene			
	Never	Yes, but not yet	Yes, already done	Total
Frontal teaching of building hygiene				
Yes, with a specific course	35	30	41	106
Yes, some lessons in a broader course	56	25	20	101
None	126	15	21	162
Total	217	70	82	369

Tab. III. Correct answers to questions about residents' knowledge.

Questions	Total	
	N.	%
1. Minimal surface requirement prescribed in Italian laws for habitable rooms	188	50.9
2. Which infection is related to overcrowding	342	92.7
3. What factors are related to indoor dampness	352	95.4
4. Requirement prescribed in Italian laws about natural lighting in habitable rooms	261	70.7
5. What are housing regulation among those proposed in the question	252	68.3
Total correct answers	1395	75.6

Tab. IV. Correct answers per each question and previous internship in "Building Hygiene".

Questions	Internship (82)		No training (141)		p
	N.	%	N.	%	
1. Minimal surface requirement	40	48,8	66	46,8	0.776
2. Overcrowding	80	97,6	123	87,2	0.007
3. Indoor dampness	77	93,9	134	95,0	0.763
4. Natural lighting	62	75,6	92	65,2	0.106
5. Housing regulation	62	75,6	88	62,4	0.042
Total correct answers	321	78,3	503	71,3	0.010

giene, and almost half of them (34.1% of residents) are not receiving any theoretical grounding in the field. On the other hand, over three quarters of the responders declared to be greatly interested on these topics, underlining their consciousness of the relevance of the themes.

Analysing the answers that dealt with theoretical knowledge, it was determined that the overall proportion of correct answers is 75.6%. It is necessary to underline that questions were very easy, investigating only basic knowledge. Biological aspects are better known than regulatory ones: in particular, respectively 92.7% and 95.4% of the residents identified (a) overcrowding as a risk factor for tuberculosis and (b) that indoor dampness influences both moulds proliferation and temperature perception. Poorer results were obtained in the other questions: 70.7% correctly indicate that natural lighting must be present in a living area, 68.3% identify the Ministerial Decree that deals with health requirements of dwellings, and only 50.9% of respondents are aware of the minimum area prescribed by law for habitable rooms (9 square metres). With regards to overcrowding and housing regulation, the researchers found a significant difference in the number of correct answers between the residents who attended an internship and those who did not, highlighting that a daily application of norms and a hands-on experience help to memorize regulatory frameworks more than just frontal teaching. This is a key point, because regulations for building hygiene are the major instrument for environmental practitioners to guarantee the highest standards in Public Health safeguard. [23-26]. The major limitations affecting the present study are essentially two. Firstly, the respondents included in the study were about half of the entire population, so the results may be not fully representative. Moreover, the low response rate (< 25%) observed in some Schools could be indicative of a selection bias, since respondents with positive personal attitude may have predominantly responded to the survey.

Finally, although all the data used in our study were collected anonymously, a potential residual social desirability bias cannot be ruled out. However, the consistency between results and internship in relation with correct answers lead us to conclude that these possible limitations only marginally affect the results of the study.

Despite the possible limitations, this is the first national study examining knowledge and training needs on built environment and indoor health among medical residents operating in one of the most populated European Country.

## Conclusions

Data highlight the contribution of internship on residents' knowledge, underlining that it should be implemented on a nation-wide scale. This would be a proposal of IAC-WG, alongside with the definition of a core curriculum on building hygiene and indoor health for the post-graduate Schools of Hygiene and Public Health. The IAC-WG is elaborating a training package for residents taking into account the general considera-

tions already expressed by our scientific society in other fields. [27, 28] The learning methods should be mainly non-formal, including problem solving strategies and cooperative learning. Priority ought to be given to:

- the analysis of real or simulated cases;
- participation to the totality of the activities within the Local Health Units (LHU), addressed to the understanding and adoption of operational procedures and regulation;
- raising the knowledge in the field of identification and reading/interpretation of the sources (scientific literature, regulations, guidelines, procedures).

Considering the role of living conditions as a major determinant of health and the current socio-economic situation, the training of Public Health Practitioners will become even more relevant in the coming years. Therefore, researchers reckon that both Ministry of Education and post-graduate Schools of Public Health need to take these issues into account.

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## Author contributions

LC and DD designed the research. FC and CC acquired the data. FC, CC, MG and DD analysed the data. LC, MG, SC and DD interpreted the data. LC and DD drafted the work. MA, CC and SC revised the work.

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