

Does the academic education of Italian teachers working in early childhood education and care include public health? An analysis of Italian university programmes

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ABSTRACT

Background: Early childhood education and care (ECEC) is crucial for children's early awareness of well-being and prevention concepts, which are essential for a future healthy lifestyle. Therefore, as public health agents, teachers and educators in ECEC should be taught core topics related to public health and well-being.

Methods: We investigated the presence and characteristics of public health courses (MEDS-24/B) in Italian primary education sciences Master's programmes in the academic year 2023-24 and propose a model for public health topics to be covered, based on the WHO Essential Public Health Functions.

Results: Only a small proportion of the Master's programmes in primary education sciences (n.14/38; 38%) included the course 'General and applied hygiene' (MEDS-24/B). We found no statistically significant differences in attendance according to any of the variables analysed (i.e. geographical location of the university, size, or public/private status of the university). While topics like "infectious disease prevention and immunization" were covered in >75%, others like "oral hygiene" were not covered at all. Detailed analysis showed great heterogeneity at national level in the topics covered between primary education sciences Master's programmes.

Discussion: The current suboptimal presence and coherence of the public health course within the Master's degree in primary education sciences at national level affects the competencies of ECEC educators and teachers,



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which in turn affects their ability to implement health promotion, disease prevention, and control measures in primary education and the wider community. At national level, more attention should be paid to the academic education of all public health agents.

Key words: public health, early childhood education and care, education, teachers, university.

Background

Health education is important from the earliest years of life as children learn behaviours and lifestyles that will stay with them throughout their lives. This period is crucial for the development of an early awareness of the concepts of well-being and prevention, which are essential for a healthy lifestyle (1). For this reason, the World Health Organization (WHO) launched the Global School Health Initiative in 1995, which aims to improve the health of students, school staff, families and other members of the community through schools. In 2021 the WHO published the document “Making every school a health-promoting school: Implementation guidance”, which underlined the need to design initial teacher education and in-service training to meet health-promoting school curricula and associated standards (2). The health promoting school environment and associated health promotion projects are important in educating children to lead healthy lifestyles (3) and the outcomes of these projects are closely linked to the training of teachers in public health issues (4). In Italy, early childhood education and care (ECEC) is organised in the ‘integrated system 0-6’ introduced by national law 107/2015 and regulated by D.Lgs 65/2017. The integrated system is part of the education system and is divided into two separate levels that accommodate children according to age: 1) the ‘educational services for childhood’ (servizi educativi per l’infanzia), for children aged 0 to 3 years; 2) the ‘childhood school’ (scuola dell’infanzia), for children aged 3 to 6 years (5). Following ECEC, primary education is compulsory and free for all. It lasts five years and welcomes pupils aged from 6 to 11 years. At national level, the initial training of educators and teachers varies according to the level of education at which they will teach.

Educators in institutions for children under the age of three years must have a Bachelor’s degree (ISCED 6) in education sciences specifically for working with children in this age group or a five-year Master’s degree in primary education sciences (ISCED 7) supplemented by a specialisation course in the education of children under the age of three (D.Lgs 65/2017). Teachers in ECEC (ages 3-6) and in primary schools must obtain a Master degree (ISCED 7) after completing a special five-year, one-cycle study programme in primary education sciences. The study programme includes qualifying internships activities from the second year of the study programme (DM 249/2010) (6). The latter decree also specifies the core knowledge and competences that students must acquire as part of the degree programme, including topics related to public health: General and Applied Hygiene, MEDS-24/B (formerly MED/42). Our aim was to investigate the presence and characteristics of public health courses in primary education university sciences Master’s programmes in Italy, in particular: i) to investigate how many programmes include public health courses (MEDS-24/B); ii) to analyse the characteristics of MEDS-24/B training programmes. A second aim was to propose a model for public health topics to be covered in a Master’s programme in primary education sciences.

Methods

Data collection

Between March and May 2024, the official websites of the Italian Ministry of University and Research (MUR) (7) were used to identify the Italian universities offering the Master’s degree in primary education sciences in the academic year 2023-24. All

timetables were analysed to find out where courses in Public Health (PH; i.e., general and applied hygiene - MEDS-24/B) were offered. The characteristics of these courses were also looked up on each university's website, including semester, teaching hours, number of students enrolled, geographical area according to the Italian National Institute of Statistics (north-east, north-west, center, south and islands), private/public classification of the university. The classification by dimension of universities used is based on the total number of students enrolled. Additional information was collected for each university, including the size of the university according to the MUR classification (mega -over 40,000 students, big-between 20,000 and 40,000 students, medium -between 10,000 and 20,000 students-, little -under 10,000 students), the number of students enrolled in the first year of Master of primary education sciences in 2023-24, and the public health course syllabus. Where information was missing, universities were contacted by email to fill in the gaps. The PH syllabuses were analysed and the topics included were compared with a model of core competencies based on the World Health Organization's (WHO) Essential Public Health Functions (EPHF) (8) adapted for schools by a multi-professional team

including public health professionals, educators and pedagogists. The WHO names twelve EPHFs; the ninth, "Public health workforce development", was not included in our model for ECEC educators and teachers, as the core of this paper focuses on this EPHF. The model developed includes a total of 22 chapters and 52 topics, with some redundancies as the same chapter or topic may be relevant to more than one EPHF. The model, which includes the EPHF reference, the chapters and the topics are shown in Table 1. Patients were not involved in the development of the model.

Data analysis

The general data on the courses were collected in a database. Syllabuses were analysed independently by two researchers after a pilot phase to setup the comparison method. Any discrepancy in the data collected was then discussed between the two and with a third PH expert until a consensus was reached. The syllabuses were analysed using a qualitative research method, in which words and phrases were coded for each chapter and topic of the model. To measure agreement between the two researchers, Cohen's Kappa was calculated. Considering that the syllabus for the 'General and applied

Table 1. The model with EPHF reference, chapters and topics for Master's students in primary education sciences.

Essential Public Health Functions Who	Ephf Description	Chapters	Topics
EPHF 1: Public health surveillance and monitoring	Monitoring and surveillance of population health status, risk, protective and promotive factors, threats to health, and health system performance and service utilization	Epidemiology (1)	Basics and health statistics
			Health status monitoring and surveillance systems
			Italian NHS working principles
		Health education	Risky behaviours: <ul style="list-style-type: none"> • smoking • substance abuse (alcohol) • sexual behaviours • cyberbullying • sedentary lifestyle
			Demographic, social and health indicators
		Food and Nutrition Hygiene	Food needs
			Healthy diet
			Types and functions of nutrients
	Malnutrition and obesity		

Table 1 (Continued)

Essential Public Health Functions Who	Ephf Description	Chapters	Topics		
EPHF 2: Public health emergency management	Managing public health emergencies for international and national health security	Prevention	The infection cycle, reservoir, cluster, epidemic, pandemic		
		First Aid	Cardiopulmonary resuscitation (CPR)		
			Unblocking maneuvers		
			Life-saving medications at school		
			Toxicology (dangerous plants and other dangerous substances of common use)		
EPHF 3: Public health stewardship	Establishing effective public health institutional structures, leadership, coordination, accountability, regulations and laws	Italian NHS	Principles, organization and management of Regional and National Health Services programs		
EPHF 4: Multisectoral planning, financing and management for public health	Supporting effective and efficient health systems and multisectoral planning, financing and management for public health	Healthcare planning and Sustainable Development Goals	WHO, SDGs and indicators, NHS financing system		
			Healthcare planning, analysis of a health promotion program		
EPHF 5: Health protection	Protecting populations against health threats, for example environmental and occupational hazards and communicable and noncommunicable diseases, including mental health conditions, food insecurity, and chemical and radiation hazards	Principles of Public Health	Definition of health		
			Health determinants		
			Burden of disease (NCDs CDs, injuries) and worldwide disease distribution		
		Major Emergencies in Public Health	Risks and response plans for major emergencies (i.e. natural disaster)		
		Environmental health	Environment and risk sources: air		
			Environment and risk sources: water		
			Waterborne diseases, hygiene requirements for swimming pools		
			Outdoor pollution		
					Indoor pollution (i.e. microclimate, thermal comfort)
		Food and nutrition hygiene	Food safety and food security		
Sustainability	Potabilization of water, wastewater treatment, air treatment				
	Sustainability, recycling, proper use of resources				
EPHF 6: Disease prevention and early detection	Prevention and early detection of communicable and noncommunicable diseases, including mental health conditions and injuries	Prevention	Definition of prevention		
			Primary, secondary, and tertiary prevention		
			Infectious disease prevention and immunization		

Essential Public Health Functions Who	Ephf Description	Chapters	Topics
			Italian national prevention plan, Italian national vaccine prevention plan
			Non-infectious diseases of developmental age (spinal deviation, vision defects, posture, mental health, caries)
			Prevention of infectious diseases (bacterial, viral, parasitic)
			Screening function and screening programmes (including screening for neonatal and rare diseases)
		Personal hygiene	Hand hygiene
			Baby hygiene and bathroom management
			Oral hygiene
		Biological risk and disinfection basics	Cleaning of surfaces contaminated by biological fluids (i.e. blood, urine, faeces)
		Food and nutrition hygiene	School catering and HACCP system
			Food safety: labelling, expiration dates, warnings, allergens
			Pasteurization, sterilization and other food preservation techniques
			Food-borne diseases and food poisoning
		Health need assessment	The importance of teachers in identifying health needs, empowering families and directing them towards appropriate services
EPHF 7: Health promotion	Promoting health and well-being as well as actions to address the wider determinants of health and inequity	Health promotion (1)	Prevention of non-communicable diseases (overweight/obesity, smoking, sedentary lifestyle)
			Promoting healthy lifestyles in childhood: nutrition
			Promoting healthy lifestyles in childhood: physical activity
			Promoting healthy lifestyles in childhood: oral hygiene
			WHO Programme: Health Promoting Schools
			Guidelines for health promotion interventions
EPHF 8: Community engagement and social participation	Strengthening community engagement, participation and social mobilization for health and well-being	Health promotion (2)	The school as an advocate of healthy lifestyle promotion; school relationship with the community
EPHF 9: Public health workforce development	Developing and maintaining an adequate and competent public health workforce	//	//

Table 1 (Continued)

Essential Public Health Functions Who	Ephf Description	Chapters	Topics
EPHF 10: Health service quality and equity	Improving appropriateness, quality and equity in provision of and access to health services	Quality and accreditation	Equity and equality
			Accreditation and quality systems in healthcare
			Health literacy
EPHF 11: Public health research, evaluation and knowledge	Advancing public health research and knowledge development	Epidemiology (2)	Hierarchy of evidences and research methodology in medicine
EPHF 12: Access to and utilization of health products, supplies, equipment and technologies	Promoting equitable access to and rational use of safe, effective and quality-assured health products, supplies, equipment and technologies	Pharmacological safety	Medication and vaccine safety development and monitoring process, medication side effects, understanding the leaflet

hygiene' course was only available for 12 out of 14 universities, the comparison with the model was conducted using the 12 available programmes. The frequencies of the presence of chapters and topics of the model in the university programmes were analysed as binary variables. The chapter was considered to be included in the programme if at least one of its topics was present in the syllabus. Considering the small number of universities included in the study, we considered 20,000 students as the cut-off point between the two categories, large and small. The Chi-square independence test or Fischer's exact test were used to examine association between the presence of the PH course and the characteristics (public or private; geographical location - northeast, northwest, centre, south, island; size) of the university. The data analyses were performed using the JASP software (version 0.19.3) [JASP Team. 2024 url <https://jasp-stats.org/>, accessed on 7 February 2025.] A p-value of 0.05 was used as statistical significance threshold.

Results

Presence of public health in the Italian Master's degree programmes in primary education sciences

In Italy there are 61 public universities, 20 private recognized universities and eight university institutes with a special regime (i.e., private not recognized,

special institutes) recognized by the Italian Ministry of University and Research (MUR). Of these, 37 universities (29 public and eight private) offer a Master's degree programme primary education sciences, with a total of 10,264 students enrolled in the first year in the 2023-2024 academic year. Of these, 14 (38%) offer the course '*General and applied hygiene*' with a total number of hours ranging between a minimum of 28 and a maximum of 32. These universities are: Università degli Studi di Roma 'La Sapienza', Libera Università degli Studi 'Maria SS, Assunta'- LUMSA, Link Campus University di Roma, Università degli Studi del Molise-Campobasso, Università degli Studi del Salento-Lecce, Università degli Studi di Bari 'Aldo Moro', Università degli Studi di Cagliari, Università degli Studi di Cassino e del Lazio Meridionale, Università degli Studi di Genova, Università degli Studi di Modena e Reggio Emilia, Università degli Studi di Pisa, Università degli Studi di Salerno, Università degli Studi di Udine, and Università degli Studi di Urbino 'Carlo Bo'. In total, therefore, 3,242 (32%) of the students enrolled in the first year of study in the 2023-2024 academic year had access to public health teaching during the five years of their studies. The characteristics of the universities offering the '*General and applied hygiene*' (MEDS-24/B) course as part of the Master's degree in primary education sciences program are shown in Table 2. There were no statistically significant differences in the distribution of universities offering a '*General and applied hygiene*' (MEDS-24/B) course as part of the Master's

Table 2. Characteristics of universities offering a ‘General and applied hygiene’ (MEDS-24/B) course as part of the Master’s programme in primary education sciences.

University				Master’s programme in primary education sciences		
University code	Geographic area	Private/ Public	Size	Number of students enrolled in 2023-2024	MEDS-24/B course year	MEDS-24/B teaching hours
U1	Center	Public	large	90	5	32
U2	Northeast	Public	small	200	1	28
U3	Northwest	Public	large	150	2	24
U4	Center	Public	small	340	2	24
U5	South	Public	large	227	2	30
U6	Center	Public	small	118	2	n.a.
U7	South	Public	small	143	5	24
U8	Northeast	Public	large	245	5	28
U9	Center	Public	mega	90	5	28
U10	South	Public	large	460	1	24
U11	South	Public	small	314	4	24
U12	Center	Private	small	300	2	30
U13	Center	Private	small	440	5	n.a.
U14	Island	Public	large	125	5	30

Abbreviations: n.a.: not available

degree primary education sciences programme, neither by geographical area (p-value 0.59), nor by public or private university category (p-value 0.40), nor by university size (p=0.71).

Syllabus analysis

All analysed syllabuses (i.e. 12 universities) contained the chapters Principles of public health and Prevention. Eleven (92%) universities included the Health promotion chapter, 10 (83%) included the Epidemiology chapter, nine (75%) included the Food and Nutrition Hygiene chapter and seven (58%) included the Environmental Health chapter. These most frequently included chapters are part of EPHF chapters 1, 2, 5, 6 and 7. The chapters Sustainability, Health Need Assessment, Major Emergencies in Public Health and Pharmacological safety were absent from all syllabuses. The remaining six chapters were included with a frequency of two (17%) to four (33%). The most frequently represented topics ($\geq 75\%$) were Infectious disease prevention and immunization, Prevention of

infectious diseases and Definition of health. The following topics were covered in at least half of the syllabuses: the infection cycle, reservoir, cluster, epidemic, pandemic (67%); Health determinants (67%); healthy diet (58%); Promoting healthy lifestyles in childhood: nutrition (58%); malnutrition and obesity (50%); Primary, secondary, and tertiary prevention (50%); Prevention of non-communicable diseases (50%). A total of 20 topics were not covered in any syllabus. The responses of the syllabuses analysed, considering all chapters of the model, are shown in Table 3. The most represented and neglected topics in the syllabuses of the ‘General and applied hygiene’ (MEDS-24/B) course within in the Master’s degree programme in primary education sciences are shown in Table 4. The full results on the syllabuses responses to the chapters and topics of the model can be found in the supplementary material. Cohen’s kappa coefficient was 0.732, showing good inter-rater reliability between the two researchers comparing the developed model and the Italian 2023-24 syllabuses of the ‘General and applied hygiene’ (MEDS-24/B) course within the Master’s degree in

Table 3. Responses to the model of the analysed syllabuses of the 'General and applied hygiene' (MEDS-24/B) course within the Master's degree in primary education sciences, considering the chapter level.

EPHF	Chapter	University code*										Total yes N (%)			
		U1	U2	U3	U4	U5	U6	U7	U8	U9	U10		U11	U12	
1	Epidemiology (1)	/	yes	yes	yes	yes	yes	/	yes	yes	/	yes	yes	yes	9 (75)
	Health education	yes	/	yes	yes	yes	yes	yes	yes	yes	/	yes	yes	yes	10 (83)
	Food and Nutrition Hygiene	/	yes	/	yes	yes	yes	yes	/	yes	yes	/	yes	yes	8 (67)
2	Prevention	/	/	/	yes	yes	yes	yes	yes	/	yes	yes	yes	yes	8 (67)
	First Aid	/	yes	yes	/	/	/	/	/	yes	/	/	yes	yes	4 (33)
	Italian NHS	/	yes	/	yes	/	/	/	/	/	/	/	/	/	2 (17)
4	Healthcare planning and Sustainable Development Goals	/	yes	/	/	/	/	/	/	/	/	yes	/	/	2 (17)
	Principles of Public Health	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	12 (100)
	Major Emergencies in Public Health	/	/	/	/	/	/	/	/	/	/	/	/	/	0 (0)
6	Environmental health	/	yes	yes	yes	yes	yes	/	yes	yes	/	yes	/	yes	7 (58)
	Food and Nutrition Hygiene	/	yes	/	yes	/	yes	/	/	/	/	/	/	/	3 (25)
	Sustainability	/	/	/	/	/	/	/	/	/	/	/	/	/	0 (0)
	Prevention	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	12 (100)
	Personal hygiene	/	/	/	/	/	/	/	/	/	/	/	/	/	2 (17)
	Biological risk and disinfection basics	/	/	/	/	yes	yes	/	/	/	yes	/	/	/	3 (25)
	Food and Nutrition Hygiene	/	yes	/	yes	yes	yes	yes	yes	/	yes	/	/	/	6 (50)
	Health need assessment	/	/	/	/	/	/	/	/	/	/	/	/	/	0 (0)
	Health promotion (1)	yes	yes	yes	yes	yes	yes	yes	yes	yes	/	yes	yes	yes	11 (92)
	Health promotion (2)	/	yes	/	yes	/	/	/	/	/	/	/	yes	/	3 (25)
	Quality and accreditation	/	yes	/	yes	/	/	/	/	/	/	/	yes	/	3 (25)
	Epidemiology (2)	yes	/	/	/	/	/	/	yes	/	/	/	/	/	2 (17)
Pharmacological safety	/	/	/	/	/	/	/	/	/	/	/	/	/	0 (0)	
Tot Chapters; N, yes (%)	4 (33)	10 (83)	7 (58)	8 (67)	7 (58)	7 (58)	4 (33)	6 (50)	7 (58)	4 (33)	7 (58)	7 (58)	7 (58)		

*U1-12 codes do not correspond directly to the universities listed in the methods section

primary education sciences. There were no statistically significant differences among the syllabuses of Master's degrees in primary education sciences analyzed in detail.

Discussion

This study assessed the presence of a public health course in the Italian Master's programme in primary education sciences and analyses in depth their syllabuses in comparison with a model adapted for ECEC educators and teachers, based on the WHO EPHF. We found that only a small proportion of the Master's programmes in primary education sciences (38%) included the course '*General and applied hygiene*' (MEDS-24/B), although it is recommended by the national regulation (DM 249/2010). We found no differences in the attendance according to any of the variables analysed (i.e. geographical location of the university, size, public/private nature of the university). The detailed analysis of all available syllabuses showed that, although there is a fairly good consistency among the chapters taught in university programmes, there is considerable heterogeneity at the national level in the topics covered by primary education sciences Master's programmes, with no differences according to the variables considered (i.e. geographical area, public or private university category, university size). To our knowledge, this is the first attempt to adapt WHO Essential Public Health Functions for the professional category of educators and teachers in ECEC, while this has already been done, for example, for public health officers, primary health care professionals (9), nurses (10) and veterinarians (11), or for more specific fields such as infection prevention and control professionals (12). Although the decision to start with the health professions is a sensible one, given the profound interconnectedness of the Sustainable Development Goals (13) and the role that each profession can play within the one health perspective, further efforts are needed to cover other important professional roles in society. Early childhood educators and teachers are considered public health agents working within the wider public health workforce (14). Therefore, academic programmes for ECEC educators and teachers are among the first that

need to be promptly addressed, as they have the potential to shape the society of tomorrow by teaching and leading by example to the youngest generations, as already reported by many authors (14–16). In recent decades, childhood obesity and overweight have increased dramatically (17). According to the Italian national surveillance system "*OKkio alla Salute*" collecting information on height and weight of children in primary school, their eating habits, physical activity, sedentary behavior and the school initiatives and based on the Childhood Obesity Surveillance Initiative coordinated by WHO, information on revealed that the percentage of overweight children aged 8–9 years in Italy in 2023 was 19% and the percentage of children with obesity was 9.8%. Indeed, 45% of children spent more than two hours a day watching TV or using other technological devices (18,19). These are certainly some of the issues that could greatly benefit from a close collaboration between families, educators and teachers. At national level, despite a national decree recommending universities to include a course on public health in the Master's programme in primary education sciences, there is still much room for improvement. It is possible that, as public health competes for the same teaching hours as two other disciplines (IUS/09 Public Law Institutions and IUS/19 Administrative Law), universities did not always choose to include the public health course. This issue, together with the inclusion of the public health course among the characterising subjects rather than the basic teaching subjects, poses a problem. Nonetheless, universities may face resource constraints or lack of a qualified instructors to provide the public health course, as well as, administrative issues in acquiring lecturers when a MEDS-24/B researcher or professor is not available to be scheduled. Last but not least, the perceived importance of including public health within the Master's programme in primary education sciences cannot be taken for granted. Looking at the year in which the subject is taught, it is clear that there is a lack of agreement on the necessary propaedeutic sequence. In terms of chapters covered in the programme, coverage ranges from 33% to 83% (4–10 chapters), with most universities covering about half of these. Almost all syllabuses include the general principles of public health, prevention and health promotion, confirming that these topics are generally

Table 4. Most represented and neglected topics in the syllabuses of the ‘*General and applied hygiene*’ (MEDS-24/B) in the Italian Master’s degree in primary education sciences.

Most represented topics (>=50% of syllabuses)	N (%) (tot 12)
Infectious disease prevention and immunization	11 (92)
Prevention of infectious diseases (bacterial, viral, parasitic)	11 (92)
Definition of health	9 (75)
The infection cycle, reservoir, cluster, epidemic, pandemic	8 (67)
Health determinants	8 (67)
Healthy diet	7 (58)
Promoting healthy lifestyles in childhood: nutrition	7 (58)
Malnutrition and obesity	6 (50)
Non-infectious diseases of developmental age (spinal deviation, vision defects, posture, mental health, caries)	6 (50)
Primary, secondary, and tertiary prevention	6 (50)
Neglected topics (0% of syllabuses)	
Toxicology (dangerous plants and other dangerous substances of common use)	
Burden of disease (NCDs, CDs, injuries) and worldwide disease distribution	
Risky behaviours: cyberbullying	
Principles, organization and management of Regional and National Health Services programs	
Medication and vaccine safety development and monitoring process, medication side effects, understanding the leaflet	
Cleaning of surfaces contaminated by biological fluids (i.e. blood, urine, faeces)	
Oral hygiene	
Hand hygiene	
The importance of teachers in identifying health needs, empowering families and directing them towards appropriate services	
Unblocking maneuvers	
Non-infectious diseases of developmental age: mental health	
medication side effects, understanding the leaflet	
WHO Programme: Health Promoting Schools	
Promoting healthy lifestyles in childhood: oral hygiene	
Cardiopulmonary resuscitation (CPR)	
Risks and response plans for major emergencies (i.e. natural disaster)	
Sustainability, recycling, proper use of resources	
Potabilization of water, wastewater treatment, air treatment	
WHO, SDGs and indicators, National Health System financing system	
Waterborne diseases, hygiene requirements for swimming pools	

considered to be the most important. In contrast, topics such as food safety and security, epidemiology and environmental health are less consistently covered in syllabuses across the country, suggesting that they tend to be considered less important. In addition, some topics have been completely neglected in the syllabuses:

although some could be considered as not necessarily belonging to the public health domain (i.e., pharmacological safety), we believe that other topics should not be overlooked, such as oral health, hand hygiene, mental health, major emergencies management, risk behaviours related to the Internet – cyberbullying – in

light of the recent data from child and adolescent health surveillance systems devices (19). For some other topics, the discussion remains open because first aid, toxicology and CPR are certainly useful for ECEC professionals, as notions and also as skills, but those topics would be probably better taught in a specific first aid training. The observed heterogeneity may be due to several factors, one of which is the research or interest profile of the individual researcher or professor teaching public health at different universities. In fact, public health covers a wide range of topics, from epidemiology to health promotion and disease prevention, as well as health services organisation. All in all, these observations highlight the missed opportunity to provide a consistent body of public health knowledge to the ECEC educators and teachers across Italy. This is a problem in many ways. ECEC educators and teachers who are not aware of the public health dimension may not be able to implement and even teach infection prevention and control measures to children, contributing to the spread of infectious diseases within the classroom and community. Furthermore, if they are unaware of the principles of prevention and health promotion, they are unable to teach basic health skills and even adhere to or implement effective programmes that will help the future generation to eat, play and live healthier and more sustainably. The consistent inclusion of public health courses and their chapters based on EPHF in the academic education of ECEC educator and teachers, on the other hand, would help to 1) inform and align didactic plans and programmes for children, guaranteeing scientific and standardized approaches with parents and their involvement; 2) manage all aspects related to health promotion, disease prevention and control more efficiently and competently; 3) improve the interaction between school and health professionals. We therefore call on our national policy to address the way educators and teachers in the field of childhood care and education should be trained on public health topics with more effective measures. Moreover, based on the chapter and topics included in the proposed model, we believe that the discussion on the development of core public health competencies for teachers and educators in ECEC should be taken further, also using the WHO-ASPHER Competency Framework for the Public Health Workforce in the

European Region, published in 2020, as a reference (20). We also think that including public health and its topics should be reinforced and possibly included as compulsory in the Master's degree in primary education sciences.

Limitations

This study has several limitations that must be considered when interpreting the results. Firstly, the small number of universities offering the public health course surely limited the statistical power of the study and, consequently, power for subgroup analyses. Secondly, the university websites were not always easy to navigate and syllabuses were not easily accessible. Thirdly, university course syllabuses varied widely in their descriptions: some were brief or not very detailed, while others were more detailed. These differences may be real (more or less detailed lessons) or not (detailed lessons but synthesized syllabuses). Guidelines for the creation of syllabuses could be useful to make them more comparable. A broader discussion with public health professionals, teachers and parents would be worthwhile to further explore specific topics that need to be taught to teachers. This discussion would be better conducted through a comprehensive survey or Delphi consensus process. Moreover, the coding and analysis of the syllabuses are the result of a qualitative analysis, that is subject to possible observation biases. Nonetheless, the pool of universities analysed, although limited in number, can be considered representative of the Italian context, as it includes universities of all sizes, from all geographical locations, both private and public, and covers 86% of Italian universities offering the public health course within the Master's degree in primary education sciences. Finally, we did not collect students' perspectives on the inclusion or quality of the public health course, or on the topics taught, which could be explored in future complementary research.

Conclusions

This study has shown that the actual presence of the public health course and the coherence of the public health course programme within the Master's

degree in primary education sciences are suboptimal at national level. This affects the competencies of ECEC educators and teachers, which in turn affects their ability to implement health promotion, disease prevention and control measures in primary education and in the entire community. At national level, more attention should be paid to the academic education of all public health agents acting in the wider public health workforce.

Availability of Data and Materials: The dataset supporting the conclusions of this article is included within the article and its additional file.

Competing Interests: FR, LB were lecturers at the University of Udine (Italy) for the public health course in past years. SB gave personal consulting on hand drying techniques for European Tissue Symposium. The other authors declare that they have no competing interests.

Authors' Contribution: BL, OGBV, LA, SB and FZ designed the research; OGBV and FB collected data; LB, OGBV, FB, FR, LA, SB and FZ discussed investigation methodology and contributed to result interpretation; MD, OGBV and BF performed data analysis; LB and SB supervised the study conduction; OGBV, BF and LB wrote the original draft; all authors revised the paper and agreed with the final version of the manuscript.

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