Biomedicine & Prevention
An Open Access Transdisciplinary Journal

Biomedicine and Prevention: a Public Health perspective

Sandro Mancinelli, Giuseppe Liotta, Leonardo Emberti Gialloreti

From the University of Rome "Tor Vergata", Division of General and Applied Hygiene, Department of Biomedicine and Prevention, Italy

The twentieth century has been characterized by virulent debates about the causal role of environmental vs. genetic determinants of diseases. At times, these diatribes turned more into ideological rather than scientific face-offs. However, today we are more aware that the large majority – if not all – disease processes, as well as human differences, are determined by both genetics and environment.

Conventionally, public health has focused its attention on the environmental determinants of health or disease. Although this emphasis is still valid, a novel understanding about the relationships between environment, genetic variability, and diseases is opening new horizons to public health practitioners, in terms of both disease management and prevention. Correspondingly, public health makers will increasingly need to acquire a basic understanding of advances in genomic sciences, so to be able to use them within public health practice. Public health needs to progress in the research of the connections between environmental agents and genetic factors involved in the causality and pathogenesis of diseases.

Hence, public health faces now challenges that might be seen as threatening the way it traditionally functions, but can also be seen as offering new chances and prospects. For sure, the makers of public health policy face enormous changes, as in these first decades of the 21st century public health has expanded into a much broader ground than before.

As a matter of fact, public health can be considered today a "fault line" discipline, acting, for example, between health and social research, between transmissible and non-transmissible diseases, between human cells and microbiota, between human and animal diseases, and of course, between environment and genetics.

Also epidemiology is today rethinking its classical approach to health and diseases, taking into account several aspects related to the new scenarios arisen in public health. Epidemiological training, terminology, and study designs have increasingly to consider innovative methodologies, which make use of newly developed biomedical informatics, so to integrate clinical, environmental and genetic data. For example, procedures utilizing biomarkers, biobanks, or integrated databases present with serious challenges in isolating useful information and knowledge for public health and/or biomedical research.

The new era of public health that is arising is beginning to integrate the continuous scientific advances into implementable health protection and health promotion policies. This happens in a time in which also a personalized healthcare has to be taken into account, even though the basis of public health is and will continue to be population focused.

The many accomplishments of public health are undeniable, yet public health practitioners will face in the next years first-time challenges and prospects. These challenges become plain when looking at current and future trends of the population's health, like, among others, transformations in health care delivery systems, population ageing and its ensuing changing needs, movement of peoples that are leading to changes in ethnic composition patterns, upsurge in information technologies, climate change, food safety, motor vehicle safety, disaster and emergency readiness, health disparities, emerging infections and antibiotic resistance, inter-professional cooperation. It is crucial that public health researchers and practitioners, as well as policy makers, consider these trends and their implications when they plan and select forthcoming and long-term strategies and policies to prevent diseases and to promote health. The challenge of developing evidence-based public health is substantial as well. Epidemiological monitoring of outcomes should become routine, so to make risks of failure clearer and to inform evidence based future decisions.

Frailty is a good example of this public health approach that has roots in the old doctrine of social and health determinants of health and, at the same time, must face the new challenges of the population ageing in developed as well as in developing countries. In the time of exasperated specialization of medical care, ageing and frailty put the spotlight the need to think multidisciplinary intervention to face multidimensional model of morbidities through a holistic approach. To control the burden of disease, and the correlated increase of health care cost, the number of healthy life years must be increased at both individual and population level. The big determinants of diseases, like malnutrition, lack of physical activity, smoking, drinking alcohol, must be enriched by including "frailty". Social isolation, lack of economic resources, multi-morbidity and functional decline are elements that act synergistically, fueling a vicious circle that can have dramatic outcomes. However, it is possible to prevent or mitigate frailty integrating social and health care, specialist intervention with a comprehensive personalized plan of care, community primary care with secondary care. There is a need to think out-of-the boxes, in order to refine the approach to care in the age in which quality of life has substituted the cure as main goal of health care.

As it has been pointed out in the editorial, prevention and medical care are linked to one another more and more. The assessment of frailty could become a model to evaluate the need of care in terms of urgency (a severely frail individual needs urgent intervention driven by an individual care plan managed by a case

manager) and/or the kind of care (a prevention program aimed to reduce the number of falls could be addressed to frail individuals. Expanding health promotion and citizens' empowerment about the issue of frailty could build up a new awareness among the aging population, setting in motion an economic mechanism with a central request for assistance supported by collaborations between public and private entities, including volunteers as well as the insurance companies. Particularly, the community care nurses could become the principal actors of this revolution, channeling evaluation, health promotion, monitoring and individualized care plans setting and their implementation at community level.

Finally, it is quite clear that the area of public health and prevention is primary involved in addressing a huge challenge: the governance of health in the third millennium interdependent global world. From the end of the 20th century, we assisted to world pandemics such as HIV/AIDS and SARS, as well as obesity, depression and diabetes ones. In fact, infectious diseases travel faster than ever before, as well as bad lifestyle behaviors, pollution, toxic substances and unsafe food, drinks and products do; the transfer of health risks changes in nature, direction and impact due to the increased speed, reduced distance and cultural transfer brought about by modern means of transportation and communication as well as the new forms of social and economic dependence and interdependence.

As it concerns public health and prevention, considering the health of the planet inhabitants as a whole, it does not sound farsighted focusing on the choice between individualistic and community approach. Rather, it emerges as a priority to increase the capacity of an actual world health governance, as well as to encourage national stakeholders to cooperate in order to achieve this goal.

This is certainly a complex and hard goal to achieve, partly because it involves a wide range of not medical actors: educators as well opinion leaders, political as well economic actors. In any case, the scientific community can be, and already constitutes, a strategic piece of this mosaic, thanks to its natural tendency to cooperate and thanks to the improved means of scientific interchange; possibly, within the medical community, public health experts are naturally more disposed to play a connection and translational role.

The need of a well-timed translation of the new acquired knowledge and technologies into public health sciences, and therefore in health policies and healthcare, is unquestionable. Journals that deal with public health have necessarily to be multidisciplinary, encompassing a wide range of disciplines**.** We hope this journal will encourage public health workers to recognize the need for a wider interaction with experts of other disciplines, while integrating their knowledge into a global vision aimed at improving population health.