BUNDESÄRZTEKAMMER

Bekanntmachungen

# Position Statement
# "Medical and Scientific Evaluation of Public Health"

The Board of the German Federal Medical Association discussed and approved this statement in its meeting on September 18, 2025, following the recommendation of the Scientific Advisory Board.[1]

## Foreword

The health of a population is a fundamental resource that not only shapes individual well-being, but also contributes significantly to social cohesion, economic performance and the development of society as a whole. Demographic ageing, an increase in chronic diseases, rising prevalence of mental health issues and growing cultural diversity are key factors that pose complex challenges for the public health system in Germany and confront health and social policy decision-making processes with new needs. The consequences of global crises – such as pandemics, geopolitical conflicts and climate change – also highlight the need to focus scientific and political debate on domestic healthcare structures and social resilience systems. At the same time, the discourse on health equity, social participation and equal access to healthcare is becoming more intense and visible. Consequently, there is a growing need to understand health as a multidimensional concept that goes beyond curative care to integrate preventive, population-based and interdisciplinary approaches. In particular, current calls for the implementation of the "Health in All Policies" approach underscore the need to systematically integrate health issues into all policy areas – such as education, environmental and urban development policy – and thus to extend the political focus beyond the traditional understanding of healthcare to decision-making processes affecting society as a whole. For example, strengthening health literacy in schools is an important component: the implementation of health-related content in curricula and the deployment of health professionals in schools can promote long-term health equality and strengthen preventive structures. Due to Germany's federal structure, implementation requires coordinated and cross-state cooperation. In the interests of a constructive solution, physicians should be recognised as important players in the health policy discourse beyond their curative function, as in other areas, and their clinical expertise and practical experience should be structurally integrated into decision-making processes and advisory bodies.

Against this background the German Medical Association has made public health a key focus, which is being addressed by the committee of the same name. The aim is, among other things, to further strengthen the role of the medical profession in this area and to contribute to an overall strategy for public health in Germany. The present medical-scientific evaluation of the current status is to form the basis for further internal medical consultations and discussions with political decision-makers, among others. In accordance with the decision of the Executive Board of the German Medical Association in June 2024, the working group "Medical-Scientific Evaluation of Public Health" established by the Scientific Advisory Board, under the leadership of Prof. Dr. Ute Thyen and the deputy leadership of Prof. Dr. Wilhelm-Bernhard Niebling, has prepared a statement that outlines the medical areas in Germany in which public health is located and highlights aspects of medical education, professional training and continuing medical education as well as the role of physicians in the field of public health. International experience has supported the critical examination of national opportunities and limitations. The analysis, which took the form of a comprehensive evaluation, reflects the expectations of the German medical profession for a sustainable and viable public health system in Germany. We would like to take this opportunity to express our sincere thanks to all those involved for their constructive contributions and discussions, as well as for their voluntary commitment.

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## 1. Evaluation of strengths and weaknesses of public health in Germany

### 1.1. Review

The development of public health in Germany is linked to great personalities such as Rudolf Virchow, Johann Peter Frank, Max von Pettenkofer and Salomon Neumann. As physicians, they were pioneers of key ideas for comprehensive improvements in living conditions aimed at improving people's health. Clean air, clean water, environmental hygiene, healthy living conditions and poverty reduction were key issues that they also brought into politics. This led to significant improvements in the health of the population. Under the Nazi regime from 1933 to 1945, the concept of social hygiene was perverted into racial hygiene and eugenics, and the newly organised public health authorities played a central role in implementing this inhumane ideology [1]. This heavy legacy was to shape public health services, particularly in West Germany, for decades and largely prevent the organised efforts essential for public health to improve the health of the population. Thus, the focus of reconstruction and development of the healthcare system in West Germany was largely in the hands of medical self-governance and on individual curative and rehabilitative medicine. In eastern Germany, on the other hand, a state-organised healthcare system influenced by socialist ideas was established, whose essential components, in line with the social hygiene movement, were prevention, centralised vaccination programmes and health education.

In the 1990s, the focus of public health in Germany broadened to include non-communicable, lifestyle-related diseases and unequal health opportunities, as well as prevention and health promotion ("New Public Health"). The academic, increasingly interdisciplinary[2] engagement with public health was strengthened from 1994 onwards by various initiatives and developments, for example five regional research networks funded by the Federal Ministry of Education and Research (Bundesministerium für Bildung und Forschung – BMBF) [2]. International developments such as the Ottawa Charter for Health Promotion also resonated in Germany, for example in the establishment of health networks and federal state associations for health. Statutory health insurance funds (Gesetzliche Krankenversicherung – GKV) began financing individual primary prevention measures in 1989; since 2015, the Prevention Act has made it possible for the GKV to also fund setting-based prevention, including health promotion measures in day-care centres, schools, companies and care facilities.

Despite positive developments and a large number of stakeholders [3], public health in Germany has not yet reached its potential and does not fully exploit existing opportunities. Health expenditure, which is high by global standards, is not sufficiently reflected in life expectancy, with Germany ranking 18th [4] among OECD countries.

The professional code of conduct for physicians[3] implemented at state level by the individual state medical associations stipulates in section 1 (1) sentence 1: *"Physicians serve the health of the individual and of the population."* In this respect, the medical profession has a duty to contribute to the urgently needed strengthening of public health in Germany.

### 1.2. Public health: core elements of a national public health system

The *WHO-definition of public health* is "Public health is the science and art of preventing disease, prolonging life, and promoting health through the organised efforts of society." [german translation see 5]. In addition to extending life expectancy, quality of life and the best possible health are also goals of public health.

The *core elements of a national public health system* are described in the twelve "Essential Public Health Functions (EPHF)" – a "set of fundamental, interdependent activities, both within and beyond the health sector, that are required to ensure comprehensive delivery of public health" [6]. The design of these functions in a national public health system should achieve three objectives:

(1) improving the health of the population,
(2) equitable access to health services for the entire population and reduction of health inequalities, and
(3) improving health security, particularly in relation to environmental influences and climate change, as well as protection in crises and disasters [7].

These goals are adopted for the present statement. The main objective of the statement is to further strengthen the role of the medical profession in the field of public health and thus contribute to a sound and effective overall strategy for public health in Germany.

The tasks that are particularly relevant to the medical profession are described in individual sections: disease prevention and early detection as well as health promotion (Ch. 2.1.), health protection (Ch. 2.2.), community engagement and social participation with a focus on health communication (Ch. 2.3.), emergency management in the field of public health (Ch. 2.4.), health monitoring and reporting (Ch. 2.5.), human resources development in public health (Ch. 2.6.) and research, evaluation and knowledge in the field of public health (Ch. 2.7.). The other four topics – public health administration; multisectoral planning, financing and management for public health; quality and equity in health care; and access to and use of health products, supplies, equipment and technologies – are mentioned in the various sections where relevant.

### 1.3. Public health service (ÖGD) and public health

In this statement, the terms "public health" and the German translation "Öffentliche Gesundheit" are used synonymously. A distinction is made between this and the term "public health service" (Öffentlicher Gesundheitsdienst – ÖGD). The latter is sometimes referred to as "local public health authority". This equivalence is not applied here. It is true that all tasks performed by the ÖGD in local authorities serve public health, but they fulfil the EPHF [8] only to limited degrees. The ÖGD plays a key but not comprehensive role in public health in Germany. The specific individual tasks of the ÖGD in the municipalities vary based on the respective health service laws of the individual federal states [9]. The ÖGD works in multi-professional teams, usually under medical supervision due to the nature of its (mandatory) tasks [10]. While the mission statement for the ÖGD [11] places particular emphasis on health promotion and prevention, professional associations believe that there is often a lack of sufficient personnel and resources for this.

[2] In this statement, the term interdisciplinary is understood to mean cooperation between different individual scientific disciplines – both within medicine and with other scientific disciplines. The term interprofessional is understood analogously at the level of joint action between different professional groups.

[3] An English translation is available at: https://www.bundesaerztekammer.de/fileadmin/user_upload/_old-files/downloads/pdf-Ordner/MBO/MBO-AE_EN_2018.pdf

## 2. Core tasks of public health – key questions

### 2.1. Health promotion and prevention

#### 2.1.1. Approaches to prevention and health promotion

The objectives of health promotion and medical prevention overlap and are therefore presented together here. Differences in target groups and methods are briefly outlined in the introduction.

*Medical prevention* aims to reduce risk factors and diseases [12]. **Primary medical prevention** includes vaccinations, nutritional supplements containing trace elements or vitamins (e.g. iodine, fluoride, folic acid for pregnant women, vitamin D or K for children) and the regulation of harmful substances. These measures generally benefit both individual patients and the population as a whole. In the area of **secondary prevention**, early detection examinations are offered to identify existing diseases or corresponding risks at an early stage and to offer treatment. In terms of **behavioural prevention**, individual counselling and support can lead to lifestyle changes and a reduction in risk factors (including smoking, unhealthy diet, physical inactivity, alcohol dependence) [13]. Even in people who are already ill, the course of the disease can be positively influenced by behavioural modification **(tertiary prevention**).

**Quaternary prevention** refers to the avoidance of risks and harm, particularly through unnecessary or incorrect medical measures. This is a particular responsibility of the medical profession.

Improving health literacy through information and individual counselling can serve all levels of prevention, i.e. understanding primary prevention measures, implementing risk reduction counselling, and decision-making and adherence to treatment for existing conditions.

*Health promotion* refers to measures that generally serve to maintain and promote health and that appeal to people in their everyday lives (so-called setting approaches in, among other places, day-care centres, schools, businesses, care facilities and neighbourhoods). At the population health level, living environments should be designed in such a way that they promote health [14].

**Structural prevention** promotes changes in ecological, social, economic, material and cultural living conditions in order to reduce or completely avoid health risks. Accordingly, normative and regulatory approaches (e.g. bans on the sale of sweetened drinks in schools, non-smoker protection laws) play an important role in situational prevention, as do economic incentives or sanctions (e.g. taxation of products that are harmful to health). There is great potential in integrating situational prevention and behavioural approaches [15, 16]. During childhood and adolescence, situational prevention should take precedence over behavioural prevention [17, 18].

#### 2.1.2. Prevention and health promotion for children and young people

Early detection examinations for children and adolescents to monitor health and development are widespread in Europe and Anglo-American countries and are widely accepted [19]. While in many other public health systems in Europe, preventive or early detection examinations for children and adolescents are assigned to the public health system and often carried out by multiprofessional teams or academically trained nursing staff, in Germany they have increasingly been transferred to the statutory health insurance system since the post-war years and are carried out by paediatricians or in general practitioners' offices. The ten "U-Checkups" are non-obligatory services offered by health insurance funds to their insured members, they are used extensively by families [20]. The services are predominantly provided by paediatricians in office-based practices who serve as primary care providers for children and adolescents in Germany, and, to a lesser extent, by general practitioners. Closely linked to the implementation of early detection examinations are primary preventive measures such as vaccinations, prophylactic measures such as the administration of fluoride, vitamin D or K, metabolic newborn screening for congenital metabolic disorders, and additions to the programme by specialists in ear, nose and throat medicine (hearing screening), orthopaedics (hip dysplasia), ophthalmology (congenital amblyopia) and dentistry. There is currently no systematic monitoring of results and no systematic quality assurance of the programme. The programme has been continuously expanded to include other physical disorders, particularly congenital disorders, which can now be detected at an early stage thanks to new diagnostic methods, as well as emotional, speech and language and social developmental disorders. Counselling on health promotion, child protection and psychosocial support has also been added to the programme. If further diagnostic and therapeutic care is required, patients are referred to other facilities covered by the Fifth Book of the German Social Code[4] (Sozialgesetzbuch V – SGB V), e.g. specialist child and adolescent outpatient clinics, social paediatric centres, child and adolescent psychiatric practices and outpatient clinics, specialist practices in adult medicine, or recommendations to make use of municipal services (e.g. counselling centres). Institutionalised cooperation with public authorities such as health or youth welfare offices varies greatly and depends, among other things, on contextual factors and personal commitment.

Due to the federal structure, preventive and counselling services for infants and young children provided by the public health service vary in scope and are generally limited, often restricted to socially disadvantaged neighbourhoods or population groups. In some federal states, systematic examinations are carried out in day-care centres [21]; in some municipalities/districts, examinations are limited to school entrance examinations. They serve both to advise families on school attendance and to advise schools on the support needs of future pupils. They are therefore also a source of population-based medical data on child health [22], although the quality of data collection and data must be further harmonised and standardised in the interests of systematic evaluability. With a view to establishing cohorts that are as long-term as possible, it is regrettable that examinations of pupils in Year 4 or Year 9 are no longer planned in any federal state. Such examinations would be particularly useful in the school setting, where vaccination and health status could be checked, not least because less than half of all insured children undergo the early detection examination at the age of 12–14 covered by statutory health insurance. Children and young people from educationally disadvantaged households in particular could benefit from these examinations in a school setting, because further referral to municipal systems, e.g. integration or youth welfare services, or, in the case of 15-year-olds, to the counselling centres of the employment offices, would be straightforward. Coordination across various Books of the German Social Code can, on the one hand, contribute individually to improving equal opportunities for education and healthy

[4] The Fifth Book of the German Social Code (Sozialgesetzbuch V – SGB V) governs the statutory health insurance system in Germany.


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development and, on the other hand, support institutions in realising their potential for greater equality of opportunity within their structures and processes [23].

In the field of child and adolescent medicine, the integration of information from general practitioners with that from municipal health services or social welfare services plays a particularly important role in improving participation (early intervention, rehabilitation, inclusion assistance) or in the field of education when granting benefits under the Ninth Book of the German Social Code[5] (SGB IX). Improvements are needed here to enable health-related and psychosocial data to be shared, with the necessary transparency and with the consent of the young people or their legal guardians.

The participation of office-based paediatricians in municipal early intervention networks or cooperation groups for child protection/violence prevention is largely voluntary; reliable and regular participation from registered practices is often not possible [24]. Incentives are provided by the interprofessional medical quality circles established in some of the states' chambers of physicians [25], which enable sustainable interprofessional work with early intervention specialists [26].

The "Expert Council on Health and Resilience" of the Federal Government of Germany has published ten recommendations for action focusing on health monitoring, the intertwining of behavioural and structural prevention, the use of modern communication technology in health promotion, and intersectoral care approaches, particularly for infants and young children [26].

#### 2.1.3. Prevention and health promotion in general practice/general medicine and gynaecological and obstetric care

The range of preventive and health-promoting measures for adults includes vaccinations, advice on early detection examinations and their implementation, structured care for patients with diabetes, CHD or COPD as part of disease management programmes (DMP, tertiary prevention) and, last but not least, protection against over- and under-treatment (quaternary prevention) [27]. It also includes advising and supporting patients with preventive and health-promoting measures in accordance with Section 20 of the SGB V.

General practitioners (specialists in general medicine, internists working as family physicians), who have so far ensured comprehensive, local and easily accessible basic care, are facing major challenges. The demand for care will increase not only due to demographic change, but also due to lifestyle-related diseases among younger people, such as obesity, diabetes mellitus, or the consequences of nicotine or harmful alcohol consumption. According to the WHO, 74 % of all deaths worldwide are caused by non-communicable diseases (NCDs) [28]. According to the Robert Koch-Institute (RKI), this proportion is 90 % in Germany [29]. Prevention and health promotion in primary care can help to reduce this burden of disease and thus relieve the strain on health systems in terms of personnel and finances.

In Germany, around two thirds (67 %) of men and half (53 %) of women are overweight (BMI ≥ 25 kg/m²). Approximately a quarter of adults are severely overweight (obese; BMI ≥ 30 kg/m²). The prevalence of obesity in the population has risen steadily over the last two decades [30]. This highlights the increasing importance of obesity in statutory health insurance care, even among the oldest age groups [31]. With the aim of improving care for people with obesity and its numerous secondary and concomitant diseases, the Joint Federal Committee (Gemeinsamer Bundesausschuss, G-BA) decided on 1 July 2024 to launch the Obesity Disease Management Programme, but this has not yet been implemented in statutory health insurance. From a medical point of view, DMPs alone are not enough, partly because the risk of obesity is strongly correlated with socioeconomic background and, in addition to an individual therapeutic approach, measures for structural prevention need to be improved [32].

Checking vaccination status, especially in vulnerable patients, closing vaccination gaps and motivating patients to receive vaccinations recommended by the Standing Committee on Vaccination (Ständige Impfkommission – STIKO) are essential tasks for physicians in primary care in order to prevent serious consequences of infectious diseases for individuals and the population as a whole. Current data from the RKI show that no more than 20 % of people over the age of 60 are vaccinated against COVID-19 or pneumococci, and only about one-third are vaccinated against influenza. Only 31 % of all people over the age of 18 with underlying medical conditions took advantage of the indicated vaccination against influenza in the 2023/24 season. Only half of pregnant women are vaccinated against pertussis and only one in five pregnant women against influenza [33].

With participation rates in the statutory health insurance early detection programmes (in 2023) of approximately 2 % for colonoscopy and approximately 25 % for prostate cancer [34] only a portion of eligible statutory health insurance beneficiaries take advantage of these services. The proportion of all women aged between 50 and 69 living in Germany who took part in mammography screening was 50.5 % in 2022 [35]. In order to increase acceptance of recommended vaccinations and these organised early detection programmes, a wide range of measures are required – such as individual counselling for insured persons on the benefits and risks, information campaigns using digital media, low-threshold access, especially for vulnerable patient groups, appropriate remuneration for physicians and financial incentives for insured persons.

In the field of gynaecology and obstetrics, in addition to early cancer detection, many approaches to health promotion and prevention are carried out in gynaecology and obstetrics practices and by midwives. Family planning advice, information on psychosocial support services during pregnancy and the postpartum period, nutritional supplements containing trace elements or vitamins (e.g. iodine, fluoride, folic acid for pregnant women), vaccinations and breastfeeding advice are among the measures that can contribute to maintaining the health of women and, where applicable, their children [36]. The topics covered by the Prevention Act – nutrition, exercise, stress management and addiction/dealing with nicotine and alcohol – play a major role in gynaecological consultations and in non-medical facilities providing prenatal care. In addition, the relevant professional associations have called for the Prevention Act to be expanded to include a fifth area of action: "sexual and reproductive health" [37].

#### 2.1.4. Prevention and health promotion in occupational medicine

In Germany, there are currently around 4,000 specialists in occupational medicine and approximately 7,500 with the additional designation "occupational medicine" [38] working to prevent or reduce harmful effects caused by work. They also contri-

[5] The Ninth Book of the German Social Code (Sozialgesetzbuch IX – SGB IX) regulates rehabilitation and participation rights of persons with disabilities.

bute their expertise to various committees dealing with health protection. The Senate Commission for the Investigation of Occupational Health Hazards of the German Research Foundation (Deutsche Forschungsgemeinschaft – DFG) has been evaluating chemical effects in the workplace for almost 70 years. Since these substances can also affect humans in the environment, this work is also of great importance for health protection against harmful environmental influences.

In occupational medicine, the preventive measures taken by health insurance funds in the workplace are supported in accordance with Section 20 of the SGB V. The findings obtained in the context of occupational medicine (secondary prevention) regarding hazardous effects in the workplace must lead to primary preventive measures, i. e. usually prompting legislative measures. In an ageing society, there are an increasing number of sick people in the workplace whose employability should be maintained (tertiary prevention). In occupational medicine, it is also important to recognise and avoid over- and under-treatment (quaternary prevention). When commercial occupational health promotion services are offered, it is the responsibility of occupational physicians to ensure that no measures are carried out in the workplace without sufficient evidence (e.g. osteoporosis screening, telomere length determination).

Like all physicians, occupational physicians are obliged to report notifiable infectious diseases. If, for example, an infection with the hepatitis B virus is diagnosed for the first time in the course of compulsory occupational medical examinations for employees, this must be reported to public health authorities. According to the Maternity Protection Act, a general risk analysis must be carried out with regard to risks to pregnancy. Upon learning of a pregnancy, the employer is obliged not only to notify the trade supervisory authority, but also to carry out a special risk assessment for the pregnant woman‘s workplace, in which the company physician is usually involved.

Offering protective vaccinations is one of the mandatory tasks of company physicians if there is a work-related risk of infection (e.g. in the health service and during work-related stays abroad). Company physicians can also offer protective vaccinations and carry out vaccination campaigns in general. Their responsibilities and scope for action are defined by federal and state regulations.

In Germany, the Federal Ministry of Labour and Social Affairs (Bundesministerium für Arbeit und Soziales – BMAS) and the statutory accident insurance (Unfallversicherung – UV) are responsible for health protection at work. Physicians contribute their expertise to the relevant committees. At the BMAS, these include the Medical Advisory Committee on Occupational Diseases, the Committee on Occupational Medicine, the Committee on Hazardous Substances and the Committee on Biological Agents. In the committees of the statutory accident insurance, recommendations for occupational health care and assessment are developed with the involvement of physicians. At the time of writing, the Committee for Maternity Protection at the Federal Ministry of Education, Family, Senior Citizens, Women and Youth (Bundesministerium für Bildung, Familien, Senioren, Frauen und Jugend – BMBFSFJ) is chaired by a physician, ensuring that medical expertise is also brought to bear. As the findings of these committees have a direct impact on medical practice, the medical profession is kept continuously informed.

Measures to protect and promote health require a risk assessment to ensure the effectiveness and efficiency of the resources used. However, when it comes to harmful environmental impacts, political decisions are often made that are not always medically justifiable [39, 40].

In medium-sized and large companies, a wide range of professions work in the field of health protection (occupational medicine, psychology, occupational hygiene, health promotion, ergonomics, social work, etc.). Close cooperation with company physicians is part of everyday working life. The obligation to cooperate between occupational medicine and occupational safety has been required by law since 1974 (Occupational Safety Act) [41]. Workplace health promotion was enshrined in the Prevention Act of 2015 [42].

### 2.1.5. How can health literacy be successfully promoted?

Health literacy (i.e. the ability to find, understand, evaluate and apply health information in order to make appropriate health-related decisions in everyday life) among the population and especially among young people [43] in Germany is low [44]. Health literacy should therefore be promoted in general, but especially in the school setting [45]. The presence, counselling and individual care provided by health professionals in schools (“school nurses”) has been implemented in many countries, but is not widespread in Germany apart from a few temporary pilot projects [46]. Anchoring health professionals in schools can promote health literacy among pupils, improve care for pupils with chronic conditions and relieve pressure on the health care system [43]. Research on the evidence for this intervention shows positive results [47]. The introduction of a separate school subject called “Health” with subject-specific curricula and professionally trained specialist teachers was called for by the 126th German Medical Assembly in 2022 [48]. As a rule, projects aimed at improving health literacy involve complex interventions which, in order to be effective, should include not only knowledge transfer but also practical everyday support and social-emotional attention as components of the implementation.

Even among adults, the proportion of people with good health literacy is low in representative surveys. Almost 60 % of the population consider themselves to have considerable difficulties in dealing with health-related information. When it comes to assessing and evaluating such information, the figure is almost 75 %. People with a low level of education in particular have problems finding their way around the fragmented German healthcare system [49].

A lack of health literacy leads to increased use of the health system and negative consequences for the associated human and financial resources [50]. Well-developed health literacy supports health-promoting behaviour and self-management in chronic diseases [51]. This highlights the need for socio-political action to strengthen this key competence among the general population [52].

**Conclusion: Health promotion and prevention**

In Germany, positive developments and successes have been recorded in all areas of health promotion and prevention listed here. Despite these positive approaches, however, there is no overall strategy and it has not yet been possible to assign prevention and health promotion appropriate and strong roles in line with the approach of “health promotion and prevention before cure and rehabilitation”. The effectiveness of health promotion and prevention approaches and the resulting efficiency gains


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have been scientifically proven; there are also strong international policy recommendations that provide a good basis for national implementation measures. In Germany, the prioritisation of curative over preventive measures in healthcare, as well as the lack of political support for the implementation of indisputably sensible and effective public health programmes (e.g. WHO Framework Convention on Tobacco Control), are contributing to a weakening of public health strategies. Barriers exist at many levels: individual and organisational health literacy is lacking, as are political priorities and funding for a strong public health system. It is necessary to emphasise health promotion and prevention in all areas of life and at all levels, from day-care and school to work, the environment and social and cultural life. Social inequality is another significant barrier. The multitude of actors is insufficiently coordinated and there is a lack of political sanction and incentive systems to firmly establish health promotion and prevention as the best way to improve health. The monitoring of measures and policies as well as quality assurance in practice must also be systematically strengthened in order to create the basis for evidence-based, effective public health strategies.

### 2.2. Health protection

Health protection focuses on eliminating, combating and preventing pathogenic factors in order to avoid risks to public health. Legal principles and provisions form the basis for the effective implementation of health protection measures for the population. Health protection is essentially characterised by the following basic principles:

(1) The precautionary principle describes the prevention of hazards before any damage to public health has occurred.
(2) The "polluter-pays-principle" stipulates that the originator is responsible for hazard prevention.
(3) The principle of cooperation describes the interaction between actors under the umbrella of hazard prevention [53].

Almost all areas of life and settings are affected to varying degrees by health protection measures. Health protection plays an important role, for example, in occupational safety and health (s. Ch. 2.1.4.), disaster control, consumer protection and the supervision of health professions. Other important aspects of health protection include infection control, drug safety, food safety, transport safety, environmental health protection, patient safety and protection against violence [7].

The medical profession is involved in a variety of ways here: Drug safety refers to the continuous systematic monitoring of drugs, with measures designed to ensure that drugs are safe and effective when used as intended [54]. A crucial element is pharmacovigilance, which is implemented in Germany through a pharmacovigilance system. This pharmacovigilance system is organised by the competent federal authorities in accordance with Section 62 of the Medicinal Products Act (Arzneimittelgesetz – AMG) [55]. Those involved include the Drug Commission of the German Medical Association (Arzneimittelkommission der deutschen Ärzteschaft – AkdÄ) and the Drug Commission of German Pharmacists (Arzneimittelkommission der Deutschen Apotheker – AMK). The core of pharmacovigilance is the recording of side effects, their evaluation and analysis, as well as appropriate risk management and communication [56]. Pharmacovigilance thus also contributes to drug therapy safety, which aims to ensure a safe medication process and minimise risks for patients through its measures [54]. The special role of the medical profession can be identified at various levels in these aspects of health protection that are relevant to medicinal products. The prescription and dispensing of medicines, patient education, individual therapy adjustment and the reporting of adverse drug reactions (in accordance with Section 6 of the professional Code for Physicians in Germany, MBO-Ä)[6] [57] as well as interprofessional cooperation between physicians, pharmacists and nursing staff, among others, in the context of the medication process are important factors that the medical professions assume responsibility with regard to drug-related health protection.

Physicians are also committed to patient safety in other areas. *Patient safety* refers to all measures and systems aimed at protecting patients from avoidable harm in connection with medical care. This essentially includes measures for error prevention, quality management, risk management and patient education. In Germany, patient safety and the associated tasks are primarily the responsibility of the self-governance of the medical profession (National Health Goal Patient Safety [58]). The interrelated fields of activity of the medical profession in terms of patient safety include, for example, medical peer reviews, the course book on medical quality management, expert commissions and mediation boards, and the medical Critical Incident Reporting-System (CIRS) as a learning system [58]. At the legal level, important aspects of health protection with regard to patient safety are regulated in the "Act to Improve the Rights of Patients" in the Civil Code (Patient Rights Act, 2013, Bürgerliches Gesetzbuch – BGB).

The influence of environmental factors on health is also summarised under the term *environmental public health*. In addition to direct factors (physical, chemical, biological), this also includes indirect factors (physical, psychological, social, cultural) that have an environmental impact on the health of the population [59]. Measures relating to health protection are regulated with regard to environmental factors, for example, in the Federal Immission Control Act, the Water Resources Act, the Federal Soil Protection Act, the Climate Protection Act and numerous other laws and regulations. Numerous environmental factors have been identified as harmful to health and are also commonly known and accepted as such by the general public. These include, for example, particulate matter [60], noise [61] and water pollution [62]. Initiatives by the medical profession also raise awareness of environmental factors that are harmful to health, such as the Heat Action Day launched by the German Medical Association as a tool to sensitise the medical profession, the general public and political decision-makers to the relevance of the issue of heat and, through this effect, to support the political decision-making process with regard to the legal anchoring of health protection measures [63]. In addition, health protection measures can also be found in other areas of law that do not always appear to be directly related to health protection at first glance. For example, the German Road Traffic Regulations and the German Federal Building Code form important pillars of cross-jurisdictional health protection with regard to accident prevention [64] and urban development (planning of green spaces) [65].

The so-called One Health approach represents another fundamental aspect of health protection. This approach describes the close connection between human, animal and environmental health and how this connection is taken into account in the

[6] An English translation is available at: https://www.bundesaerztekammer.de/fileadmin/user_upload/_old-files/downloads/pdf-Ordner/MBO/MBO-AE_EN_2018.pdf

implementation of health protection, disease control and health promotion [66].

Particular attention is paid to the "Health in All Policies" approach, as the direct link to health protection in different areas of life and the associated legal regulations does not always appear to be clearly discernible [7]. This requires close cooperation between the various legal areas and those responsible for them in order to take account of the far-reaching and differentiated nature of health protection and to ensure that health protection measures are effective and their effectiveness maximised.

Furthermore, health protection illustrates in a special way the interaction between the various players in the German healthcare system. With the aim of averting health risks, close coordination of competences and responsibilities at various levels is necessary. Health protection measures are largely based on legal regulations at federal, state or local level. In order for health protection to be effective, technical and scientific findings must be translated into appropriate legislation. This requires both an understanding of the different actors in an overarching system and orderly and functional communication and distribution of responsibilities.

Another important aspect, especially in crisis situations with (potential) negative effects on public health, is what is known as "health security". This encompasses far-reaching measures to protect the health of both individuals and population groups. Among other things, this includes measures relating to health communication, emergency preparedness and ensuring that healthcare services continue to function in crisis situations [67].

**Conclusion: Health protection**

Physicians play a central role in health protection, as they are not only responsible for diagnosing and treating individual patients, but also promote their patients' health and perform a preventive function. They provide advice and information, conduct research and further training, and are involved and/or organised in relevant expert bodies and committees. In addition, they are active in public health care by monitoring the spread of infectious diseases, acting as key players in the implementation of protective measures in crisis situations such as pandemics, and collecting epidemiological data and ensuring documentation.

The medical profession acts as a link between the various levels of health protection. Through their work in different areas of patients' lives (e.g. occupational health and safety training or school entrance examinations), it is the task of physicians to identify factors that are harmful to health at the individual, population group and general population levels, to describe them epidemiologically and to classify them scientifically on the basis of evidence. In order to be as effective as possible in this regard, it is important to reinforce the understanding that every physician plays a central role in a comprehensive public health strategy and takes appropriate action in specific situations.

Through the work of the medical profession in (political) committees and in medical self-government, scientific findings on identified health hazards or imminent health risks can be translated into political decision-making processes with the aim of legally establishing health protection measures to prevent risks to public health.

### 2.3. Health communication

Health communication as an interdisciplinary and multiprofessional field of research and practice has developed since the 1970s. In the narrower sense, health communication in prevention, diagnostics and therapy aims to improve the health of individuals as well as the population as a whole, and indirectly to reduce healthcare costs. Both intended (e.g. education) and unintended communication effects (e.g. in social media and mass media) are equally subject to consideration. Mass media campaigns are generally only effective if they are integrated into a theory-based, multi-sectoral, sustainable, multi-level health promotion strategy [68]. The medical profession has a special responsibility in science-based health communication. This includes the most professional and effective use of all media. The challenges are considerable: for example, uncertainties regarding the causality of epidemiological data can make it difficult to make clear statements about primary prevention or politically significant links between health and social or environmental conditions. Therefore, findings from various scientific disciplines must be compiled in an interdisciplinary manner in order to take account of the complexity of the issue [69]. Effective health communication also requires the appropriate infrastructure to be in place. Health communication, including in the context of public health, must be geared towards the media usage behaviour of the population. For example, 93 % of people in Germany were regularly online in the first quarter of 2022 [70]. In order to make the various mechanisms of health communication (informing the population and facilitating communication between professionals) sustainable and effective, digitalisation must be continuously advanced. In addition, care must be taken to ensure the responsible use of artificial intelligence (AI) in health communication. This is the only way to ensure that, in addition to health communication, other public health instruments such as prevention campaigns and health protection measures can be implemented in a meaningful way.

#### 2.3.1. Role and responsibilities of physicians and their organisations/institutions in health communication

In various legal contexts, reference is made to the "current state of medical science and technology", e.g. in the various books of the German Social Code, the German Medicinal Products Act (Arzneimittelgesetz – AMG) and regulations on the application of good manufacturing practice in the manufacture of medicinal products and active substances (Arzneimittel- und Wirkstoffherstellungsverordnung – AMWHV), the German Transplantation Act (Transplantationsgesetz – TPG), the German Transfusion Act (Transfusionsgesetz – TFG) and the German Pre-implantation Diagnosis Regulation (Präimplantationsdiagnostikverordnung – PIDV). It should be noted that the "state of medical science and technology" is not a constant. The framework conditions are currently characterised by highly dynamic advances in knowledge in many medical fields, partly as a result of improved research infrastructures, digitalisation and the use of AI [71]. This reduces the so-called "half-life" of medical knowledge. This development has consequences not only for every physician [72], but also for the communication structures in the healthcare system, which will be examined in more detail below.

Numerous associations, public institutions and commercial enterprises are involved in health communication. The content is interest-driven and varies in its scientific basis depending on the orientation of the institution. Given the resulting diversity of voices, some of which are contradictory, the immediate global


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availability in the media and its interactive nature, this situation offers considerable opportunities for health promotion, but also risks that are exacerbated by the growing importance of social media [73]. In addition to spontaneous counterstatements, there are systematic activities against "fake news", e.g. on the Wissenschaftskommunikation.de portal or at the German Society for Internal Medicine (Deutsche Gesellschaft für Innere Medizin – DGIM: Fake news in internal medicine: DGIM offers support in providing information [74]). The determined implementation of the Digital Services Act can also be beneficial here.

In addition to the natural sciences, other sciences must also be taken into account in medicine. This is because medical practice must consider aspects of law, ethics, society, religious attitudes, family, economics, cost-effectiveness, individual life planning and cultural diversity. It should also be borne in mind that scientific findings in medicine are often based on probabilities, are not static and can be superseded, for example, by larger sample sizes or new hypotheses. This requires critical questioning and evaluation of scientific findings. Not least, the experiences with the COVID-19 pandemic show that the state of knowledge, the certainty of statements and existing uncertainties must be communicated alongside the facts. Falsifications or false statements must be countered with appropriate clarifications, whereby communicating this in language that is understandable to laypeople poses a challenge. The planning, design and evaluation of mass media health campaigns requires not only the preparation of knowledge in the sense described above, but also expertise in the media usage behaviour of various target groups and the strategies of the relevant media channels. It is essential to avoid further widening the knowledge gap between population groups.

From a medical perspective, with regard to evidence-based policy advice, research and the translation of research findings into public health practice [69], it is essential that medical and scientific knowledge is incorporated into political decision-making processes. Science must not take a normative approach; science provides basic information as a basis for decision-making, but not the decision itself. With knowledge of the current state of medical science and technology, it is up to politicians to decide what conclusions to draw. Not everything that is scientifically evident is politically possible or even appropriate – politics is about balancing interests and compromise. Scientific advice often finds itself caught between the conflicting priorities of consultant independence and the practical logic of politics and administration. In this respect, structured policy advice, as already practised today in hearings on draft legislation, should replace individual advice "on demand" wherever possible, even outside the existing legal framework, and be standardised as a procedure.

#### 2.3.2. Role of medical self-governance in health communication

The following section highlights key players and their role in communication for general healthcare:

The duties of the state chambers of physicians as public-law institutions are regulated in the respective healthcare professions and chamber laws of the federal states – these vary; e.g. in accordance with Section 6 (1) of the Healthcare Professions Act of North Rhine-Westphalia:

> *„The chambers' tasks are: […] 4. to promote and conduct professional training for chamber members in order to help ensure that the knowledge, skills and abilities required for the practice of the profession are in line with the current state of science and practice throughout the chamber members' professional lives, […] 6. to ensure the maintenance of a high professional standard, […] 7. to represent the professional interests of the chamber members, […] 13. to inform the chamber members and the public about their activities and professional issues, 14. to perform the tasks assigned by law in the field of vocational training; […] 15. to carry out training and qualification measures for the profession-specific employees of the chamber members. In fulfilling these tasks, the interests of the common good must be taken into account."*

The state chambers of physicians and the federal German Medical Association (Bundesärztekammer – BÄK; umbrella organization of the 17 state chambers of physicians) have the dual mandate conferred on them by the respective healthcare professions and chamber laws to represent the professional interests of physicians on the one hand and, on the other hand, to support their efforts to remain up to date with the latest medical science throughout their entire medical careers [72]. This dual function should be seen as one of the chambers' strengths and a unique selling point. The chambers represent all physicians in Germany, not just the members of a scientific society, professional association or healthcare sector. Thus, based on personal and compulsory individual membership, it is the chambers' task to serve all physicians across all sectors. In this sense, the chambers perform tasks assigned to them by state law, which serve, for example, to ensure and guarantee the quality of care (such as continuing medical education and training, quality assurance) [72].

At the federal level, the German Medical Association plays an important role in communicating the state of medical science. The German Medical Association performs the tasks specified in its statutes and has also been assigned tasks under federal law, such as the authority to issue guidelines for determining the state of medical science in accordance with the Transfusion Act (TFG) and the Transplantation Act (TPG). Coordinating the efforts of the 17 state chambers of physicians, the German Medical Association also actively participates in the process of shaping public opinion on health policy and develops perspectives for citizen-oriented and responsible health and social policy [75]. In order to fulfil these tasks, the German Medical Association makes use of various committees, particularly scientific ones, such as the Scientific Advisory Board of the German Medical Association [76], the Drug Commission of the German Medical Association [77] and the Central Ethics Committee at the German Medical Association [78].

The joint, scientifically based, cross-sector position statements developed by the committees of the German Medical Association in an interdisciplinary and often interprofessional manner are the product of collective expertise, which highlights the underlying facts but also the limits of expertise. Medical intervention may also be necessary in areas where scientific knowledge is insufficient or lacking [72]. The different degrees of evidence must be clearly stated and the best available evidence must be used. State chambers of physicians and regional associations of statutory health insurance physicians, as institutions of the self-governance of the medical profession, play an essential role in health communication, especially in the context of public health. Their role includes communicating evidence-based information, promoting doctors' communication skills, and organising and supporting prevention campaigns. Through their official channels, such as websites, press releases and scientific publications, they help to make the latest medical findings and guidelines widely available and understandable.

Already during medical education (medical school), emphasis is placed on physician-patient communication. During further medical training, communication skills are deepened in a subject-specific manner and applied in practice as part of daily professional practice. Accordingly, aspects of communication are included in numerous places in the specialty training regulations for physicians[7] [79].

Further aspects of communication and health communication can also be identified in the various specialist medical training courses and additional training courses[8] [79].

(State)chambers of physicians offer specialised guidelines, seminars and training courses that focus on communicating public health issues and improving physicians' communication skills [80, 81]. These training courses help to convey preventive health messages efficiently and communicate complex medical content to patients in an understandable way. This includes health promotion and prevention, factors influencing health behaviour and their consequences for medical consultation, work-specific conditions and intervention strategies[9] [80]. A guide entitled "Kommunikation im medizinischen Alltag" (Communication in Everyday Medical Practice), first published by the North Rhine Medical Association in 2015 and reissued in a second, revised and expanded edition in 2023, addresses the improvement of physicians' communication skills. The current edition covers the basics of communication, introduces conversation techniques and discusses various medical conversation situations, including medical communication via social media [81].

Institutions of medical self-governance are therefore not only an important player in medical education and training, but also a central organ of health communication, bridging the gap between scientific research, medical practice and public health. They promote ethically appropriate, transparent communication between doctors, patients and society.

#### 2.3.3. Role of medical scientific societies and other institutions in health communication

Medical scientific societies contribute to reliable health communication by providing information from their respective fields of expertise on their websites, in newsletters and in press releases. The press also actively consults the relevant professional societies on specialist issues, and these societies play a role in policy advice during systematic consultation procedures on draft health legislation. Founded in 1962, the Association of the Scientific Medical Societies in Germany (Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften – AWMF) advises on *"fundamental and interdisciplinary matters and tasks"* and aims to *"promote the interests of medical science more effectively to the outside world"* [82]. Medical scientific societies can claim to communicate on the basis of evidence and consensus, particularly with regard to their guidelines. Medical scientific societies, professional associations, patient organisations, subordinate authorities (e.g. Federal Institute of Public Health [Bundesinstitut für Öffentliche Gesundheit – BIÖG]/formerly Federal Centre for Health Education [Bundeszentrale für gesundheitliche Aufklärung – BZgA]) or other non-governmental actors (e.g. working groups for health promotion in the federal states) as well as physicians in their daily work are responsible for communicating with the population. Particularly in primary prevention, this communication can clearly be improved, at least in Germany, and requires further efforts and the support of all parties involved [83, 84].

#### 2.3.4. Professional and ethical aspects of health communication

The professional ethical duties of physicians in public health communication are based on fundamental ethical principles of medicine and were last updated in the World Medical Association's International Code of Medical Ethics in 2022 [85]. This involves a commitment to serving the health and well-being of each individual on the basis of good medical practice and contributing to the health and well-being of the entire population. In doing so, the welfare of society as a whole and future generations must be taken into account. Section 1(1) of the Professional Code for Physicians[10] in Germany (MBO-Ä) also stipulates that *"Physicians serve the health of the individual and of the population"*. Paragraph 2 goes on to describe: *"It is the task of physicians [...] to contribute to the preservation of natural resources in view of their importance for human health"* [57]. According to medical professional law, the equitable distribution of healthcare at the societal level and the individual rights of patients (cf. Section 7 (1) sentence 1 MBO-Ä) must also be respected. The ethical principles of autonomy, benevolence, non-maleficence and justice [86] also apply to both individual and population-based healthcare. The special role of physicians in health communication is also emphasised in the World Medical Association's International Code of Medical Ethics.

The central duty of physicians, both in the physician-patient relationship and with regard to the common good, is to provide scientifically sound and evidence-based advice. The aim is to ensure that people can make informed decisions through clear and comprehensible information (respect for human autonomy). This means that they understand both the advantages and disadvantages of certain public health measures. This applies in particular to preventive measures such as vaccinations, healthy lifestyles and behaviours that protect public health. In crisis situations, physicians should communicate risks in a way that does not cause unnecessary panic, while remaining honest and transparent [87].

It is important that health information reaches all population groups, especially vulnerable ones, and takes cultural differences into account appropriately. Here, physicians have a re-

[7] In Section B – Areas, Specialist and Key Competencies, the following are described under the heading "General Content of Further Training for Section B" as action competencies: "Deepening and strengthening job-specific attitudes for the benefit of the patient, based on medical expertise, recognised ethical principles, communicativeness, collegiality and preventive commitment"; "Situational medical communication, including counselling of relatives"; "Information and documentation of findings"; "Therapy decisions at the end of life, including discussions with relatives"; "Interdisciplinary and interprofessional cooperation" [79].

[8] To name just a few examples: 80-hour continuing education course in psychosomatic primary care based on the (model) course book of the German Medical Association "Psychosomatic Primary Care"; this course is a mandatory part of specialist training in general medicine, gynaecology and obstetrics, child and adolescent medicine, and is a prerequisite for acquiring additional training in sexual medicine. The course consists of 50 hours of "patient-centred communication" and 30 hours of Balint group work; "patient-centred communication" can also be completed separately; further training to become a specialist in hygiene and environmental medicine: "Risk analysis, assessment and communication as well as counselling of individuals, groups, authorities, institutions and politicians"; further training to become a specialist in internal medicine, haematology and oncology: "Situational communication with patients and relatives, including psychosocial aspects in life-threatening or advanced oncological and haematological diseases"; further training to become a specialist in public health: "Cooperation and communication with political representatives and civil society institutions", "Risk analysis, assessment, communication and management of environmental health hazards" [79].

[9] One example of this is the seminar offered by the Bavarian Medical Association, which is based on the structured continuing education programme "Health Promotion and Prevention" developed by the German Medical Association in 2008 and is offered to physicians and other healthcare professionals. The seminar focuses on the topics mentioned above [80].

[10] An English translation is available at: https://www.bundesaerztekammer.de/fileadmin/user_upload/_old-files/downloads/pdf-Ordner/MBO/MBO-AE_EN_2018.pdf


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sponsibility to address inequality and injustice in access to health services by acting as advocates for their patients. The protection of personal health data and the preservation of confidentiality also play an essential role. Finally, interprofessional collaboration with other health professions and institutions is crucial to ensure consistent and clear messages in public health communication.

**Conclusion: Health communication**

Knowledge-based and effective health communication is a task for the entire healthcare system, including the public health sector. It is a prerequisite for the successful performance of all essential public health tasks, such as health promotion and prevention, risk communication in emergencies, health protection and crisis management. It plays a particularly important role in promoting participation in the social community and commitment to social interaction and health. Physicians take on health communication in many areas of practice, clinical medicine, research and teaching, as well as in medical self-administration in individual and population-based medical counselling and care, thereby promoting health literacy for all. They bear a special responsibility for communicating evidence-based knowledge and are aware that the effective communication of health knowledge, particularly in population-based campaigns, requires an interdisciplinary and interprofessional approach. With this in mind, physicians should also advocate for digitalisation and the responsible use of artificial intelligence in health communication.

### 2.4. Crisis prevention and crisis management

Disasters and crisis situations require advance planning and the development of capacities for crisis management and response. Epidemics, natural, environmental and technological disasters, man-made attacks and, last but not least, acts of war threaten the health of the population and thus place unique demands on public health. In this context, the networking of medical and other agencies and tasks, as well as the effective use of existing infrastructure, including that of the public health system, are of central importance in ensuring an efficient response. In the context of international cooperation on cross-border health crises, Germany is also called upon to build up and maintain medical and public health expertise and capacities [88]. All of the aspects mentioned below require secure and efficient digital communication structures and functioning, constantly monitored channels and digital applications.

In crises and emergencies, public health care makes use of various structures. The regular rescue service forms the first line of defence, with rescue and emergency medical services providing initial medical care. Disaster control ("Kat-Schutz") and the Federal Agency for Technical Relief (Technisches Hilfswerk – THW) also employ physicians with special qualifications in acute and emergency medicine, who provide initial medical care and prioritise treatment. Since the medical management of such crises requires multisectoral coordination and cooperation, all areas of care and public health services must be structured and optimised in advance. This should be addressed early on in crisis management plans so that the necessary structures can be activated immediately and implemented efficiently when needed – a response cannot begin only when the crisis occurs [89–91].

In serious situations, the armed forces of Germany provide additional medical personnel, often with additional qualifications in disaster medicine. The Federal Office for Civil Protection and Disaster Assistance (Bundesamt für Bevölkerungsschutz und Katastrophenhilfe – BBK) coordinates the operations at a higher level, with physicians taking on advisory roles, particularly in relation to medical strategies and resource allocation. The Federal Republic of Germany can also make its emergency structures and medical infrastructure available to other countries for the management of serious crises within the framework of assistance agreements. However, comprehensive legal legitimisation for the BBK is still pending. On 2 June 2022, at the spring meeting of the Conference of Interior Ministers, the federal and state governments established the Joint Competence Centre for Civil Protection (Gemeinsames Kompetenzzentrum Bevölkerungsschutz – GeKoB), which, as a permanent cooperation platform, strengthens the coordinated cooperation of all partners in civil protection by intensifying the exchange of information, jointly assessing risks, building forecasting capabilities and supporting political and strategic crisis teams at federal and state level [92].

Physicians work in organisations such as emergency services, disaster control, THW and the armed forces in a wide variety of roles. Their tasks range from acute medical care and logistical support to advisory activities. However, these positions do not necessarily involve regular involvement in disaster and crisis management. The involvement of physicians with specific leadership experience in these areas can significantly improve communication and decision-making in emergency situations. The fact that a state of emergency is often declared without sufficient medical involvement sometimes leads to inefficient coordination. Greater involvement of physicians with leadership skills in the respective crisis teams, such as the concept of the "medical director of hospital coordination" during the COVID-19 pandemic, could optimise medical care and resource management.

Precise communication is crucial in crises [89]. The main channels are mobile phone networks, apps such as the federal government's warning app (NINA) or similar regional options, as well as radio and television. Sirens supplement these channels, either as an addition or as a fall-back option [93, 94].

Physicians contribute significantly to communication through their expertise. During the COVID-19 pandemic, they provided clear behavioural guidelines to effectively inform the population. In disaster control, physicians provide accurate medical information that contributes to the correct assessment of the situation, particularly with regard to health risks, and to rapid decision-making.

The rapid availability of international or global data enables swift responses, particularly in the case of epidemics, for which there is usually no evidence available a priori and for which specific guidelines do not exist. In such situations, in view of the social and political need for information, individual expert opinions are communicated, the reliability of which naturally depends on the foresight and self-criticism of the expert. Here, too, scientific medical societies and associations should play a consensus-building role, conveying messages to society that are far more convincing than the contradictory opinions of individual experts.

Smooth cooperation between various medical and non-medical organisations and structures is particularly important in public health crises and disaster situations and requires a strong public health perspective. From an emergency and disaster medicine perspective, preparatory measures should be taken, particularly in the context of disasters such as climate-related events (e.g. floods), pandemics (e.g. COVID-19) and other major incidents [90, 95, 96]. These measures must ensure that specific medical experts are identified, integrated into the processes and included in the relevant (crisis) teams:

(1) Disaster management and planning: Interprofessional teams should be formed and positions and qualifications defined in advance, including various medical experts, as early as the planning phase for disaster management. This applies to all situations involving chemical, biological, radiological and nuclear substances (CBRN situations).
*Example: interprofessional teams for climate disasters, comprising environmental physicians, emergency physicians and epidemiologists, among others*

(2) Integrated crisis teams: During a disaster, it is crucial to set up crisis teams that include various medical experts in order to comprehensively assess the situation and make technically sound decisions. These teams should have flexible structures so that they can respond quickly to changing situations and provide the necessary technical expertise. In the interests of coordinated action, it is essential that responsibilities are clearly defined in advance.
*Example: medical directors of hospital coordination for the management of pre- and intra-hospital treatment resources*
In the Netherlands, this networking and cooperation has been implemented in the 25 so-called Veiligheidregios (safety regions), which are responsible for regional preparation, coordination and implementation in crisis and disaster situations, including fire protection.

(3) Healthcare management: In the event of pandemics or defence situations, for example, hospital resources must be made available on a supraregional basis. Coordinating these resources requires special medical expertise (e.g. disaster medicine, emergency medicine, intensive care medicine, infectious diseases, etc.).
*Example: cloverleaf principle, clustering of hospitals*
A functional digital data infrastructure and communication structures are of great importance.

(4) Psychosocial support: Providing psychosocial support to affected populations and to professionals working in the field is important to minimise long-term health consequences.
*Example: psychologists, psychiatrists and those trained in crisis intervention should be involved in crisis teams*

These preparatory measures and the targeted integration of specific medical expertise can effectively strengthen interdisciplinary and interprofessional cooperation in the field of public health, which should lead to a more tailored response to unforeseen events of supraregional significance.

Against the backdrop of increasingly complex and dynamic modern crisis and disaster scenarios, the aspects outlined above underscore the need for systematically anchored, interdisciplinary and interprofessional medical crisis preparedness and management.

**Conclusion: Crisis prevention and crisis management**
Coping with catastrophic events requires structured, forward-looking, interdisciplinary and interprofessional planning of medical resources and decision-making processes. The integration of medical expertise into preparatory and operational structures – for example, through integrated crisis teams, supraregional care management and psychological intervention concepts – is essential for a resilient healthcare system. Only through clearly defined responsibilities, flexible system architectures, regular exercises and consistent consideration of interdisciplinary perspectives can an effective medical response to complex crisis situations be prepared.

### 2.5. Public health surveillance and health monitoring

The term surveillance describes the ongoing systematic collection, analysis, evaluation and dissemination of data on the health of the population. This data is used to plan, implement and evaluate measures to combat and prevent disease, but also to develop measures to promote health. The term "monitoring", which is also often used in this context, differs from surveillance primarily in that monitoring is usually intermittent and more specifically targeted at changes in health or risk factors, particularly as a result of measures taken.

In Germany, public health services at the state and the municipal level (Öffentlicher Gesundheitsdienst – ÖGD) and, on a federal level, the Robert Koch-Institute (RKI) are responsible for surveillance. Surveillance in accordance with the Infection Protection Act (Infektionsschutzgesetz – IfSG) concerns infectious diseases. During an outbreak of an infectious disease, this surveillance enables, for example, the rapid identification of affected persons, the mapping of the spread of the disease and the evaluation of the effectiveness of control measures such as vaccinations or quarantine. In this context, Integrated Molecular Surveillance (IMS) is increasingly coming to the fore as a sustainable and internationally comparable means of monitoring infectious diseases. This involves analysing the genomes of pathogens using whole genome sequencing (WGS), linking them to the data reported under the IfSG and evaluating them on an ongoing basis. This combination of molecular and epidemiological data is crucial for monitoring outbreaks and detecting chains of transmission. Another objective of the IMS is the continuous monitoring of important pathogen characteristics based on genome sequences, in particular antibiotic resistance and virulence. Overall, the IMS aims to contribute to a better understanding and ongoing monitoring of the pathogen situation in Germany, thereby supporting the public health service in its work.

In addition, surveillance will be expanded to include aspects such as antibiotic resistance, wastewater surveillance and surveillance of non-communicable diseases (e.g. diabetes surveillance, mental health surveillance, RKI's Burden of Disease Project) [29]. A wide range of data sources are available for surveillance, including population statistics, cause of death statistics, hospital statistics, and the various regular surveys conducted by federal institutes and other institutions (including the Federal Institute for Occupational Safety and Health [Bundesanstalt für Arbeitsschutz und Arbeitsmedizin – BAuA], the Federal Institute of Public Health [Bundesinstitut für Öffentliche Gesundheit – BIÖG]/formerly the Federal Centre for Health Education [Bundeszentrale für gesundheitliche Aufklärung – BZgA], the Federal


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Institute for Risk Assessment [Bundesinstitut für Risikobewertung – BfR], the Paul Ehrlich Institute [PEI], the Federal Institute for Drugs and Medical Devices [Bundesinstitut für Arzneimittel und Medizinprodukte – BfArM], the Federal Environment Agency [Umweltbundesamt – UBA], and the Max Rubner Institute [MRI]). Data from the statutory cancer registries of the federal states (see also Centre for Cancer Registry Data [Zentrum für Krebsregisterdaten – ZfKD] [97]) and other disease-specific registries can be used for disease-specific surveillance.

Surveillance data is extremely important for physicians if they want to assess symptoms and suspected cases in patients appropriately and in a timely manner. They can also contribute to surveillance themselves, for example as sentinel practices. Surveillance of acute respiratory diseases in the outpatient sector is carried out by the Influenza Working Group at the RKI, with a focus on influenza, COVID-19 and RSV infections [98]. Close contact with the relevant health authority is essential in order to initiate surveillance activities or to draw conclusions from regional surveillance data about possible connections with one's own patients. Regular school entrance examinations, for example, provide excellent guidance on the development of children's health status when they start school. In this respect, it is essential for physicians to be familiar with the RKI's surveillance systems and publications. Surveillance results are easily accessible through regular electronic publications such as the Epidemiological Bulletin [99].

Health monitoring and health reporting in the ÖGD take place at three levels: at federal level by the RKI, in the federal states and local authorities in accordance with the Health Service Acts (Gesundheitsdienst-Gesetze – GDG) and local authority regulations. Ideally, the evaluation is then followed by targeted measures for health promotion and prevention ("data for action").

Population-based data from the healthcare system is available to a limited extent, for example through specific evaluations by individual statutory health insurance funds. These publications mostly aggregate data over longer periods (e.g. annually) and are therefore useful for longer-term adjustments and measures, but less so for timely public health measures. The data from the regional Associations of Statutory Health Insurance Physicians (Kassenärztliche Vereinigungen – KV) vaccination monitoring system, which is compiled by the RKI from the billing data of the 17 KV bodies, can be accessed digitally on a dashboard [100]. Regional analyses and corresponding comparisons are possible. This data can be used to evaluate vaccination campaigns, for example, by making comparisons over time. Attention must be paid to possible distortion factors.

Overall, it can be assumed that the increasing digitisation of the healthcare system will lead to an increase in the number and availability of relevant data sets for public health measures taken by physicians. The medical profession must prepare itself accordingly in order to make the best possible use of the growing opportunities and, at the same time, help shape the further expansion of surveillance.

**Conclusion: Public health surveillance and health monitoring**

In Germany, a large amount of data can be used for monitoring and surveying the health status of the population and important influencing factors, which should become more readily available and accessible as a result of increasing digitalisation. Physicians play an important role in generating this data, for example by reporting infectious diseases and via sentinel practices, as well as through data collection in the public health service. Active participation in data generation and the knowledge-based interpretation and use of these diverse data sources are of great importance for the public health tasks of the medical profession in order to derive concrete strategies from them.

### 2.6. Physicians as competent public health actors

The public health landscape is characterised by a multitude of actors who make an important contribution to health promotion, prevention and the protection of the population. Physicians play an essential role in this. The foundations are laid during medical education (s. Ch. 2.6.1.) and further medical training (s. Ch. 2.6.2.). Physicians are able to put medical knowledge directly into practice and, through their interactions with patients, disseminate valuable information that serves to prevent disease and promote a healthy lifestyle. In doing so, they assume a central role as trusted individuals who can facilitate access to health information and clear up misunderstandings. In many cases, physicians are the first point of contact for preventive health measures such as vaccinations, early detection or healthy lifestyle habits.

Cooperation between general practitioners and local public health services (ÖGD) is a key pillar of this approach. This cooperation is extremely important for the implementation of preventive health measures and the management of health crises, among other things. As the primary point of contact for the population in primary care, general practitioners are closely involved in day-to-day health issues. They often have a comprehensive overview of their patients' health and are therefore able to identify health risks at an early stage on an individual medical level. The ÖGD, on the other hand, assumes a coordinating and overarching role by being responsible for public health promotion, prevention and the protection of the population at the municipal and regional level. Close cooperation between these two actors is therefore crucial for achieving health promotion and prevention goals. One example is the prevention of infectious diseases, where general practitioners can detect potential outbreaks of infectious diseases at an early stage through regular individual health checks and diagnostics, while the public health service coordinates the necessary measures for public infection control and combating epidemics.

It therefore remains of central importance to strengthen the medical staffing of the ÖGD and to provide it with sufficient funding. Against the backdrop of a broad, demanding and growing range of tasks, the 117th German Medical Assembly in 2014 already called for adequate medical staffing in the public health authorities. In order to perform the diverse and demanding tasks in the field of health care and health protection, from school entrance examinations to pandemic management, with a high level of competence, highly qualified physicians with many years of clinical experience must be recruited and retained for the ÖGD [101].

#### 2.6.1. Medical Education

Medical education also aims to impart the knowledge, skills and abilities required to provide comprehensive healthcare to the population ([102] see Section 1(1) of the Licensing Regulations for Physicians [Approbationsordnung für Ärzte – ÄApprO]). Admission to the second stage of the medical examination requires that evidence of achievement has also been provided in the interdisci-

plinary areas of health economics, the health system, public health, prevention and health promotion ([102] § 27 ÄApprO). In the oral-practical examination, prospective physicians must demonstrate that they have mastered the fundamentals and basic knowledge of health promotion, prevention and rehabilitation, and that they know how to assess the influences of the environment, society, family and work on health ([102] § 30 ÄApprO).

One of the objectives of the long-overdue amendment to the ÄApprO is to anchor topics relating to public health and population medicine even more firmly in the training objectives and content. Another aim is to improve understanding of the roles of the various health professions in relation to public health and cooperation between health professions on the basis of mutual respect and shared values.

Thanks to a corresponding amendment to the ÄApprO, since May 2022 medical students have been able to complete part of their practical year and clinical traineeships in public health service institutions, enabling them to familiarise themselves with the various areas of responsibility of public health authorities at an early stage.

Public health content is also anchored in the National Competence-Based Learning Objectives Catalogue for Medicine (Nationaler Kompetenzbasierter Lernzielkatalog Medizin – NKLM), which defines the competencies that should be acquired upon completion of medical studies. In addition to knowledge and skills, these include overarching learning objectives such as attitudes, scientific competencies and so-called soft skills. Graduates should be familiar with ethical and legal issues relating to public health and be able to promote population-based health in collaboration with other health professions and service providers. Relevant content is also taught in dentistry and veterinary medicine courses.

### 2.6.2. Professional training

Building on this medical education, further skills that can be classified as public health are taught in further professional training [79].

The general content applicable to professional training in all medical fields includes the following:

- Ethical, scientific and legal foundations of medical practice
- Economic and structural aspects of healthcare
- Deepening and strengthening profession-specific attitudes for the benefit of patients, based on medical expertise, recognised ethical principles, communication skills, collegiality and preventive commitment
- Psychosocial, environmental and intercultural influences on health, as well as the connection between illness and social status
- Effects of climate change on health
- Interdisciplinary and interprofessional cooperation
- Vaccination/administration of protective vaccinations

The specialist training programme, which specifically and comprehensively covers the content of public health, is the specialist medical training programme in public health [103]. This includes training in various areas relevant to public health: public health institutions, including health authorities, areas of direct patient care, sub-areas of psychiatry and psychotherapy, and a 720-hour academic course. The latter is offered – alongside other qualifications for physicians and other healthcare professions – at the Düsseldorf Academy for Public Health in North Rhine-Westphalia; the states Bavaria, Baden-Württemberg and Saxony have their own programmes.

In addition, specific public health aspects are included in the continuing medical education content for individual specialist competencies. Particular mention should be made here of the specialist competencies in general medicine, occupational medicine, hygiene and environmental medicine, internal medicine and infectious diseases, child and adolescent medicine, child and adolescent psychiatry and psychotherapy, microbiology, virology and infectious disease epidemiology, psychiatry and psychotherapy, and physical and rehabilitative medicine.

Public health aspects are also explored in depth in various additional training courses, such as emergency medicine and, in particular, social medicine.

### 2.6.3. Specialists in public health care

Core public health personnel [104] includes, in particular, physicians working in the ÖGD. In addition to medical specialists in public health, physicians with various other specialist qualifications are also employed in the ÖGD. Further training as a medical specialist in public health qualifies physicians to manage a health authority and perform official medical duties.

The diverse tasks of physicians working in the public health service include health protection, health promotion, prevention, advice and information, as well as management and coordination, health reporting and the performance of sovereign tasks, including hygiene, drinking water and bathing water monitoring. The preparation of medical reports by public health officers and the performance of duties in accordance with state laws on assistance and protective measures for mental illness (Psychisch-Kranken-Gesetz – PsychKG) also fall within the scope of their responsibilities. The responsibilities of public health specialists include, in particular, advising and supporting political representatives and civil society institutions on health policy issues (health planning, health insurance, health protection, special risk situations) and risk communication.

Since the 1990s, the German Medical Association‘s statistics have shown a downward trend in the number of physicians with specialist qualifications in public health [38]. At the same time, the proportion of female physicians in this field rose steadily. Of the 724 medical specialists in public health working on 31 December 2023, 407 were employed in public health departments, 263 of whom were female physicians. As the German Medical Association‘s statistics on physicians are based on the most recently acquired specialist title, the number of physicians with this specialist competence may be underestimated.

The overall decline in the number of medical specialists in public health is worrying and is weakening the public health service. For this reason, recruiting young talent is a particular focus. Fortunately, 55 new specialists in public health were certified in 2023, 42 of whom were women. This represents a significant increase compared to previous years (2022: 36 specialist qualifications [including 30 female physicians], 2021: 28 specialist qualifications [including 24 female physicians]).

### 2.6.4. Continuing medical education

There is no systematic overview of the wide range of educational and training opportunities and providers available. The public health sector is characterised by the fact that many interdisciplinary training events are offered. In view of the need for interprofessional cooperation, it would be desirable to have an even greater range of interprofessional training courses and a central office for recording training opportunities and providers for public health.


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In addition to medical specialty training, the Academy for Public Health in Düsseldorf and similar institutions in other federal states play an important role in continuing medical education and offer a wide range of courses for physicians in all fields, enabling them to acquire specific knowledge and skills in public health, social medicine and public health in line with their individual qualification requirements.

#### 2.6.5. Public health degree programmes

According to the German Rectors' Conference (Hochschulrektorenkonferenz – HRK) database, there are 48 full-time degree programmes in the field of public health listed in Germany. Together with other types of programmes, 76 courses are offered overall, 52 of which are master's programmes[11]. The Standing Conference of the Ministers of Education and Cultural Affairs lists a total of 65.3 professorships at 43 locations (as of January 2025). A precise overview of the annual number of graduates in this specific field is not available nationwide. However, at master's level, it can be estimated that there are 500 or more graduates per year. At the University of Bremen, for example, 55 students obtained a master's degree in the three public health programmes in 2023.

#### 2.6.6. Employees in the public health service

Various professional groups work together in the public health services (ÖGD). An overview of the personnel working in the ÖGD was compiled by the "Pakt ÖGD" advisory board and highlights the existing multi-professional nature of the ÖGD [105]. There are differences in composition between the federal states. A report by the Federal Statistical Office from September 2024 shows the large regional variation in the composition of staff in terms of age, qualifications and the size of the population to be cared for [106]. The largest professional group is physicians, followed by professions in the fields of education, social work and disability support worker, and medical assistants [107]. In order to meet future challenges in the public health service, the "Pakt ÖGD" advisory board has advocated for even greater involvement of professionals with degrees in health sciences/public health as well as in social sciences and natural sciences.

**Conclusion: Physicians as competent public health actors**

Public health is characterised by interdisciplinarity and the consideration of various disciplines of knowledge. Medicine is an essential core discipline in this context. Physicians acquire knowledge and a high level of competence in public health issues as part of their training and further education.

Public health requires a multi-professional approach. This means that we need to keep developing our understanding of the roles of the different players in public health for the health of the population and the division of labour, as well as cooperation between health professions based on mutual respect and shared values.

In addition, any considerations regarding a functional public health system must take into account the anticipated shortage of human resources due to demographic change. Digital development and the sensible use of new technologies should also be considered and promoted as a means of support and supplementation in this context.

### 2.7. Public health research

#### 2.7.1. Evidence-based public health

Scientific research provides the evidence base for public health. Relevant findings are generated through studies at various descriptive and analytical levels using combinations of qualitative and quantitative methods. In public health, practical relevance and applicability plays a central role. Studies must therefore be designed to be as practical as possible, conducted in relevant settings and geared towards transferability. Traditional clinical studies are rarely suitable in this context, as they do not reflect the heterogeneity within the populations under investigation or the complexity of the settings. Basic biomedical research can provide important insights into the aetiology and pathomechanisms of diseases relevant to population health, which should be taken into account in public health interventions. The effectiveness and safety of public health interventions in both the curative and preventive fields can be investigated in high-quality (cluster) randomised pragmatic trials. It is often important to include children and adolescents, adults who are unable to give consent, hard-to-reach population groups and people at particular risk in intervention studies. This poses ethical and organisational challenges that public health researchers must address with appropriate inclusive and participatory research strategies.

#### 2.7.2. Research funding

In 1992, the Federal Ministry of Education and Research (Bundesministerium für Bildung und Forschung – BMBF) began promoting the establishment of public health structures at universities and technical colleges by funding three public health research networks (Berlin, Northern Germany, North Rhine-Westphalia). The programme was extended and expanded several times, resulting in a total of five research networks, nine degree programmes, ten public health chairs and the Faculty of Health Sciences at Bielefeld University ([108], see page 127–141).

Since 2014, the BMBF has been funding research networks on primary prevention and health promotion (first funding period 2014–2017: seven networks, total funding of € 17,6 million). Following an interim evaluation, five networks were extended for a further three years (2018–2021, € 31 million).

The Framework Programme for Health Research (11.2018) announced plans to increase the importance of public health research in Germany. However, no call for proposals has been issued under this heading to date. In the period 2023–2032, the BMBF is funding the establishment and operation of the Lusatian Centre for Digital Public Health – for health and needs-based healthcare in Lusatia [109] (Lausitzer Zentrum für Digital Public Health – LauZeDiPH), a collaboration between the Robert Koch-Institute (RKI), Technical University of Cottbus-Senftenberg and the Leibniz Institute for Prevention Research and Epidemiology – BIPS in Bremen. Current calls for proposals from the BMBF concern, for example, the funding of intervention studies for healthy and sustainable living conditions and lifestyles [110] and research to strengthen evidence-based practice and transfer in prevention research and quality in health research [111].

[11] The master´s programmes are open to students with bachelor degrees in academic public health programmes or related subjects as well as physicians with or without specialty training.

The German Research Foundation (Deutsche Forschungsgemeinschaft – DFG) provides substantial funding in the area of Public Health, Health-Related Care Research, and Social and Occupational Medicine (Panel 2.22–02). Between 2014 and 2023, a total of approximately 1,100 grant applications were funded in this area under the keywords health research, health care and health system. Since 2019, the DFG has been funding three research groups in the field of public health [112].

As part of its departmental research programme, the Federal Ministry of Health (Bundesministerium für Gesundheit – BMG) has also been funding six selected research and development projects since April 2021 that aim to strengthen cooperation between the municipal public health services (ÖGD) and public health research. In May 2023, a further seven research projects were approved to strengthen and further develop the ÖGD. All funded projects involve close cooperation between university institutions involved in public health and partners from the public health service. Numerous other areas of activity in the BMG's departmental research touch on public health-related research topics, in particular health promotion and prevention, and strengthening health literacy among the population [113].

All of the research funding lines mentioned are, in principle, interprofessional in nature. Alongside members of other health and therapeutic professions and health sciences, physicians are the main beneficiaries of research funding in the field of public health.

### 2.7.3. Structural anchoring of public health research

Currently, public health and its main sub-areas are only research priorities at a few universities. The majority of these are universities of applied sciences, such as the universities in Fulda, Lüneburg and Neubrandenburg. Most bachelor's and master's degree programs are also offered at universities of applied sciences, although several universities are currently involved in this field as well (e.g., Bielefeld University, TU Dresden, FU Berlin, University of Düsseldorf, University of Bremen).

Currently, no medical faculty has designated public health as a research focus; however, the University Medical Center and the University of Greifswald offer "community medicine" (CM) as a research focus. In addition to the population-based prospective Study of Health in Pomerania (SHIP) cohort studies, CM includes descriptive, analytical, and interventional studies in the areas of prevention and health services research. The main areas of focus include regional, cross-sectoral, and interprofessional healthcare concepts for children, adolescents, and the elderly. The Faculty of Medicine and Health Sciences at the University of Oldenburg has been cooperating with the University of Groningen since 2019 in the Cross-Border Institute of Healthcare Systems and Prevention (CBI) on issues relating to healthcare and public health research. The University Medical Center Cottbus Innovation Center, which is currently under construction, will establish a research focus on health system and healthcare research – according to the research concept, public health issues will play an important role here [114].

Of the non-university research centres affiliated with the Helmholtz Association, six focus on health (cancer [German Cancer Research Center, DKFZ], neurodegeneration [German Center for Neurodegenerative Diseases, DZNE], molecular medicine [Max Delbrück Center, MDC], infection [Helmholtz Centre for Infection Research, HZI with its branch Institute for One Health], environment [Helmholtz Munich], energy, health, matter [Helmholtz Centre Dresden-Rossendorf, HZDR]). All centres address public health issues to varying degrees, but basic research is always the primary focus, and there is no known cross-centre concept for public health research. The DKFZ is developing cancer prevention as a new focus and is working with German Cancer Aid to establish a National Center for Cancer Prevention in Heidelberg [115].

At the German Center for Neurodegenerative Diseases (DZNE), Cardiovascular Disease (German Center for Cardiovascular Research, DZHK), Cancer (German Consortium for Translational Cancer Research, DKTK), Diabetes (German Center for Diabetes Research, DZD), Infection (German Center for Infection Research, DZIF), and Lung Research (German Center for Lung Research, DZL), public health research is not a priority. Only the DZNE has a research focus on health services research, in which public health aspects (e.g., primary, secondary, and tertiary preventive approaches to neurodegenerative diseases) are developed [116]. At the new German Center for Child and Adolescent Health (DZKJ), community medicine will be an overarching research focus in which all locations will participate (lead: Greifswald/Rostock location [117]). The second new DZG (German Centre for Mental Health, DZPG [118]) will address prevention and early detection as well as living environments (e.g., mental health in cities) as research topics.

Within the Leibniz Association, Bremen is involved in issues relating to both prevention and public health through the BIPS and the Science Campus for Digital Public Health. Other Leibniz Institutes focusing on prevention and public health include the Bernhard Nocht Institute for Tropical Medicine, the German Institute of Human Nutrition Potsdam-Rehbrücke, and the Leibniz Institute for Environmental Medicine Research (IUF).

Public health research is an essential task of the RKI and is carried out there in the departments of Infectious Diseases [119] and Infection Epidemiology [120], Epidemiology and Health Monitoring, the Center for Biological Hazards and Special Pathogens [121], Method Development and Research Infrastructure [122], the newly established Center for Artificial Intelligence in Public Health Research, as well as in the project and junior research groups and DFG-funded research projects at the RKI [123]. Many projects are carried out in cooperation between different departments and groups. For public health research, it is particularly important to consider the interaction between communicable and noncommunicable diseases and the determinants of health in intra- and extra-institutional research collaborations and to strengthen the corresponding structures [124].

The monitoring studies conducted by the RKI are particularly important, with the Children and Adolescents Health Survey playing a central role in the surveillance of the physical, mental, and psychosocial health of children and adolescents since 2003. Unfortunately, funding for further investigation of the cohort was discontinued in 2017, meaning that no readily available data was available during the coronavirus pandemic [125]. A new health surveillance panel began in 2024, but only includes subjects aged 16 and older.

The "Expert Council on Health and Resilience" of the Federal Government of Germany identified research needs and makes recommendations for the further development of infrastructure. Two related statements on public health and preventive medicine were recently published [15, 16, 117, 126–129].

There are still considerable shortcomings in the field of public health research. For example, there is a lack of standardized and structured nationwide collection and evaluation of popula-


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tion-based data (e.g., the early detection examinations for children and adolescents offered by the statutory health insurances, school entrance examinations, school dental examinations). The effectiveness, safety, and acceptance of interventions to promote and maintain health and strengthen health literacy have not yet been sufficiently studied, particularly for socially disadvantaged population groups, children and adolescents, the elderly, and people with cognitive impairments. The evidence base for public health must be further strengthened and expanded in order to effectively harness its considerable potential for improving health equity and strengthening autonomy and personal responsibility for the health of the population.

**Conclusion: Public health research**

Public health research is the basis for evidence-based population-wide prevention, strengthening health literacy and autonomy, increasing equal opportunities, and thus strengthening the health of the population and the resilience of the healthcare system. Public health research takes a holistic approach, whose research ethics requirements must be met with inclusive and participatory research designs and appropriate methodology.

It is only in the recent past that infrastructure for public health research has been established on a significant scale. University and non-university research, the strengthening of the public health service, and positive developments in the area of data protection and research data infrastructure, such as the research data center at BfArM and electronic patient records, now offer considerable potential. Research resources and expertise should be better pooled and integrated in the future. Public health researchers should work in networks and take a goal-oriented and strategic approach. Successful interventions should be implemented promptly in real-world settings, with their acceptance and health economic efficiency systematically monitored and their population-based success quantitatively measured using relevant endpoints.

The systematic development of existing population-based data sources and improved access to healthcare-related data, e.g., from health insurance companies, cancer registries, population-based cohorts, and surveys, are essential foundations for evidence-based public health research and practice. To this end, the establishment and management of central data infrastructures and the digitisation of all processes in the field of public health are of great importance.

Methodological and scientific progress, including in specific areas of medicine, cannot and should not be limited to individual benefits, but should also be applied at the population level in the interests of public health. One example of this is the advances made in the field of molecular medicine with the establishment of what is known as "molecular public health".

## 3. Perspectives on public health, including international implications

This chapter summarizes the results of a discussion held by international and national experts on 28 October 2024 (s. Ch. 6.3.).

### 3.1. International implications

When formulating perspectives on public health in Germany, it is worth comparing public health systems in other countries and the joint strategies of supranational organizations such as the WHO.

As already emphasized in this paper, the WHO's *essential public health functions* [6], serve as agreed guidelines for the content of national and international public health strategies. At the application level, these are organized in a system in which the responsibilities and structures of the bodies involved in public health vary considerably from country to country. This is largely due to the overall organizational structure of the state, and thus also that of the healthcare system (e.g., centralized states as opposed to federal states with federal structures). There are also differences in the interpretation, emphasis, and implementation of public health in the various national concepts, insofar as these exist in a clear form.

In a national organizational structure, government agencies, public health institutions, healthcare providers (including the medical profession), and non-governmental organizations (NGOs) with their respective divisions of responsibilities generally appear to be involved in the success of the public health strategy through close cooperation and exchange [130].

Many countries around the world maintain national public health institutes, which differ in their specific ranges of responsibilities, in their intranational cooperation with other institutions and public health actors, and in their integration into the respective state organizational structures. In 2023, the Scientific Services of the German Bundestag compiled a status report for various countries in Bundestag printed paper WD 9 – 3000 – 011/23, which allows for a closer look at the different national public health institutes of selected countries [131].

The overarching structure is the "International Association of National Public Health Institutes (IANPHI)", whose stated goal is to strengthen the participating countries' capacity to act in the field of public health by networking and structurally developing national public health institutes. The IANPHI states that this goal is to be achieved through the establishment of new national public health institutes, targeted capacity building of institutions, and the promotion of individual inter-institutional cooperation. Currently, 123 national public health institutes from 103 countries are represented in the IANPHI (as of 12 June 2024) [132]. Both the Robert Koch-Institute (RKI) and the Federal Institute of Public Health (Bundesinstitut für Öffentliche Gesundheit – BIÖG/formerly Bundeszentrale für gesundheitliche Aufklärung – BZgA) are involved in this merger on behalf of Germany.

In addition to the RKI and the BIÖG, which – according to their understanding of their tasks – are key players in a national public health concept, the number of other public health actors is almost impossible to keep track of. Numerous organizational structures that are necessary for a functioning public health system are already established in Germany. However, structures will need to be further developed so that the individual actors function as part of an overarching public health strategy in order to perform the numerous and diverse tasks of public health in close coordination, consideration, and entirety, and to avoid duplicate structures and inconsistencies – the "Health in All Policies" approach should be mentioned here as a guiding principle. This important task has also been identified as such by politicians [133]. Furthermore, the "Health for All Policies" approach is now understood as a further development of the earlier "Health in All Policies" approach [134, 135]. In this context, particular emphasis is placed on the mutual benefits of the va-

rious policy areas from the perspective of health promotion. In all public health systems, physicians play a central role in public health structures, both as part of central government structures, such as the ÖGD in Germany, for example, but also in primary care and in areas outside the health care system. One advantage here is the range of specializations within the medical profession, which, thanks to its diverse fields of development, ensures that physicians are positioned at many levels of public health structures and contribute to strengthening these structures in various areas of application.

In addition to structural differences and diverging international priorities in public health measures, there are also significant differences in the financial support provided for public health. A direct comparison of national health expenditure is only possible to a limited extent due to the sometimes significantly different definitions of public health in the countries under consideration [136]. It is therefore unclear which preventive measures for individual patients, which in a preventive understanding of public health would certainly be attributable to public health expenditure, are included in the cost evaluation under general health expenditure. However, the publication released in 2019 suggests that, in the wake of the economic crisis, there appears to have been a trend toward cost savings in public health expenditures in many European countries, with general public health expenditures diverging significantly in this regard [136].

According to data from the Federal Statistical Office, of the total healthcare expenditure (€ 497,661 million) for Germany in 2022, € 39,141 million will be allocated to the area of "prevention/health protection", € 29,316 million will be spent on "general health protection", but only € 5,796 million will be spent on "health promotion". These categories are financed through a combination of public funds and health insurance funds [137]. The situation described above remains unchanged, namely that it is not possible to clearly differentiate exactly how much funding is available for a public health strategy from the federal government's health expenditure. The report by the Expert Council on Health and Care on the subject of "skilled workers in the healthcare sector" shows that only 0.21 % of total statutory health insurance expenditure in 2022 was allocated to "prevention and health promotion" [138].

### 3.2. The role of public health in Germany from an international perspective

The following chapter will outline the recommendations of international experts on establishing public health and its structures in Germany with regard to the role of the medical profession.

There is a lack of transparency regarding financial expenditure on public health in Germany, and the measures defined in a national public health strategy remain unclear in some respects. In October 2020, the German government published its concept paper "Global Health Strategy of the German Federal Government" which places particular emphasis on Germany's role in the field of global health. Successful international engagement in the field of public health requires a functioning public health system at the national level.

The WHO has clearly emphasized the particular importance of primary health care, i.e., care provided by family physicians, as a crucial pillar in promoting human health [139]. Patients' access to the healthcare system at the primary care level offers the medical profession in particular the opportunity to work with a broad section of the population, both in terms of individual medicine and, in a broader sense, population medicine. The Astana Declaration of the Global Conference on Primary Health Care points out, among other things, the close interconnection between primary health care and essential public health functions [140]. This particularly underscores the prominent role of the medical profession in national and international public health strategies, as physicians can act as a link between individual and population medicine. The fact that the medical profession plays an important and decisive role in the public health workforce is also rooted in the self-image of the medical profession. The mission to promote, maintain, and restore health, both in terms of individual medicine and public health, is reflected, among other things, in the Federal Medical Code in § 1 (1): *"Physicians serve the health of the individual and of the population"* [141].

The link between individual and population-based approaches can be seen, for example, in preventive measures that have an impact both in the context of individual patient treatment and, to a corresponding extent, on the population as a whole. It is undisputed that prevention is a central task of medicine. The absolute necessity of prevention is obvious. The 2023 country profile on health shows that preventable deaths in Germany in 2020 remained below the European Union average at 157 deaths per 100,000 inhabitants [142]. Malignant lung diseases, alcohol-related diseases, and ischemic heart disease remain the leading causes of preventable diseases [142]. Prevention programs with a broad scope (e.g., nicotine and alcohol cessation) are supported by measures at the primary care level in order to further increase their success – physicians play a central role in this.

In addition to the outlined responsibility that the medical profession assumes for public health issues through the performance of its duties in primary care, there are additional opportunities for the medical profession to exert influence in an overarching public health strategy. A strong position for the medical profession in promoting a national public health structure requires specific knowledge, continuing education and training opportunities, and the practice of multi-professional joint action, which are recognized by the respective actors. This enables physicians to act powerfully as public health actors and to be more strongly recognized as such.

All of these aspects require a clear, transparent national public health structure that allows for the identification and interaction of all public health actors. A coherent strategy is needed that allows for further development, networking, and error analysis and correction at both the overarching and individual responsibility levels in order to design a sustainable public health system. As a public health actor on many levels and through its function as a link, the medical profession can play a key role in national and international public health systems and, in line with its professional profile, is committed to strengthening public health.

## 4. Recommendations

Health and equal health opportunities require healthy living conditions and environments. Political decisions influence national and global health as well as the environment; they must therefore **be recorded across departments and taken into account in line with a "health in all policies" approach**. The development and implementation of such an overall strategy and overcoming fragmented public health approaches require strengthening a shared understanding [143] of public health among all stakeholders. Accordingly, a public health strategy is needed that systematically harnesses the positive approaches of health promotion and prevention nationwide and integrates them into other important public health functions such as health protection, crisis


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management, health communication, multi-professional education, training, and continuing education, as well as research. Responsibilities for public health should be brought together and coordinated more closely, as the current interministerial coordination has proven to be neither successful nor appropriate. The large number of stakeholders **requires transparent coordination and comprehensive governance structures**. This requires a **whole-of-government approach** with strong and sustained involvement of non-governmental actors and civil society itself. A professional and appreciative approach to meaningful division of labour is the key principle of cooperation between all actors in public health. In addition, **political sanction and incentive systems (regulation)** are essential in order to establish the best way to achieve better health for all in the long term in terms of contextual prevention and to counteract the **prioritization of curative over preventive measures** in healthcare. Barriers exist at many levels: Individual and organizational health literacy is inadequate, as are political priorities and funding for a strong public health system with an emphasis on health promotion and prevention at all levels. Of particular importance are the obstacles posed by commercial interests and lobbying, which stand in the way of implementing an overall strategy for improving health for all (commercial determinants of health) and require clear and well-communicated responses.

The **medical profession plays a central role** in a comprehensive and scientifically sound public health strategy. Within the framework of Germany's well-established medical curative care system at the individual level, it can contribute to health promotion and prevention. Thanks to the population's broad access to primary care, these measures are also effective in terms of public health. This must be accompanied by strong preventive measures, without which individual measures to change lifestyle-related individual behaviour often remain ineffective. **Physicians also play a central role** in health protection, especially in the workplace and in facilities for children and adolescents – they must be given much better support in taking on this task, and existing barriers must be removed. Here, different responsibilities between the states and the federal level, heterogeneous legal foundations, and a large number of different types of actors, which also vary from state to state, make effective coordination and communication difficult. In addition, the **deployment of medical professionals should be more clearly bundled** in order to make more effective use of their skills and to clearly define the role of physicians in interprofessional action in public health. Furthermore, **suitable channels of cooperation and communication** should be created to improve joint coordination of health protection measures.

**Smooth cooperation between various medical and non-medical organizations and structures** is particularly important in public health crises and disaster situations and requires a strong public health perspective, not least for the adequate planning of medical resources and decision-making processes. Preparatory measures should be taken for disasters, pandemics, and other major incidents. These measures must ensure that **specific medical expertise is integrated into the processes** (including disaster management and planning, healthcare management, psychosocial support) and that appropriate (crisis) teams are **adequately planned.** These preparatory measures and the targeted integration of specific medical expertise can strengthen interprofessional cooperation in the field of public health in the long term. The aim is to effectively and precisely manage the health consequences of unforeseen events with supraregional implications.

**Active participation in data collection at all levels, achieving and ensuring the best possible data quality, knowledge-based use** of diverse data sources, and **interpretation of the results** derived from them are of great importance for the strategic orientation of the medical profession's public health tasks. An indispensable basis for evidence-based public health research and practice is the systematic development of existing population-based data sources, such as early detection examinations for children and adolescents and school entrance examinations, as well as improving access to care-related data, such as health insurance, cancer registries, population-based surveys, and cohorts. To this end, **the establishment and management of central data infrastructures and the digitization** of all processes in the field of public health, as well as an inclusive and participatory methodology, are of great importance. University and non-university research, the strengthening of the public health service, and positive developments in the areas of data protection and research data infrastructure, such as the research data center at BfArM and electronic patient records, offer considerable potential that must be realized in a timely manner. Research resources and expertise should be better pooled and integrated in the future.

**Continuous and systematic collection, analysis, and evaluation of health-related data**, as well as **targeted and needs-based reporting**, are essential for identifying problems and for planning, implementing, and evaluating public health measures. The quality and significance of health data must be evaluated using scientific methods at the national, state, and local levels, combined with data from other areas such as social indicators or environmental data where appropriate. Social determinants must always be taken into account when analysing and classifying communicable and non-communicable diseases. Public health researchers should work in networks and take a goal-oriented and strategic approach. Successful interventions should be implemented promptly in real-world settings, their acceptance and health economic efficiency systematically monitored, and their population-based successes quantitatively measured using relevant endpoints. The **systematic scientific review of the effectiveness and success of public health measures** should be promoted, and structures that have proven successful should be consistently prioritized in policy. Issues relating to the underlying mechanisms of health and its maintenance must become a greater focus of research. Appropriate and effective evaluation systems, the necessary research infrastructure, and the inclusion of medical expertise in the analysis of data and the derivation of measures serve to avoid ineffective treatment approaches. Where measures or programs with very low or unclear value (low-value programs) are identified, consistent and systematic "de-implementation" is essential.

**Knowledge-based and effective health communication** is a prerequisite for successfully accomplishing all essential public health tasks, such as health promotion and prevention, reducing health inequalities, risk communication in the event of hazards, health protection, and crisis management. It plays a particularly important role in promoting both participation in the social community and commitment to social interaction, as well as in the equitable distribution of health opportunities. Physicians have a special responsibility to communicate evidence-based knowledge and should advocate for the expansion of digitalization, the appropriate use of technical innovations, and the responsible application of AI in health communication as well.

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As part of the working group's deliberations, a technical discussion was held on 28 October 2024, with the national and international institutional experts listed below. The experts received questions prepared in advance by the members of the working group prior to the technical discussion. Based on these questions, the experts gave presentations. Two participants submitted written answers to the pre-formulated questions. The participating experts were informed in advance of the expert discussion that they were not authors of the statement. The evaluation and recommendations in Chapter 3 correspond to the results of the expert discussion.

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