INSPQ INSTITUT NATIONAL DE SANTÉ PUBLIQUE DU QUÉBEC

ANTICIPATING TOMORROW'S CHALLENGES: ORIENTATIONS AND PRIORITIES FOR SCIENTIFIC DEVELOPMENT

2024-2029
SCIENTIFIC PROGRAM

Québec

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Institut national de santé publique Québec

Legal deposit – 4th quarter 2024
Bibliothèque et Archives nationales du Québec
ISBN: 978-2-550-97843-5 (French printed version)
ISBN: 978-2-550-97844-2 (French PDF)
ISBN: 978-2-555-00074-2 (Printed version)
ISBN: 978-2-550-99208-0 (PDF)

TABLE OF CONTENTS

	A WORD FROM THE PRESIDENT AND CEO		2
	A WORD FROM THE VICE-PRESIDENT FOR SCIENTIFIC AFFAIRS		3
	SUMMARY		5
1	INTRODUCTION		6
	1.1	The foundations of public health	6
	1.2	The INSPQ, a cornerstone of Québec's public health network	6
	1.3	The purpose of the scientific program	7
	1.4	The framework and development process	8
2	A CHANGING WORLD: MAJOR TRENDS LIKELY TO AFFECT HEALTH		12
	2.1	Growing social and economic disparities	12
	2.2	An aging population	14
	2.3	Immigration and demographic diversification	14
	2.4	Climate change	15
	2.5	Increasing frequency and scale of health threats and emergencies	16
	2.6	Social changes associated with digital transformation	17
	2.7	Changes in the world of work	18
3	AN INSTITUTE ON THE MOVE: MODERNIZING OUR ACTIVITIES		20
4	EVOLVING THEMES: OUR PRIORITIES FOR SCIENTIFIC DEVELOPMENT		22
	Developing and maintaining health throughout the life course		23
	4.1	Family environment and early childhood	23
	4.2	Youth development, educational success, and safety	24
	4.3	Healthy aging	25
	Adoption of healthy and safe lifestyles and environments		26
	4.4	Physical and natural environment	26
	4.5	Built environment	27
	4.6	Workplaces	28
	4.7	Social and community environments	29
	4.8	Lifestyle habits	30
	4.9	Psychoactive substances and addiction	31
	4.10	Safety and violence prevention	32
	Infectious disease prevention		33
	4.11	Immunization	33
	4.12	Infectious risks in healthcare settings	34
	4.13	Transmission of infections in the community	35
	Emergency preparedness and response		36
	4.14	Identifying threats	36
	4.15	Preparing for and responding to public health emergencies and disasters	37
5	A LIVING PROGRAM: CONDITIONS FOR SUCCESS AND FOLLOW-UP MECHANISMS		38
	5.1	Conditions for success	38
	5.2	Mechanisms for monitoring and adjustment	41
6	CONCLUSION		42
APPENDIX 1	List of Contributors		44
APPENDIX 2	development approach and methodology		46
APPENDIX 3	Summary of strategic directions in scientific development		49

A WORD FROM THE PRESIDENT AND CEO

Public health institutions, such as the Institut national de santé publique du Québec (INSPQ), live intensely in the present moment. It's what we do. A new problem, a new question, a new incident demands the attention of our experts every day: a contagious outbreak here, a toxic leak there, a new pathogen reported by the World Health Organization, alarming poverty statistics, an innovation in need of evaluation, a diagnosis in need of confirmation. Always available, ready to drop everything and respond to an emergency, to reassure a decision-maker, to inform, sometimes to convince. We love our work and we do it conscientiously and often passionately.

So why a five-year plan like the one that's in front of you today? What's the point, when the news comes with its own succession of orders and requests, all urgent, all top priority? The answer is simple: to be ready. So that we're never (or almost never) caught off guard. To understand the questions before they're even asked and to know some of the answers beforehand. The act that created the INSPQ 25 years ago clearly foresaw this, making it one of our obligations to identify and prepare for emerging challenges.

As you will see in the following pages, it's not easy to anticipate, in public health as elsewhere. The INSPQ teams who devised this plan, and above all that of the Vice-Chair for Scientific Affairs, had to find a method of separating the essential from the incidental and identifying the most important trends. Predicting, in fact, means choosing: the most serious threats, the fundamental changes, the prospects that must be given the best chances—the results are compelling. There will be adjustments and updates over the years, but I'd be surprised if the INSPQ didn't emerge stronger from the process. Thank you to everyone who helped us prepare for the future.

Pierre-Gerlier Forest, Ph. D. FACSS

A WORD FROM THE VICE-PRESIDENT FOR SCIENTIFIC AFFAIRS

Here, as elsewhere, the world is changing. The transformation of our society is accelerating, driven by major trends that are creating new challenges and opportunities. For a centre of expertise and reference like the Institut national de santé publique du Québec (INSPQ), it's crucial to have a framework that enables us to anticipate the public health issues involved, document their progress, and study promising courses of action to meet them. Only then will the INSPQ be able to enlighten decision-makers and the public on the best ways to protect and improve the health of our communities, using relevant, solid, and timely data and knowledge.

With all of this in mind, we present our *2024–2029 Scientific Program*, which defines the orientations and priorities for scientific development over the coming years. They are the fruit of a collective exercise in reflection and vision, drawing on the complementary nature of the INSPQ's various cutting-edge areas of expertise, which are the strength and hallmark of our organization. They will guide our efforts to develop our programming and service offering, so that we are ready to meet any public health challenges that may arise in the future.

On behalf of myself and the organization, I would like to extend my warmest thanks to all those who have contributed to this essential, anticipatory work.

Éric Litvak, M.D., M. Sc., M.M. FRCPC

SUMMARY

The Institut national de santé publique du Québec's *2024–2029 Scientific Program* is the result of a collective process of reflection. It identifies the main emerging or growing public health issues and pinpoints the areas where our knowledge and capacity for action need to progress.

This view of the future is crucial for decision-makers and public health authorities, as well as for the general public and civil society.

To structure its thinking and the development of its scientific program, the INSPQ has identified seven major contemporary trends that are likely to have a significant impact on public health in the near future. It is further grounded in a model that organizes the main determinants of health around fifteen themes and distinguishes five essential scientific activities at the crossroads of knowledge and practice.

The scientific program includes:

- Fifteen (15) orientations, indicating the general direction the INSPQ intends to follow to adapt to major trends that may affect public health and to modernize its essential scientific activities.
- Forty-one (41) priorities in scientific development, specifying avenues for better monitoring, better understanding, and better preparation for action on emerging issues related to themes of interest in public health.

In order to give concrete expression to these orientations and priorities for scientific development, certain conditions for success are required. These include the importance of scientific leadership, interdisciplinarity, and collaborations and partnerships.

This scientific program will be a key tool in guiding the INSPQ's work over the coming years. These orientations and development priorities will need to be embodied in future scientific outputs and annual programming. Monitoring mechanisms will assess progress and enable the program to be adjusted periodically as the context demands.

1. INTRODUCTION

1.1 The foundations of public health

Every modern society has a public health system that looks after the health of its population and the well-being of individuals and communities. This system complements the care system, which provides individual medical services. It acts on a population scale to promote health, prevent disease, and protect against the most significant health risks.

Public health must first analyze health needs and establish a population diagnosis. In other words, it determines which health problems carry the greatest burden in the population according to their frequency and severity. It focuses specifically on health problems that can be avoided or that can be acted upon to mitigate their consequences.

Next, public health needs to better understand the various factors that contribute to the appearance of these health problems or, on the contrary, to their prevention or the maintenance of good health. These factors include social and economic conditions, environmental characteristics, living and working environments, group and individual behaviours, and biological and hereditary factors. These factors, which act upstream and influence the occurrence of avoidable problems, are called determinants of health.

Finally, public health must establish effective ways of acting on these determinants in order to improve the health of the whole population and its subgroups. Its arsenal is made up of a wide range of interventions, from public policies to personalized interventions. To implement them, public health works with partners from different sectors who have the levers required to alter certain determinants of health, sometimes in a role of influence, support, or collaboration.

1.2 The INSPQ, a cornerstone of Québec's public health network

The diversity of preventable health problems, the complexity of the determinants behind them, and the wide range of interventions they require make public health a highly transdisciplinary field. This is based on the integration of a vast spectrum of data, methods, and scientific or experiential knowledge. High standards must be met in order to acquire cutting-edge expertise in all areas of public health. The scarcity of experts in this field makes it impossible to extend this expertise to many regions of the province. That's why, in 1998, Québec created a unique centre of expertise and reference: l'Institut national de santé publique du Québec.

In the Québec system, the regional public health departments and the Ministère de la Santé et des Services sociaux, guided and supported by the Direction nationale de santé publique, are responsible for implementing the *Programme national de santé publique* and the regional action plans. The INSPQ assists and advises these authorities and their partners, providing them with a wide range of products and services at the cutting edge of knowledge and practice. This ensures that public health decisions, programs, or interventions are based on the most solid science, in a timely and cost-effective manner.

The INSPQ's scientific products include health-surveillance and threat-monitoring data and analyses; publications and tools to synthesize existing knowledge and make it accessible; guidances and recommendations, some of which are drawn up by permanent expert committees with a long-term vision of complex issues; research and development reports, which lead to new knowledge; and evaluation work, which looks at risks present in a specific context in order to support their management, or at interventions in a real-life environment in order to guide their implementation and dissemination on a wider scale.

The INSPQ's services include various forms of support and consultancy for its partners; training for people working in different sectors, including the healthcare system; highly specialized laboratory services in microbiology and toxicology offered by two leading laboratories (the Laboratoire de santé publique du Québec and the Centre de toxicologie du Québec); and specialized screening services for people in vulnerable situations or remote locations. These services support clinical activities by providing access to screening and reference diagnostic tests. They are also essential to public health efforts, whether for surveillance, threat vigilance, risk assessment, epidemiological surveys, or monitoring developments during public health emergencies or crises. Finally, in conjunction with its academic partners, the INSPQ also plays an important role in teaching and research, thus ensuring the availability of a qualified next generation of scientists and the development of new knowledge.

1.3 The purpose of the scientific program

To fully assume its role, the INSPQ must not only be at the forefront of the most recent advances in public health, it must also anticipate the challenges of tomorrow. This forward-looking approach is crucial for decision-makers and public health authorities, as well as for the general public and civil society. That's why the INSPQ's has a mandate to inform the public about emerging problems, their determinants, and effective ways of preventing them.

The *2024–2029 Scientific Program* is the result of a process of reflection that recognizes that not everything can be predicted. It identifies the main emerging or growing public health issues and pinpoints the areas where our knowledge and capacity for action need to progress.

It represents a kind of "scientific compass" that will guide the development of the INSPQ's work over the coming years. Different from the INSPQ's usual scientific products, this program is in fact an exercise of anticipation and positioning.

Although primarily intended for the INSPQ's teams and public health authorities, this document aims to:

- Present our reading of the context and the main emerging or growing public health issues;
- Specify the orientations we intend to follow and the scientific developments we feel should be given priority in response to these challenges;
- Highlight the conditions required to achieve these developments and exercise our anticipatory role on an ongoing basis.

The scientific program does not cover all the important topics on which the INSPQ is already working and will continue to work. A more comprehensive overview of the INSPQ's products and services can be found in its annual program.

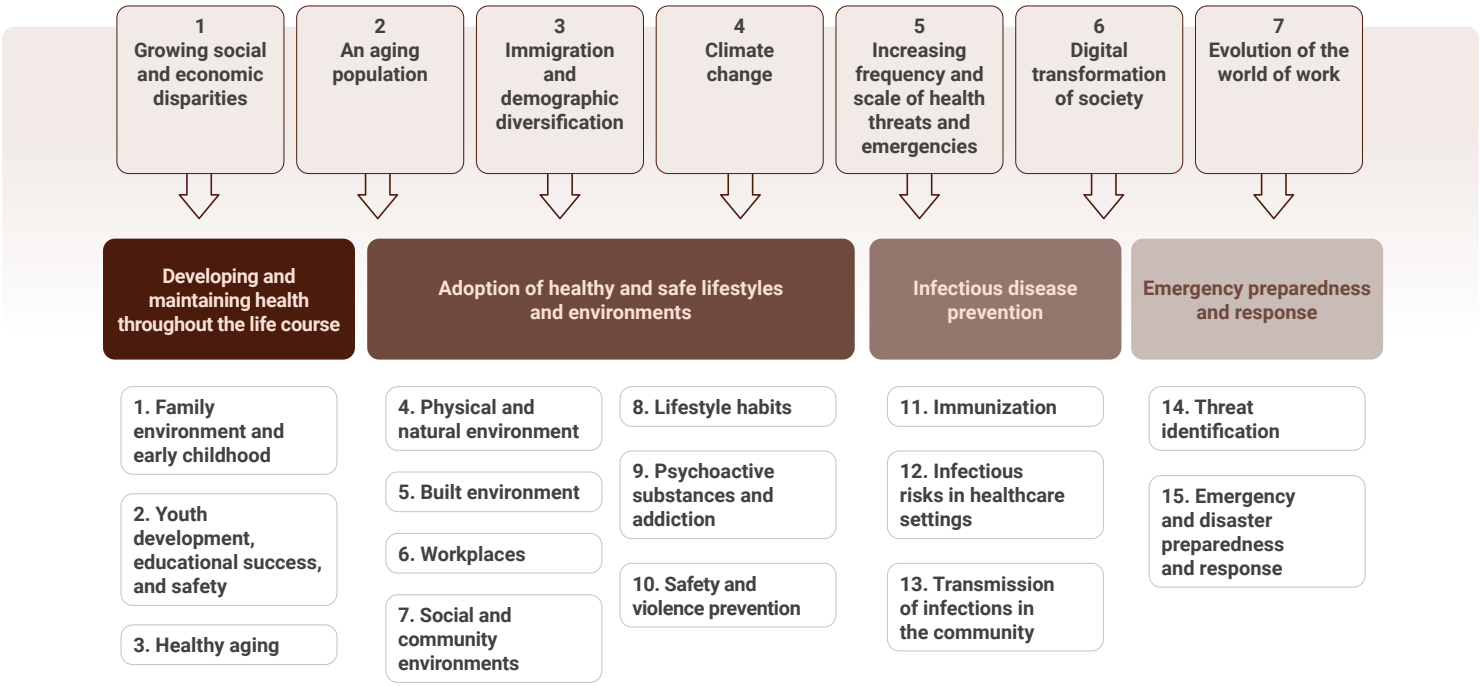
1.4 The framework and development process

More than 200 INSPQ staff from all departments and with a wide range of expertise (Appendix 1) contributed to the development of this scientific program. The approach (Appendix 2) was based on a rapid review of the grey literature and information available on the websites of scientific and public health organizations, as well as on the reflections of numerous interdisciplinary working groups.

The first step was to identify the major contemporary trends that characterize the evolution of the world and Québec society and that are likely to affect public health in the years to come. A process of review, analysis, and reflection has led the INSPQ to select seven of them, and to define a general **orientation** to be followed in response to each.

In order to narrow down the range of topics to be considered, the INSPQ then drew up a framework that organizes the determinants of health into 15 essential themes, themselves divided into four groups. This framework is based on the one used for the INSPQ's previous program, as well as for the *Programme national de santé publique 2015-2025*.

Figure 1. Seven major trends and fifteen key themes for public health

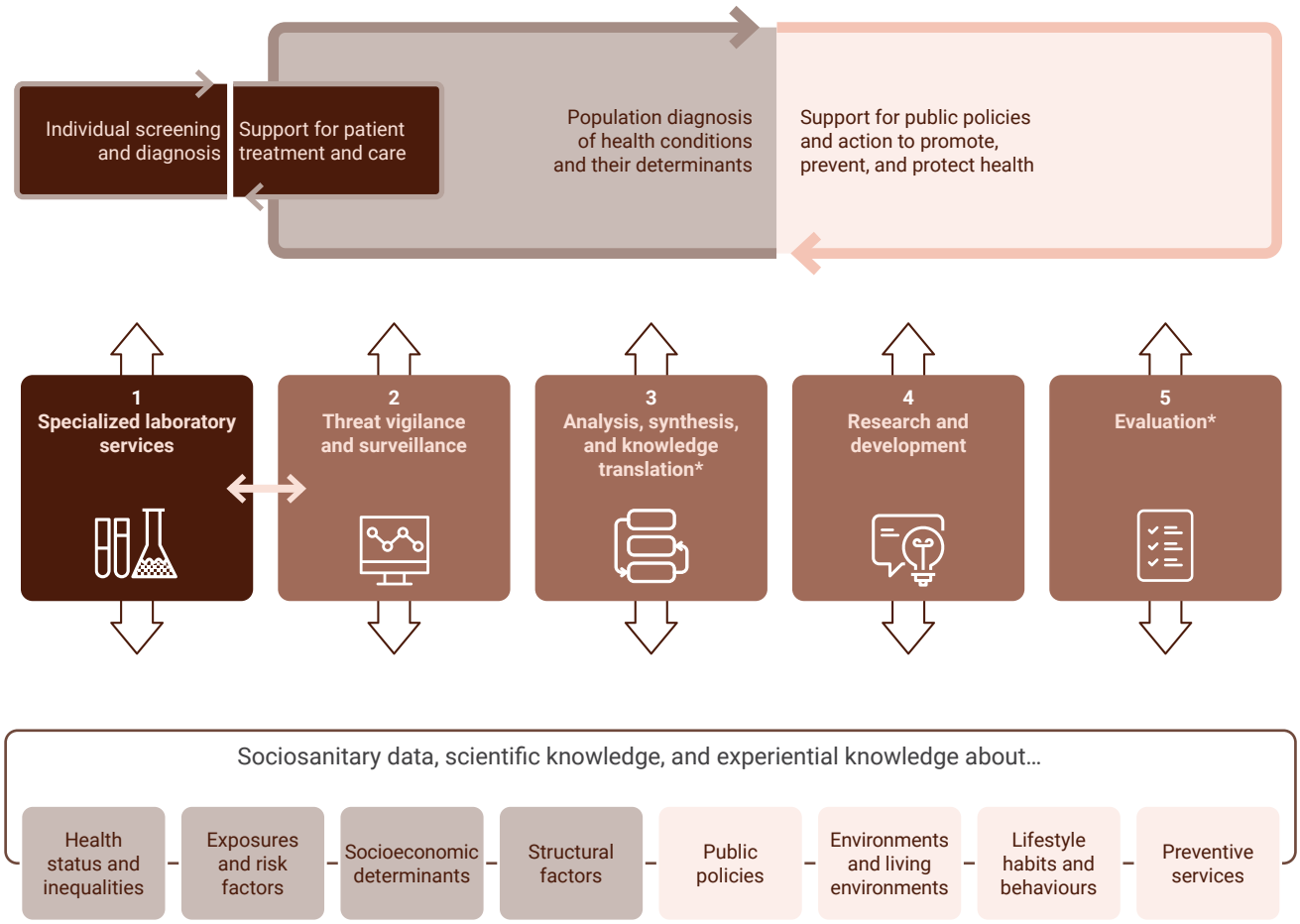


By considering the influence that the seven trends are likely to have on each theme, working groups have proposed **priorities for scientific development** based on them.

To clarify these development priorities, we have identified five key scientific activities of the INSPQ, at the interface between knowledge and practice: specialized laboratory services; monitoring and surveillance; analysis, synthesis, and knowledge translation (including guidance and recommendations); research and development; and evaluation. These activities draw on health data, scientific knowledge, and experiential know-how to facilitate the diagnostic and intervention work of public health authorities, clinicians, and other partners. Through its original contributions, the INSPQ also enriches the knowledge base from which it draws.

Other working groups focused on these five core scientific activities, to reflect on more cross-cutting considerations and define orientation for each.

Figure 2. Five of the INSPQ's key scientific activities at the interface between knowledge and practiceles pratiques



* including guidance and recommendations

To summarize, in the following sections:

- The **orientations** indicate the general approach the INSPQ intends to take in the coming years to adapt to major trends that may affect public health and to modernize its essential scientific activities. The orientations will influence the work of many of the organization's teams.

- The **priorities for scientific development** specify the paths we need to follow to better monitor, understand, and act on the emerging issues associated with each theme. These priorities are more specific than the orientations, but they are nevertheless quite broad in scope, paving the way for several types of scientific activity.

Before proceeding, here are a few points of clarification. The field of public health requires us to look at the health of the population from several angles: that of the various health problems that affect it and that we wish to prevent; that of the multiple determinants that influence these problems and on which we can act upstream; and that of the different subgroups of the population, in particular those with a disproportionate burden of problems, under the effect of structural factors and an accumulation of unfavourable determinants.[1]

First, the INSPQ has chosen to define its priorities for scientific development according to themes that correspond to health determinants, rather than health problems. Indeed, many of the health problems we want to prevent are influenced upstream by the same determinants.

Second, subgroups of the population living in conditions of vulnerability are included in each theme, even if they are not explicitly mentioned. Public health is concerned not only with the health of the population as a whole, but also with its distribution and equity between different subgroups. The INSPQ is particularly concerned with improving health outcomes for Québec's Indigenous populations and communities.[2]

Third, the INSPQ recognizes the importance of access to healthcare and services as a determinant of population health. As responsibility for this field of expertise is shared with several organizations, including the Institut national d'excellence en santé et en services sociaux and the Commissaire à la santé et au bien-être, it is excluded from the fifteen themes addressed in Section 4.

1. This concept will be taken up again in Section 2.1.
2. Réseau francophone international pour la promotion de la santé and Centre de collaboration nationale des déterminants de la santé. (2022). Glossaire des principaux concepts liés à l'équité en santé. Montréal (QC): RÉFIPS; Antigonish, NS: CCNDS, St. Francis Xavier University.

2 A CHANGING WORLD: MAJOR TRENDS LIKELY TO AFFECT HEALTH

The INSPQ has identified seven major trends that will catalyze social transformations and are likely to have an impact on public health over the coming years. These complex and interrelated trends are the result of the interplay between various global systemic forces, such as ecosystem, demographic, geostrategic, and technological changes. While some of these trends may have positive aspects, the ability of people and organizations to adapt to them will be put to the test, which is why they are so important. The INSPQ is already working on some of these trends. For others, it means developing or strengthening expertise and collaborations. The INSPQ wishes to better understand the effects of these trends on the health of the Québec population in order to support interventions likely to reduce the negative repercussions or improve the health of different subgroups. In this section, we present for each trend:

- A short description of the trend;
- An overview of its anticipated effects;
- The orientation adopted by the INSPQ in response.

2.1 Growing social and economic disparities

Description

Social and economic disparities are on the rise around the world, including in Québec, as evidenced by the simultaneous increase in the concentration of wealth at one extreme and homelessness at the other. The crisis associated with the COVID-19 pandemic has exacerbated these disparities as much as it has highlighted them. Certain subgroups of the population have been particularly hard hit: women, racialized and Indigenous people, the less affluent or marginalized, precarious workers, seniors, and young people.

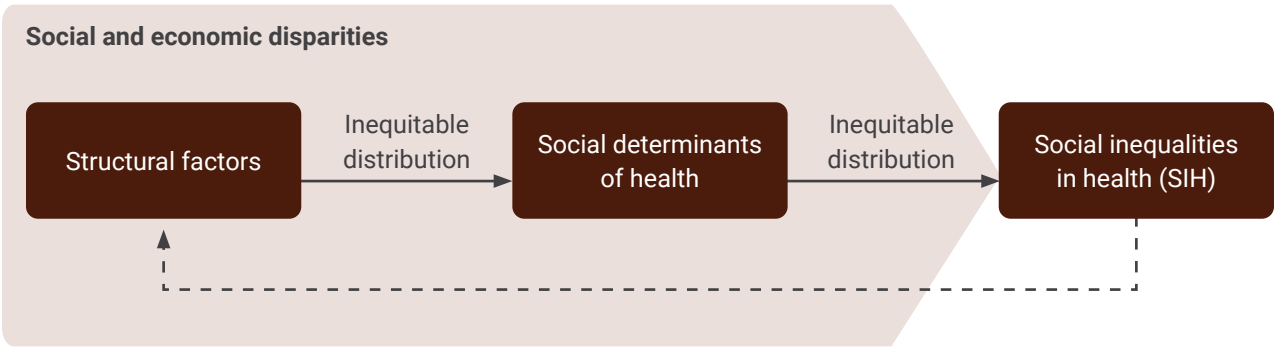
Upstream, social and economic disparities are rooted in **structural factors**[3] (political and economic context, public policies, business practices, culture, and societal values). These factors can create or reinforce a hierarchy of socio-economic positions or discrimination, based on education level, occupation, income, gender, age, "race"[4], or ethnicity, physical ability, membership in an Indigenous group, immigration status, gender identity or expression, sexual orientation, or religion. These structural factors contribute to the progression of disparities and their perpetuation across generations. First Nations and Inuit people are particularly affected by these disparities due to the historical context of colonialism and systemic racism.

3. Also referred to in the literature as structural or distal determinants of health, or social determinants of social inequalities in health.
4. The quotation marks are used because the notion of "race" is the subject of debate in the French-speaking world. On the one hand, it is argued that its use should be avoided, given the biological determinism to which it refers. On the other hand, it is argued that, taken as a social construct, its use is preferable to help gain recognition for the social phenomenon of racism. The use of quotation marks underlines this ambiguity.

Effects

Social and economic disparities are intimately linked to the **social determinants of health**.[5] These determinants correspond to the circumstances in which people are born, grow up, live, work, and age (e.g., housing, working, and employment conditions, social support, access to care and services). Growing disparities inevitably lead to an increase in **social inequalities in health (SIH)**. SIH are modifiable, unfair, and systemic differences in health status, linked to structural and social disadvantage. The more socially and economically disadvantaged people are, the worse their health is likely to be. In short, structural factors maintain an inequitable distribution of the social determinants of health, which generate more SIH (Figure 3).

Figure 3. The origins of social inequalities in health (SIH) in the population



Social and economic disparities can also amplify the negative health effects of other major trends, and, vice versa, certain trends are likely to increase disparities and SIH. To reverse this trend, more and more scientific and public health organizations are recognizing the need to better understand the role of structural factors on population health, as "causes of causes," in order to support actions aimed at modifying them.

Orientation

➦ The INSPQ will encourage approaches aimed at modifying structural factors and increasing the participation of relevant subgroups of the population in its work, in order to promote health equity.

5. Also referred to in the literature as the intermediate determinants of health.

2.2 An aging population

Description

The world's population is aging at an unprecedented rate. In Québec, the number of older adults and their proportion of the population will continue to grow significantly over the next few years. The rapid aging of Québec's population is the result of rising life expectancy, declining fertility, and the advancing age of the baby-boomer generation.

Effects

Healthy aging offers opportunities to continue working, engage in new activities, and make a positive contribution to families and communities alike. However, Québec's accelerated aging process raises major societal challenges. These include increased demand for healthcare; the need for adapted, affordable, and safe housing; adapted transportation; the development and maintenance of social ties, including intergenerational ties; issues of inclusion and digital literacy; and challenges in the workplace. This trend also presents challenges for aging people (cognitive decline, cumulative chronic illnesses, loss of mobility, social isolation, ageism, etc.) and for family caregivers.

Orientation

➦ The INSPQ will become more involved in monitoring aging and identifying best practices to promote healthy aging and the social contribution of seniors.

2.3 Immigration and demographic diversification

Description

Global migration has existed for a long time, but it is intensifying as a result of poverty, conflict, social and economic disparities, climate change, and environmental degradation. In recent years, Canada, including Québec, has granted permanent resident status to a record number of new arrivals (e.g., economic immigrants, immigrants applying for family reunification, refugees). This trend is likely to continue, particularly in response to a labour shortage caused mainly by the aging of Québec's population. Temporary immigration (e.g., temporary foreign workers and their families, foreign students, asylum seekers, migrants with precarious status) is also on the rise. Refugees, asylum seekers, and people with precarious status have sometimes experienced difficult circumstances in their countries of origin, facing trauma, violence, and infectious diseases (among other things). Some have experienced long and complex migratory journeys to reach Canada.

Migrant status is an important determinant of health, determining eligibility for healthcare and social services, and influencing the ability to access quality employment. Many immigrants arrive with a health status comparable or better than that of the general Canadian population. However, the health status of some of them deteriorates over time. There are still SIH based on migratory status, ethnic origin, language, or religion.

Effects

While immigration brings many demographic, economic, and cultural benefits, it can also pose societal challenges. In the absence of proper planning, they put pressure on already overburdened systems such as health and education services, as well as housing. Low social acceptance of immigration by the host society, discrimination, segregation, social polarization, or low adherence of immigrants to the values favoured by the host society all have an impact on social cohesion. Weak social cohesion can have consequences for perceptions of safety, mental health, and intentional trauma (violence, abuse, and suicide).

Orientation

➦ The INSPQ will develop expertise to document the health needs of people from immigrant backgrounds, the consequences of racism and discrimination, and the effects of social diversification on social cohesion.

2.4 Climate change

Description

Climate change is accelerating at an alarming rate, and Canada is warming twice as fast as the global average (three times as fast in the North). It is one of the major threats to health in the 21st century. Increasingly frequent phenomena are threatening the health of many communities and are likely to intensify. Examples include heat waves, floods, increased allergens and vector-borne diseases, forest fires, and droughts.

Effects

Climate change jeopardizes the health gains of recent decades, disproportionately affects certain subgroups of the population, and will generate rising health and social service costs. In addition to climate hazards and the risks they entail for people's health, well-being, and safety, the response to these threats is leading to increasingly far-reaching social transformations, such as the socio-ecological transition[6]. Given the complexity and interdependence of the factors behind climate change, climate action must be collective. It must include all sectors of human activity and levels of government, from the local to the global. Many interventions that contribute to the fight against climate change bring direct benefits for health and equity, and vice versa. Public health authorities, who are already heavily mobilized, are called upon to pursue their actions in the face of the climate threat. They do this by promoting greenhouse gas mitigation measures and supporting the socio-ecological transition, by improving community adaptation to climate change, and by ensuring they are prepared to respond to more frequent and severe climate emergencies. In addition, they must pay particular attention to the impact of structural factors and the protection of people in vulnerable situations to help prevent an increase in SIH.

6. Socio-ecological transition is the transition to a more sustainable economic and social model. This model renews the way we consume, produce, work, and live together, in response to major environmental challenges such as the climate crisis, scarcity of resources, accelerated loss of biodiversity, and increasing environmental health risks. Source

Orientation

➦ The INSPQ will take greater account of the impact of climate change on the issues it addresses, and facilitate the development of knowledge that will inform the actions and decisions of the public health sector, its partners, and civil society.

2.5 Increasing frequency and scale of health threats and emergencies

Description

Our societies are facing an acceleration in the occurrence and severity of new and re-emerging threats, both predictable and less predictable, due to a number of factors, e.g., climate change, loss of biodiversity, globalization, population movement, widespread use of antibiotics, advances in biotechnology, and political conflict. Threats include infectious diseases; antimicrobial resistance; new contaminants; extreme climate events; and chemical, biological, radiological, and nuclear incidents, whether intentional or unintentional.

Effects

These threats and the resulting emergencies will not only have a major impact on the physical health of populations, but will also have immediate and long-term psychosocial and economic consequences, contributing to an increase in SIH.

Orientation

➦ The INSPQ will strengthen its capacity to anticipate, detect, and respond to health threats and emergencies and their impacts, including their long-term psychosocial repercussions.

2.6 Digital transformation of society

Description

The digital transformation, also known as the digital revolution or digital age, is part of a profound and accelerating worldwide technological change. By digital transformation, we mean the omnipresence of screens, social networks, and hyperconnectivity. Added to this is the development and easier access to artificial intelligence (AI), big data, and other emerging technologies for generating and processing information. This is the emergence of a digital space or living environment where services, work activities, social exchanges, and leisure activities are carried out.

Effects

Digital transformation is bringing many changes in lifestyles and in the organization and delivery of work. It brings benefits in terms of data access and processing, informed decision-making, performance optimization, and social connectivity. Nevertheless, it has negative effects on physical health (chronic illnesses, eye and vision problems, sleep disorders, musculoskeletal disorders), cognitive abilities (attention, memory), and mental health (well-being, anxiety, depression, cyber-victimization). Research is also focusing on the impact of technology on young people's development during childhood and adolescence (language, motor skills, cognition, behaviour, motivation, and academic success). Finally, because digital transformation directly or indirectly affects several health determinants (employment, education, healthcare, social ties, etc.), unequal access to its benefits could generate new forms of social exclusion, reinforcing SIH.

Changes in the way information is accessed, produced, and disseminated in the digital age can also lead to information overload (infodemic). Disinformation and misinformation can lead to further polarization and distrust of institutions. The effects of these phenomena on health and social cohesion are not yet fully understood.

Orientation

- The INSPQ will facilitate the development of knowledge on the effects of digital transformation on social cohesion, population health, and SIH, in addition to strengthening its expertise and acquiring best information practices.

2.7 Evolution of the world of work

Description

The environment, organizations, and working conditions and employment are constantly evolving. This constant evolution is particularly pronounced in the context of digital transformation, climate change, the aging of the population, and labour shortages. Digital platforms are multiplying. Remote working is gaining in importance. Artificial intelligence is becoming more prevalent, leading to the automation and robotization of certain tasks. Part-time work is on the increase. In addition, more precarious working and employment conditions are emerging among certain categories of workers. Due to persistent labour and skill shortages, young people are entering the labour market earlier and earlier, experienced aging workers are being encouraged to stay longer, and the use of foreign workers is increasing.

Effects

While the changing world of work can bring many benefits in terms of productivity, economic growth, and the reduction of certain risks associated with the workplace, it can also present significant challenges. Labour shortages and increased pressure to perform can lead to work intensification. Similarly, they can generate a mismatch between the activities performed and the functional capacity of workers who lack the necessary supervision or training. With technological modernization, the emergence of new sectors of activity, and the spread of remote working, which affects social ties, workers could be exposed to new risk factors. The effects of the recent law updating Québec's occupational health and safety system will be closely monitored, particularly in terms of risk prevention in the workplace. Finally, changes in the world of work could exacerbate SIH because they will not affect all workers equally, especially those in vulnerable conditions such as temporary foreign workers.

Orientation

➦ The INSPQ will be actively involved in monitoring and evaluating emerging phenomena affecting the world of work to document their effects and determine best practices for minimizing their impact on workers.

3 AN INSTITUTE ON THE MOVE: MODERNIZING OUR ACTIVITIES

The changing world will have an impact on the INSPQ and its core scientific activities. The INSPQ anticipates the following: a greater number of emerging and complex problems to monitor and understand; a growing volume of analyses to perform and develop; an increase in requests and scientific productions to process and carry out; and a greater variety of partners and target audiences using our products and services. Moreover, the time required to provide results and answers could be reduced. In this context, its scientific activities will need to be modernized, in particular through the development of methodologies, tools, and expertise.

Figure 4. Orientations for the INSPQ's core scientific activities

➦ Together with its partners, the INSPQ will work to broaden access to data, develop new sources, and facilitate their integration and analysis to produce timely and relevant scientific knowledge.

1 Specialized laboratory services

Laboratoire de santé publique du Québec

➦ The INPSQ will implement genomics and bioinformatics to improve infectious disease monitoring, surveillance, and diagnosis.

Centre de toxicologie du Québec (CTQ)

➦ The INSPQ will continue to develop its technological capabilities, enabling it to remain efficient, cutting-edge, and innovative, in order to monitor exposure to emerging contaminants.

2 Threat vigilance and surveillance

Threat vigilance

➦ The INSPQ will equip itself with innovative and flexible expertise, tools, and methods, including modelling and wastewater, to provide integrated analyses and adapt to new threats.

Surveillance

➦ The INSPQ will develop new methods and expertise, including economic burden analysis and participatory surveillance, to ensure that surveillance is adapted to the changing context, more integrated and agile.

3 Analysis, synthesis, and knowledge translation*

➦ The INSPQ will adapt its production approaches and evaluate the impact of its products, so that it can more easily integrate a diversity of knowledge and improve its practices in the current context of information overload.

4 Research and development

➦ The INSPQ will seize opportunities for partnerships and external funding to advance knowledge and develop innovative methodologies and tools, including artificial intelligence.

5 Evaluation*

➦ The INSPQ will develop new methodologies and expertise, such as contribution analyses, economic analyses, and the evaluation of monitoring systems, so that evaluation practice is better adapted to the changing context and increasingly complex issues.

* including guidance and recommendations

4 EVOLVING THEMES: OUR PRIORITIES FOR SCIENTIFIC DEVELOPMENT

In this section, for each of the 15 essential public health themes (figure 1), we briefly present:

- A description of the theme;
- Its expected evolution, driven by the impact of seven major trends (among other things);
- The INSPQ's priorities for scientific development;
- Other topics of interest that emerged during the discussions but were considered less of a priority.

The scope of priorities for scientific development is relatively broad. Most will involve carrying out several types of scientific activity. With a few exceptions, the wording of priorities often begins with "Better monitor" or "Better understand."

- By "better monitor" we generally refer to the need to continuously assess a health problem in the population and its determinants or to identify and characterize a health risk or threat;
- By "better understand" we generally refer to the need to improve knowledge of the causes, consequences, or effective means of intervening in different issues.

Under each priority, icons indicate the corresponding essential scientific activities, following the same legend as in Figure 4:

Specialized laboratory services | Threat vigilance and surveillance | Analysis, synthesis, and knowledge translation | Research and development | Evaluation

It is difficult to divide the world of public health into mutually exclusive themes. As with major trends, many themes are interrelated, and overlapping is inevitable.

4.1 Family environment and early childhood

Description

Early childhood is a critical period that determines one's health throughout life. The development and well-being of young children and their families depend on a wide range of personal, social, economic, and environmental conditions.

Expected evolution

- More families with young children may find themselves in a situation of poverty or food insecurity. The causes: growing social and economic disparities and multiple barriers for access to housing and quality employment.
- Changes in the world of work will alter employment and working conditions and may have repercussions on the work–life balance and parents' mental health.
- Parents' and young children's exposure to screens is likely to increase over the next few years, diminishing parent-child interaction and disrupting children's development.
- The deterioration of the environment linked to climate change and the increase in the frequency and scale of threats and emergencies are likely to affect families. Young children are particularly sensitive to their effects.

Priorities for scientific development

- Better understand interventions (e.g., public policies) that act on structural factors and social determinants of health to reduce their negative effects on families and young children.
- Better understand the impact of parents' working and employment conditions on families' mental health.
- Better understand the mechanisms and factors of vulnerability by which climate change will affect the health and well-being of families and young children.

Other subjects of interest

- Food insecurity and its effects on pregnant women, families, and young children
- Short- and long-term effects of negative childhood experiences
- The impact of digital transformation on the frequency and quality of family interactions

4.2 Youth development, educational success, and safety

Description

Health, safety, and educational success are closely linked among young people, from preschool through to post-secondary education. For the vast majority, school is the most significant living environment after home.

Expected evolution

- New technologies and hyperconnectivity are transforming the contexts in which we learn and socialize, with potentially significant consequences for young people's health, psychosocial development, and educational success.
- The changing economic context, the changing world of work, and climate change will not affect all subgroups of the population equally. They are likely to increase the physical and mental social inequalities in health (SIH) among children, young people, and their families.
- Growing social and economic disparities may increase achievement gaps between subgroups of the population that include children, young people, and young adults. New arrivals, First Nations and Inuit people, and people from diverse sexual and gender backgrounds will be more affected.

Priorities for scientific development

- Better monitor and understand the mental health, well-being (loneliness, isolation, etc.), lifestyle, and consumption habits (psychoactive substances, online gaming, etc.) of young people and their determinants.

- Better understand the effect of different family support policies on the health and well-being of children, young people, and young adults.

- Better understand how digital transformation, the economic context, and climate change will affect educational environments and determine the adaptations required to ensure that schools remain healthy environments conducive to health and success.

Other subjects of interest

- School experience and success for young people living in different environments or in conditions of vulnerability

4.3 Healthy aging

Description

Aging is inevitable, but individual and social actions throughout the lifecycle help preserve health, well-being, and functional autonomy for as long as possible. Furthermore, an accumulation of disadvantages from an early age can produce effects that affect health and persist throughout life. For healthy aging, it's never too early or too late to take action.

Expected evolution

- As life expectancy increases, more and more people will be affected, for longer, by disabilities or illnesses that impact on their functional autonomy, as well as by conditions conducive to social isolation.
- With ageism and other types of discrimination still present, many consequences are anticipated for seniors' physical, mental, and cognitive health, as well as for their social participation.
- Adapting local environments to facilitate access to healthy food, safe and active travel, and the development and retention of social ties will represent a growing challenge.
- Several factors, such as climate change, the economic context, and the shortage of affordable housing, can impoverish and increase disparities among seniors. Significant repercussions on their living conditions are to be expected.

Priorities for scientific development

- Better monitor and understand all aspects of the health status of aging people (based on the integrated model of healthy aging).
- Better understand the effects of different interventions aimed at preventing ageism, unintentional trauma, and other problems that affect seniors.
- Better understand how public policies can influence the living conditions, environmental adaptation, and social participation of seniors from a perspective of intergenerational equity.

Other subjects of interest

- Preventing risk factors and promoting cognitive health
- SIH in seniors
- Seniors' working conditions
- Polypharmacy among seniors

4.4 Physical and natural environment

Description

The physical and natural environment has a direct impact on people's health, whether through the quality of water, air, soil, or noise. Climatic hazards and the degradation of our environment are exposing more and more populations to a multitude of risks to their health and well-being.

Expected evolution

- Climate change will transform the population's exposure to certain infectious diseases and environmental contaminants.
- The appearance of new contaminants or exposure conditions linked to air, water, or soil could increase health risks for the population.
- People living in vulnerable conditions are likely to be more exposed to these risks.

Priorities for scientific development

- Better understand the health effects of contaminants that are new or of emerging concern.

- Better monitor the exposure of different subgroups of the population to the multiple contaminants and risk factors present in the physical and natural environment.

- Better understand how individual risk factors can affect the ability to adapt to climate change.

Other subjects of interest

- Combined effects of climate change and other environmental exposures
- Public policies affecting the physical and natural environment
- The challenges and benefits of natural environments for health

4.5 Built environment

Description

Housing conditions, the organization of transportation infrastructure, and the layout of neighbourhoods are all part of the built environment. This plays a considerable role in people's health and quality of life.

Expected evolution

- Modernizing land-use planning to adapt to climate change, urban sprawl, and changes in the world of work could have unforeseen negative effects on subgroups of the population living in vulnerable conditions.
- Economic conditions, rapid urbanization, migratory movements, and the worsening state of available housing make it difficult to find adequate accommodation at a reasonable cost.
- Climate change, certain construction practices or occupants' lifestyle habits can lead to a deterioration in building quality. This could affect the healthiness of homes, the risk of exposure to pathogens, and residential instability, which in turn will have repercussions on physical, psychological, and social health.

Priorities for scientific development

- Better understand land use that increases resilience to climate change and health equity.

- Better monitor the housing needs of the population and subgroups living in vulnerable conditions, and better understand the interventions that can improve access to healthy, affordable housing.

- Better understand the key factors that can improve the healthiness of buildings, their resilience to climate change, and their adaptability to the needs of people of all ages.

Other subjects of interest

- Assessing and analyzing territorial inequalities
- Geographical access to community services and infrastructure
- Land-use planning to create favourable environments (especially for safe, active transportation)

4.6 Workplaces

Description

Work is a key determinant of health. It can provide favourable conditions for development and fulfillment. Conversely, it sometimes generates disabilities or leads to the onset of major illnesses. An infringement of a worker's physical or psychological integrity will have an impact on his or her family, community, and workplace. Unhealthy working conditions of all kinds lead to premature aging and a reduced quality of life that continues into retirement.

Expected evolution

- Access to a healthy and safe workplace—both physically and psychologically—is a challenge. Certain categories of workers (temporary foreign workers, those with disabilities, the young and the elderly, etc.) are experiencing an increase in precarious or vulnerable conditions.
- Climate change, changes in the world of work, new industries, and new ways of working (artificial intelligence, remote working) will foster the emergence of new risks and increased exposure to existing ones, including psychosocial risks. Consequences for the physical and psychological health of Québec's working population are to be expected.
- Legislative changes in labour and employment policies will bring in new players, as well as changes in the organization of prevention services and the intervention methods employed by players in the Réseau de santé publique en santé au travail.

Priorities for scientific development

- Better monitor and understand the evolution of new occupational diseases, emerging work-related risk factors, and new work methods.
- Assess the impact of labour and employment policies and of changes to programs and interventions resulting from legislative changes, particularly on workers living in vulnerable conditions.
- Better understand the effects of workforce diversification on health risks and SIH.

Other subjects of interest

- Maternity at work
- How AI is changing the job market
- New business sectors in the green economy
- Psychosocial risks in the workplace
- Economic and impact assessment of preventive interventions

4.7 Social and community environments

Description

Social and community environments play a major role in the health of individuals, particularly during periods of upheaval. They influence the living environments in which individuals develop, as well as social ties and behaviours. They also organize and facilitate access to support resources. These environments are heterogeneous, and their vitality is conditioned by the subgroups of the population that form them.

Expected evolution

- The socio-economic context, climate change, an aging population, and digital transformation are likely to increase social isolation, feelings of loneliness, and mental health problems in the population. Some of these factors could increase the stigma attached to substance use, socio-economic status, age, "race," religion, gender, or sexual orientation.
- Growing social and economic disparities are likely to particularly affect certain subgroups of the population living in conditions of vulnerability, despite current social policies and measures.
- The diversity of migratory trajectories and the number and plurality of immigrant populations will generate specific needs among these subgroups. However, we don't know enough about these populations' health status nor associated SIH.

Priorities for scientific development

- Better understand the impact of structural factors and social determinants on the health of different minority subgroups of the population or those living in conditions of vulnerability.

- Better understand the impact of major trends on the changing characteristics of social and community environments that influence health problems and population well-being.

- Better understand how different migratory routes affect migrants' health and well-being, inclusion, and social cohesion.

Other subjects of interest

- The effects of stigma on health
- The effects of public policies aimed at complex and difficult-to-solve social problems
- Modernization of deprivation measures
- Interventions aimed at community health, well-being, and resilience

4.8 Lifestyle habits

Description

Lifestyle habits encompass a whole range of behaviours, including a physically active lifestyle, diet, sleep, and screen use. Lifestyle habits have a major impact on the overall health of individuals and populations. They are constantly evolving under the influence of social, environmental, and commercial factors.

Expected evolution

- Growing social and economic disparities and climate change are likely to exacerbate food insecurity and reduce food quality. They can affect, for example, commercial determinants such as production, price, or affordability.[7]
- An aging population, climate change, choices in urban development, and public policy are all likely to influence the adoption of a physically active lifestyle and sedentary lifestyles.
- The pervasiveness of digital technology in all spheres of life brings advantages (access to services, remote working, etc.). But it also presents health risks (sleep problems, symptoms of depression and anxiety, increased physical inactivity, etc.). Many services, including public services, can only be obtained online. In this context, digital access and digital literacy are a new determinant of health and SIH.

Priorities for scientific development

- Better monitor and understand the influence of commercial determinants on lifestyle habits.
- Better monitor and understand the impact of climate change and the socio-economic context on lifestyle habits.
- Better understand the impact of screen use on the health and well-being of individuals of all ages, and the interrelationships with other lifestyle habits.

Other subjects of interest

- Lifestyle habits in rural areas
- Effects of public policies on lifestyle habits
- Effect of interventions to promote healthy lifestyle habits
- Sleep habits and their effects on health

7. Commercial determinants of health include the systems, practices, and pathways by which commercial actors influence health and equity.

4.9 Psychoactive substances and addiction

Description

The use of licit and illicit psychoactive substances (PAS), such as tobacco, alcohol, cannabis, medications, and drugs, as well as other products such as games of money and chance (GMC), can affect the health of the population and increase SIH. Their effects on health are influenced by a combination of social, commercial, and environmental factors. These determine which products and substances are available and consumed, at what frequencies, in what quantities, and according to what practices, both in the general population and among those who develop an addiction. The increase in opioid and other drug overdoses is one of the most acute manifestations of the challenges posed by substance use to public health.

Expected evolution

- In the age of social media and online advertising and shopping, it will become easier to subvert the spirit and application of the legal framework for PAS and GMC. Conversely, it will be more difficult for public health to intervene effectively.
- The trend in overdoses will continue, and new risky substances will continue to appear on the illegal market.
- As the population ages and social and economic disparities increase, consumption patterns will change, including the use of new prescription and non-prescription substances.

Priorities for scientific development

- Better understand the effects of the legal framework for PAS and GMC and their application, including the analysis and evaluation of public policies.

- Better understand how population-based interventions can help reduce the health problems and harms associated with PAS and GMC use.

- Use innovative methods to better monitor the consumption habits of PAS and GMC, their determinants, their effects on health, and the resulting health and economic burden.

Other subjects of interest

- Exposure to advertising and marketing in the digital environment
- Social determinants associated with problematic PAS and GMC use
- Denormalizing use and reducing stigma
- Safer supply and drug testing

4.10 Safety and violence prevention

Description

Trauma remains a major cause of mortality and morbidity whether it results from involuntary events or interpersonal violence. Violence takes many forms (physical, verbal, psychological, sexual, economic, social) and manifests itself in a variety of contexts and environments. Access to safe, violence-free environments is a basic need for the well-being and health of individuals.

Expected evolution

- Shifts in demographics and climate change will affect injury patterns, including falls, drownings, and injuries associated with natural disasters.
- The heterogeneity of the population and its housing needs will accentuate the need to create environments conducive to social cohesion to meet basic needs such as personal security.
- The increase in incivility and violence can be observed across the board in schools, workplaces, communities, and on social networks and the Internet. This increase undermines the population's sense of security.

Priorities for scientific development

- Better monitor and understand different types of violence (known and emerging), including their scale, associated factors, determinants, and avenues for intervention, notably by using new data sources (social networks, AI).

- Better understand the impact of exposure to violence in different living environments on the population's sense of security, social cohesion, and collective well-being.

Other subjects of interest

- Social polarization and radicalization leading to violence
- Intergenerational transmission of violence

INFECTIOUS DISEASE PREVENTION

4.11 Immunization

Description

Infectious diseases can have serious consequences for individuals and the population as a whole. Immunization through vaccination remains one of the most successful and cost-effective preventive interventions for reducing their frequency.

Expected evolution

- An increase in vaccine-preventable diseases is possible, notably due to their lower circulation during the pandemic (rebound effect) and the drop in vaccination coverage observed worldwide and in the province.
- Vaccination hesitancy and fatigue may have increased, particularly in response to the pandemic and the introduction of new vaccines in the *Québec Immunization Program*. These phenomena are reflected in lower vaccine acceptability among the population. Even healthcare professionals may be reluctant to get vaccinated and recommend vaccination.
- Changes are expected in the landscape of vaccine-preventable diseases. Causes include climate change; cross-border movements (importation of diseases by humans, animals, food); immigration (issues of accessibility to vaccination); and population aging.

Priorities for scientific development

- Strengthen the assessment of vaccination programs implemented in Québec and of new immunizing products, so as to optimize vaccine strategies.

- Develop new tools and methodologies such as modelling, projections, and genomics to document the burden of vaccine-preventable diseases and monitor vaccine efficacy and safety.

- Better monitor and understand trust in and adherence to immunization programs among the population and healthcare professionals, in order to identify barriers to vaccine acceptability and effective strategies for addressing them.

Other subjects of interest

- Influence of the informational and organizational environment and the role of healthcare professionals on vaccine acceptability

4.12 Infectious risks in healthcare settings

Description

Healthcare settings are ideal for the transmission of infections. This is due to the concentration of vulnerable people, the simultaneous presence of several infectious agents, the multiple contacts between care staff and patients, and the complexity of care and technology. To minimize risks, these environments must rigorously apply infection prevention and control (IPC) and medical device reprocessing (MDR) measures.

Expected evolution

- New pathogens are emerging, particularly multi-resistant ones, adding to the difficulties of managing, preventing, and controlling transmission in healthcare settings.
- Applying best practices in IPC and MDR remains a daily challenge. Further efforts are required to support their integration into all care settings, including non-institutional settings, and to adapt to the evolution of the technologies used.

Priorities for scientific development

- Better track nosocomial infections, including emerging and antimicrobial-resistant pathogens.

- Develop new tools and specialized analyses to support the assessment and management of epidemiological situations in healthcare settings.

- Develop new knowledge translation tools and a renewed training offering to support the expansion and maintenance of expertise in IPC and MDR.

Other subjects of interest

- Sustainable development concerns in line with IPC and MDR good practices
- Document the cost-benefit impacts of IPC and MDR measures

4.13 Transmission of infections in the community

Description

The transmission of infections in the community is influenced by a combination of complex and interrelated factors. Understanding these factors helps to optimize preventive measures. Particular attention needs to be paid to individuals and subgroups of the population living in vulnerable conditions because the transmission of certain infectious diseases is more likely to affect them.

Expected evolution

- Many factors favour the emergence and spread of infections transmitted by water, food, animals, or people. These factors include globalization, urban densification, climate change, destruction of natural habitats, population movements, and human–animal interactions.
- Antimicrobial resistance is expected to emerge and accelerate, due in particular to pressure from the use of antibiotics in humans and animals, and to animal husbandry practices.
- Public health action must take into account the complexity of human interactions and behaviours, changes in society, and the economic situation, to avoid increasing disparities and social insecurity.

Priorities for scientific development

- Better anticipate, monitor, and understand the transmission, emergence, and re-emergence of infectious agents, including antimicrobial-resistant pathogens, notably through the use of genomics and modelling.

- Identify best practices in infectious disease prevention and control to support intervention, particularly for subgroups of the population and individuals with cumulative risk factors for acquisition, transmission, and complications.

Other subjects of interest

- Effect of structural factors and social determinants on the transmission of infections in the community
- Integrating the *One Health* perspective to better understand, prevent, and control the transmission of infectious diseases

4.14 Identifying threats

Description

The COVID-19 pandemic underlined the importance of being able to anticipate and identify any type of threat to public health, whether biological, chemical, or physical, as early as possible. This is an indispensable prerequisite for emergency preparedness and response.

Expected evolution

- New threats are likely to emerge with the development of industries; the growing diversity of vectors and vehicles for disease transmission; and factors favouring more rapid spread within certain subgroups or the population.
- Identifying and communicating threats will become even more complex. The increasing likelihood of facing several simultaneous or cascading threats; the rise in the number of people living in vulnerable conditions; and contradictory or polarizing messages in the public arena are among the reasons.

Priorities for scientific development

- Develop a capacity to monitor, detect, and identify emerging threats through innovative methods and making greater use of interdisciplinary expertise.

- Develop new modalities and tools to rapidly assess and communicate the risk and potential effects of threats of various kinds, and propose options for intervention to inform decision-making.

Other subjects of interest

- Means and communication tools adapted to emerging threats for decision-makers and subgroups of the population

4.15 Preparing for and responding to public health emergencies and disasters

Description

For public health players—in conjunction with their civil protection partners during a disaster—the aim of emergency preparedness and response is to reduce the negative effects on the population's health. Different subgroups and local communities have different levels of exposure and adaptability.

Expected evolution

- Threats of various kinds (biological, chemical, or physical) are expected to increase as a result of climate change, globalization, and political conflict.
- The increased frequency of public health emergencies will affect a number of health determinants (lifestyle habits and behaviours, socio-economic conditions and disparities, access to services). Similarly, there will be an increase in psychosocial and economic consequences.
- The increasing frequency and intensity of emergencies and disasters, and the occurrence of simultaneous or cascading threats, could exceed the capacity of organizations and communities to respond. These include tracing, diagnostics, and emergency response. The burden will not affect all subgroups of the population equally. It is important to bear in mind the increased exposure and adaptability of some of them.

Priorities for scientific development

- Improve knowledge of best practices for preventing, preparing for, responding to, and recovering from public health emergencies, using a multi-hazard approach to increase the effectiveness of interventions, particularly for people living in vulnerable conditions.

- Improve understanding of the long-term psychological and social impacts of disasters in order to better rebuild and strengthen the resilience and well-being of affected populations.

Other subjects of interest

- Simultaneous or cascading risk management tools
- Strategies for deploying state-of-the-art threat detection and diagnosis capabilities
- How to position scientific communication in a complex media environment

5 A LIVING PROGRAM: CONDITIONS FOR SUCCESS AND FOLLOW-UP MECHANISMS

5.1 Conditions for success

The major trends outlined above force the INSPQ to periodically review its focus in order to remain relevant, but also to analyze and adapt its working methods. In order to achieve its orientations and priorities for scientific development, and thus fulfill its role as a proactive force, the INSPQ has identified six conditions for success, based on its reflections and consultations. They are described below. In addition, a number of supporting comments by contributors to the process are presented.

1 Providing scientific leadership

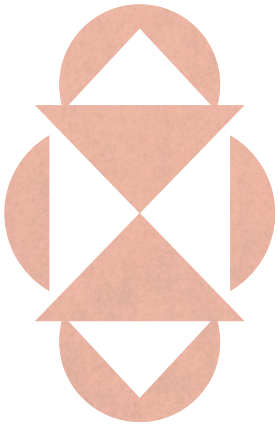
To fully play its anticipatory role, the INSPQ will continue to demonstrate the scientific leadership expected of a recognized centre of expertise and reference. In addition to proposing orientations and priorities for scientific development over the next five years, it will continuously monitor the evolving context. It will inform its target audiences of emerging issues where more energy needs to be invested. It will develop position papers on specific complex issues or cases, in order to share its vision of the situation and the contributions that public health, including the INSPQ, should make.

> "Ensure that we have the scientific independence and resources required [...], so that we can pinpoint the relevant issues to be studied, determine the methodologies to be used to answer them, and, in keeping with our mission, inform the public about emerging problems and possible interventions to prevent them or reduce their impacts."

2 Promoting and supporting interdisciplinarity

The complexity of the public health challenges we face in the coming years is undeniable. More than ever, pooling the expertise of the INSPQ's staff is proving to be the key to analyzing issues from all angles and integrating diverse perspectives more effectively. Taking an interdisciplinary approach to complex issues and emerging problems has already proved its worth at the INSPQ. This approach can now be extended to other subjects and themes.

> "With the experience of the pandemic and the advisory workshops for the scientific program, multidirectorate, and cross-professional working [from various disciplines] should be encouraged within the INSPQ to leverage our collective expertise."



3 Cultivating partnerships and collaborations

In the face of the complex challenges and emerging issues that lie ahead, collaboration and consultation with key partners will be essential. Of course, the INSPQ intends to take advantage of its established network of partners. It also intends to establish and cultivate new collaborations with university researchers. The goal is to facilitate the development of innovative methods, tools, and expertise, or to accelerate the production of knowledge on certain subjects. The INSPQ would like to involve more partners and the populations concerned in its work on emerging trends and issues. In this way, it will enrich its work, better contextualize it, and maximize its usefulness.

> "Develop and facilitate partnerships, with added value, including partnerships with university researchers."

> "We must ensure that our work is better contextualized and put to use, which implies involving the people concerned (target populations, organizations, knowledge users, etc.) in the projects (…)."

4 Sustaining and developing expertise

To achieve our orientations and priorities for scientific development, it will be essential to maintain and develop certain key areas of expertise. Nevertheless, they represent a major challenge in the context of a labour shortage. Continuing education, mentoring, internships, recruitment of experts—several strategies will be examined.

5 Using innovative methods and tools

Artificial intelligence and machine learning, modelling, genomics, social media analysis: there are many methodological and technological opportunities to help us better anticipate, detect, and understand problems. The INSPQ will make sure to use methods and tools that are both relevant and adapted to the context. It will monitor developments, adapting its existing methods and tools where necessary, or developing more innovative ones, in conjunction with partners where appropriate.

> "Free up innovation capacity to meet new needs…"

6 Ensuring the quality of scientific output

The INSPQ has a robust quality framework to ensure that its scientific products and services are carried out to the highest standards. In a context of change and development, the INSPQ is committed to maintaining high standards of quality, in line with its Engagement qualité.

Finally, to support and encourage the implementation of these conditions for success, two additional ingredients are required:

1. A long-term funding structure that offers latitude in the choices to be made and enables the support of orientations and priorities for scientific development and other essential developments (methodology, technology, expertise) and;

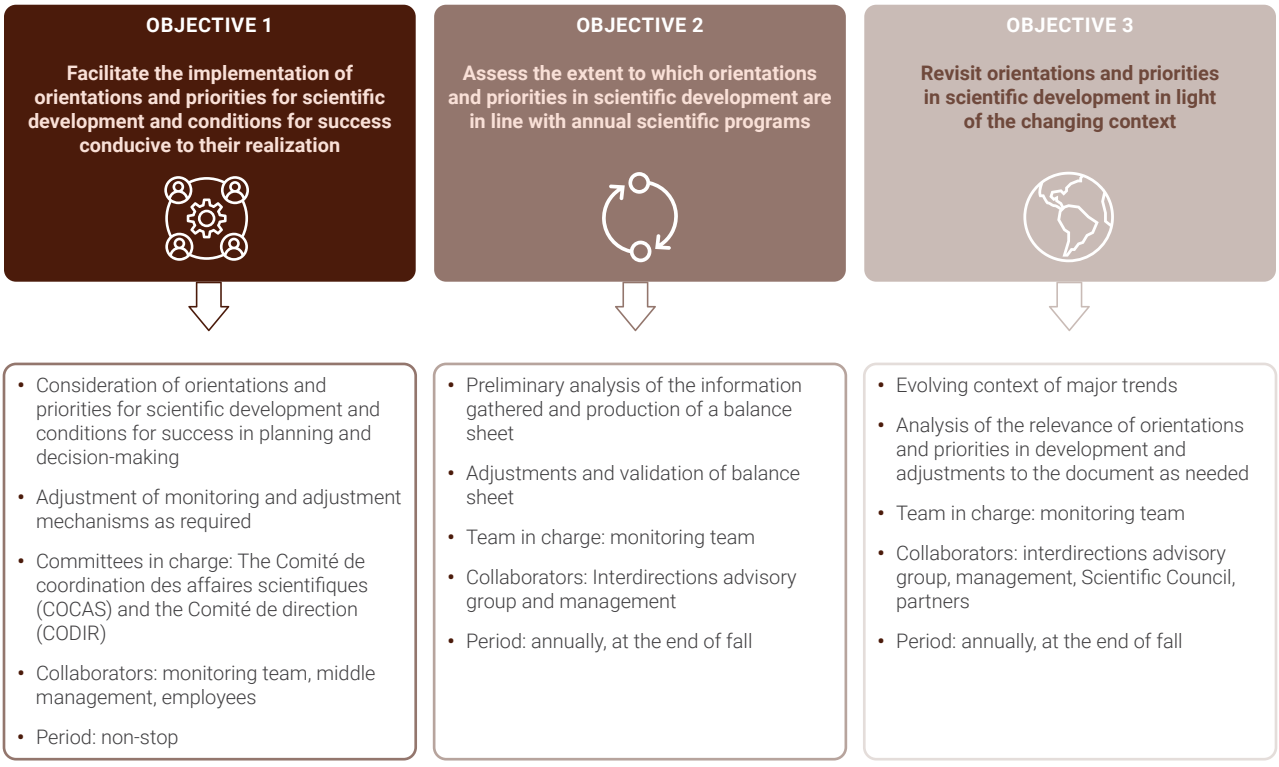
2. An organizational and management culture that values interdisciplinarity, collaboration, innovation, and facilitates change.

5.2 Mechanisms for monitoring and adjustment

The scientific program is designed to help the INSPQ better anticipate, monitor, and understand emerging and growing public health issues. It proposes seven orientations linked to major trends, eight orientations linked to scientific activities, and 41 priorities for scientific development linked to themes (see summary in Appendix 2). These elements will need to be updated in the organization's scientific products and annual programming. However, annual programming is not limited to orientations and priorities for scientific development. It reports on all the products and services provided by the INSPQ, which are broader in scope.

To ensure that we're moving in the right direction, monitoring and adjustment mechanisms that meet three objectives are presented in Figure 5.

Figure 5. Overview of mechanisms for monitoring and adjustment



6 CONCLUSION

The major trends characterizing today's world raise many concerns for tomorrow's public health.

However, if we can anticipate the challenges they will pose and prepare ourselves accordingly, it is possible to alter the course of events. We can intervene with the intention of minimizing their negative effects on health and maximizing their positive impact.

With this *2024–2029 scientific program*, the INSPQ is fulfilling its mandate to anticipate and contribute to this collective effort to prepare for the future. The program's orientations and priorities for scientific development will enable us to better monitor emerging issues, but also to better understand their consequences and the best ways of addressing them.

By producing and disseminating relevant, sound, and timely knowledge, the INSPQ aims to inform the actions and decisions of public health authorities, its partners, and society as a whole. In this way, the INSPQ's ambitions to "better monitor" and "better understand" are useful to all stakeholders. They will enable us to act more effectively to promote, prevent, and protect the health of the population of tomorrow.

APPENDIX 1
LIST OF CONTRIBUTORS

Project Team

Maria Arauz, Martine Isabelle, Éric Litvak, Jocelyne Sauvé, Geneviève Trudel

Policy Committee

Dominique Courteau, François Desbiens, Julie Dostaler, Caroline Drolet, Valérie Émond, Judith Fafard, Pierre-Gerlier Forest, Éric Litvak, Patricia Hudson, Christiane Thibault

Scientific Council

Monique Benoît, Arnaud Chiolero, Benoît Corriveau, François Desbiens, Olivier Ferlatte, Pierre-Gerlier Forest, Lise Gauvin, Laetitia Huiart, Shelley-Rose Hyppolite, Eddy Lang, Éric Litvak, Julie Loslier, Richard Massé, Guillaume Poliquin, Amélie Quesnel-Vallée, Sophie Dupéré

Bureau d'information et études en santé des populations

Carolyne Alix, Nathalie Auger, Claudia Blais, Manon Blackburn, Marie-Claude Boisclair, Valérie Émond, Mathieu Gagné, Susie Gagnon, Caroline Gourde, Nathalie Gravel, Maude Landry, Mathieu Langlois, Pascale Lévesque, Marie-Hélène Lussier, Sylvie Martel, Sonia Marcoux, Victoria Massamba, Éric Pelletier, Linda Perron, Céline Plante, Julie Riopel-Meunier, Louis Rochette, Antoine Saint-Amand, Michèle Shemilt, Marc Simard, Jérémie Sylvain-Morneau, Sébastien Tessier

Direction du développement des communautés et des individus

Joséfina Ades, Anne Anderman, Stéphani Arultas, Olivier Bellefleur, Amélie Bergeron, Odile Bergeron, Marie-Ève Bergeron-Gaudin, Chantal Blouin, Caroline Braen-Boucher, Guillaume Burigusa, Maryse Caron, Gabrielle Désilet, Gabrielle Durette, Yan Ferguson, Catherine Fournier, Dominique Gagné, François Gagnon, Annie Gauthier, Marianne Jacques, Mathieu-Joël Gervais, Édith Guilbert, Élise Jalbert-Arsenault, Maude Lachapelle, Julie Laforest, Johanne Laguë, Félix Lebrun-Paré, Fanny Lemétayer, Stéphanie Lessard, Julie Lévesque, Mathieu Maltais, Aurélie Maurice, Pierre Maurice, Andréanne Melançon, Annie Montreuil, Catherine Moreau, Patrick Morency, Réal Morin, Sébastien O'Neil, Élisabeth Papineau, Isabelle Paradis, Marie-Claude Paquette, Karine Perreault, Dave Poitras, Anne Sophie Ponsot, Marie-Claude Roberge, Éric Robitaille, Salma Sahil, Mouctar Sow, André Tourigny, Stéphanie Vermette, Nancy Wassef

Direction des risques biologiques

Ariane Adam-Poupart, Marie-Josée Archetto, Gabrielle Asselin, Maude Bigras, Karine Blouin, Geneviève Boily, Annick Boulais, Nicholas Brousseau, Anne Bruneau, Valérie Cortin, Eve Dubé, Élise Fortin, Dominique Gagnon, Marie-Claude Gariépy, Marc-Anciel Gaudette, Geneviève Germain, Stéphanie G Dubé, Dominique Grenier, Patricia Hudson, Alejandra Irace-Cima, Marilou Kiely, Anne Kimpton, Christine Lacroix, Pierre-Henri Minot, Brigitte Paquette, Elizabeth Parenteau, Natasha Parisien, Gentiane Perrault-Sullivan, Laurence Pothier, Étienne Racine, Chantal Richard, Isabelle Rouleau, Chantal Sauvageau, Noémie Savard, Louise Valiquette, Stéphanie Vermette, Jasmin Villeneuve

Direction des technologies de l'information

Jerry Grzadka, Marie-Jeanne Lortie

Direction de la santé environnementale, du travail et de la toxicologie

Georges Adib, Pierre-Paul Audate, Mélanie Beaudoin, Isabelle Bilodeau, Emmanuelle Bouchard-Bastien, Marie-Hélène Bourgault, Marc-Olivier Brouard, Évelyne Cambron-Goulet, Céline Campagna, Magalie Canuel, Nicolas Caron, Stéphane Caron, Karine Chaussé, Carole Chénard, Mylène Coderre, Caroline Delisle, David Demers-Bouffard, Marie-Eve Dubuis, Pierre Dumas, Normand Fleury, Jean-Bernard Gamache, Laetitia Gaurier, Mathieu Gauthier, Katerine Girard, Joric Goulet, Isabelle Goupil-Sormany, Geneviève Hamelin, Vicky Huppé, Caroline Huot, Nathalie Jauvin, Yolaine Labbé, Maud Emmanuelle Labesse, Félix Lamothe, Éric Langlois, Lise Laplante, Faiza Lazreg, Marie-Eve Levasseur, Andrée-Anne Marcoux, Richard Martin, Jérôme Martinez, Ciprian Mihai Cirtiu, Nektaria Nikolakakis, Marie-Jo Ouimet, Nicolas Parenteau, Mélanie Perroux, Marianne Picard-Masson, Stéphane Perron, Gabriela Ponce, Patrick Poulin, Olivia Roy-Malo, Marie-Pascale Sassine, Ariane St-Louis, Christiane Thibault, Maria Tran, Émile Tremblay, Mathieu Valcke, Corinne Zinflou

Laboratoire de santé publique du Québec

Pierre Marie Akochy, Sadjia Bekal, Alexandra Cecan, Hugues Charest, Dominique Courteau, Valérie Dekimpe, Réjean Dion, Marc Christian Domingo, Florence Doualla Bell, Philippe Dufresne, Judith Fafard, Cindy Lalancette, Brigitte Lefebvre, Inès Levade, Isabelle Meunier, Donald Murphy, Lila Naouelle Salhi, Bouchra Serhir, Maude Paquette, Christian Therrien, Karine Thivierge, Maud Vallée

Secrétariat général

Éric Bédard, Maude Chapados, Michel Désy, Geneviève Grenier, Karine Hébert, Florence Morestin, Valérie Otis, Nicolas Ribes-Turgeon, Julie St-Pierre, Caroline Tessier

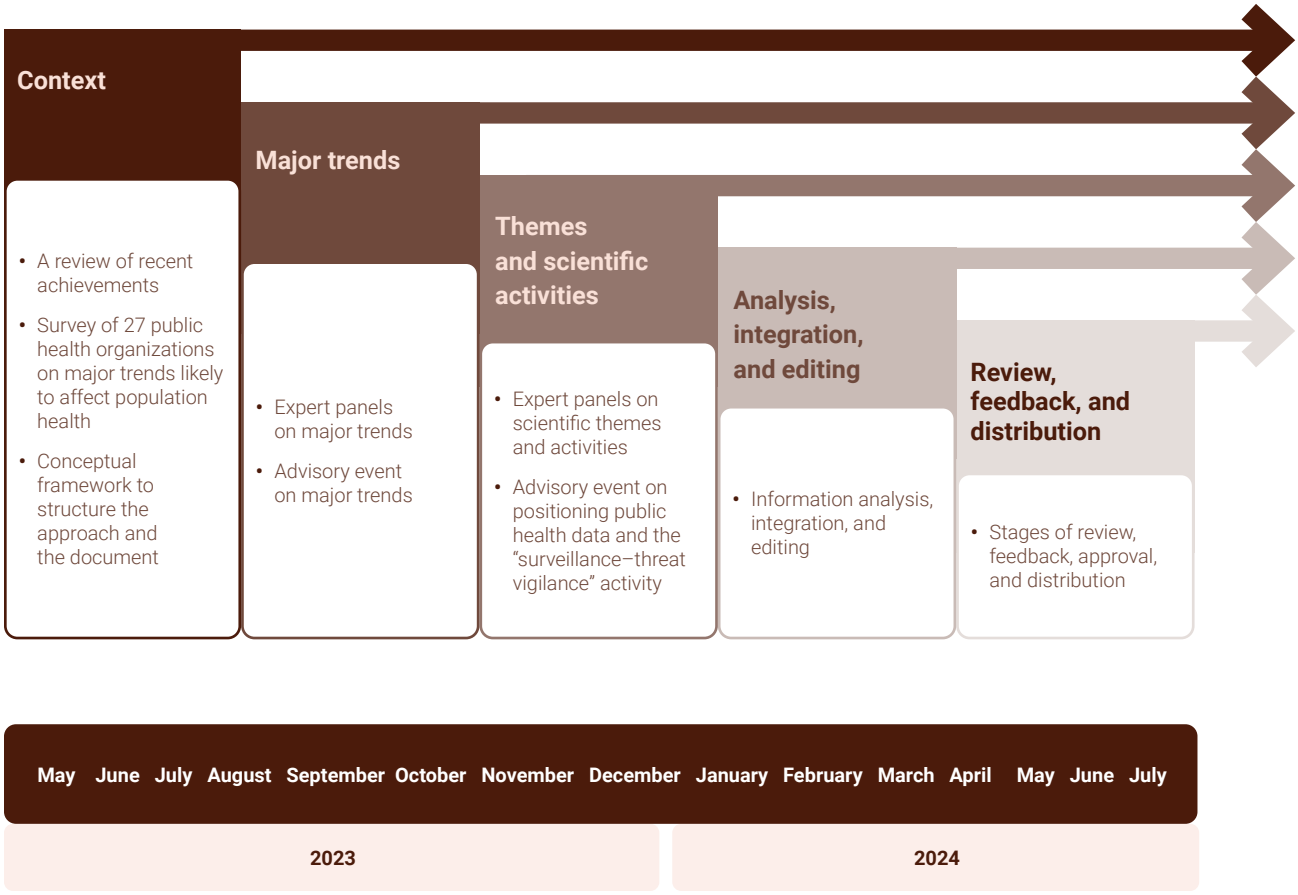
Vice-présidence aux affaires scientifiques

Maria Arauz, Janine Badr, Andrée Fafard, Hélène Fillion, Martine Isabelle, Marc Lemire, Éric Litvak, Josiane Loiselle-Boudreau, Gilles Paradis, Sophie Pouliot, Mathieu Roy, Geneviève Trudel, Maryline Vivion

APPENDIX 2
DEVELOPMENT APPROACH AND METHODOLOGY

Over a period of about a year, and involving more than 200 people, the process of developing the *scientific program* was divided into five main phases.

Figure 6. Main phases of the scientific program development process



Context

The main objectives of the first phase were to gain a better understanding of the internal and external context in which we operate, and to structure our thinking. To do this, we:

- **Compiled a summary of the INSPQ's achievements** in recent years;
- **Conducted a rapid survey of 27 scientific and public health organizations**[8] with a view to identifying the major contemporary trends characterizing the evolution of the world and Québec society, which are likely to have significant repercussions on public health. Following this review, analysis and reflection led us to select seven.
- **Developed a conceptual framework to structure the approach, orientations, and development priorities**. In addition to the seven trends, the framework defines the five main scientific activities carried out by the INSPQ, as well as the 15 key public health themes it addresses. This framework, drawn up by the Project Team, was discussed and endorsed by the Policy Committee and the Scientific Council.

Major trends

The aim of the second phase was to deepen reflection on the seven trends identified. To achieve this goal, we:

- **Set up expert panels** (one for each trend), each made up of around ten experts. Drawing on their knowledge, they shared their perspectives on the anticipated impacts of the trends and their ideas about what the INSPQ should achieve. A template reporting the highlights of the meeting was produced.
- **Hosted a consultative event on key trends**, attended by an interdirections group of roughly 65 people. This expanded group, responsible for taking a broad, high-level look at the work and bringing coherence to the whole, was able to discuss the initial proposals put forward by the focus groups. The event and the ensuing assessment fed into the subsequent phase of the process.

Themes and scientific activities

The third phase of the process was essentially aimed at anticipating possible changes in the INSPQ's themes and scientific activities, as a result of major trends and other factors. To do this, we:

- **Set up thematic expert panels** (one for each theme), each comprising around ten experts. Following each group's meeting, a template was completed, specifying the expected evolution of the theme, highlighting emerging or growing issues for which it is essential to do more in the coming years, and proposing priorities for the INSPQ in this area.

8. Data collection was carried out by exploring the organizations' official websites between March 9 and March 30, 2023. Here is the list of organizations in alphabetical order: Australian Institute of Health and Welfare, British Columbia Centre for Disease Control (BCCDC), Canadian Institutes of Health Research (CIHR), Centers for Disease Control and Prevention (CDC) (USA), Dutch National Institute for Public Health and the Environment (RIVM) (Netherlands), European Centre for Disease Prevention and Control (ECDC), Federal Centre for Health Education (Germany), Federal Office of Public Health (FOPH) (Switzerland), Finnish Institute for Health and Welfare (Finland), Fonds de recherche du Québec – santé (FRQS), International Science Council (ISC), National Institute for Health and Care Excellence (NICE) (UK), Norwegian Institute of Public Health (NIPH), Office for Health Improvement and Disparities (UK), Pan American Health Organization (PAHO), Public Health Agency (France), Public Health Agency of Canada (PHAC), Public Health Agency of Sweden (Sweden), Public Health Ontario, Public Health Wales, Robert Koch Institute (RKI) (Germany), Sciensano (Belgium), Social Sciences and Humanities Research Council of Canada (SSHRC), Te Pou Hauora Tumatanui – Public Health Agency (New Zealand), UK Health Security Agency (United Kingdom), World Health Organization (WHO), World Health Organization Europe.

- **Set up focus groups on scientific activities** (one for each of the activities ["Analysis, Synthesis, and Knowledge Translation," "Evaluation," and "Research and Development"], then two for the "Specialized Laboratory Services" activity), each made up of around ten experts. Following each of these meetings, a template was drawn up outlining how this scientific activity should evolve over the coming years (methodological and technological developments, expertise, etc.).
- **Held a consultative event on the positioning of public health data**, in particular for the threat vigilance and surveillance activity, in the presence of the Interdirections Group. The event and the assessment it produced helped to shed light on the expected evolution and needs in terms of methodological and technological developments and expertise, in particular.

Analysis, integration, and editing

The aim of this fourth phase was to assess the work carried out in the previous phases, and to draw up a document integrating the ideas, conveying the essential points, and enabling the objectives to be achieved.

To do this, we:

- **Analyzed the information gathered in the templates and reports from previous phases and drafted a first version**. The Project Team followed the proposals of the focus groups as closely as possible. However, given the quantity of material collected, choices had to be made about what to retain. Essentially, these choices were guided by the relevance of the elements to the rationale and objectives of the document. In addition, a number of proposals had to be reformulated or put forward to improve harmonization, clarity, and relevance.
- **Initial review and improvement of content** by the scientific departments. This step led to the drafting of Version 2 of the document.

Review, feedback, and distribution

This fifth and final phase of the process was aimed at improving the clarity, accessibility, and relevance of the document prior to its release. To do this, we:

- **Submitted Version 2 to three groups within the INSPQ for feedback**: management, the Assemblée des médecins, dentistes et pharmaciens, and the Interdirections Group that had already been involved in the process. Interested parties were invited to read the document and complete an online form designed to capture their general appreciation and feedback. A total of 42 people out of 153 completed the form. In addition to the quantitative analysis of the results, a qualitative analysis of the one hundred or so comments received was also carried out.
- **Obtained feedback from members of the Scientific Council**, an advisory body that oversees the quality, integrity, and relevance of the INSPQ's scientific activities. In addition to completing the online form, council members were able to comment on the document and discuss it at a meeting.
- **Analyzed all the comments received and made improvements, both in terms of content and form**, in conjunction with the knowledge translation and communications team.
- **Presented content outlines** to INSPQ staff and public health partners, and made final adjustments before posting on the INSPQ website.

APPENDIX 3
SUMMARY OF ORIENTATIONS AND PRIORITIES FOR SCIENTIFIC DEVELOPMENT

Orientations for major trends	
Growing social and economic disparities	
OMT1	The INSPQ will encourage approaches aimed at modifying structural factors and increasing the participation of relevant subgroups of the population in its work, in order to promote health equity.
An aging population	
OMT2	The INSPQ will become more involved in monitoring aging and identifying best practices to promote healthy aging and the social contribution of seniors.
Immigration and demographic diversification	
OMT3	The INSPQ will develop expertise to document the health needs of people from immigrant backgrounds, the consequences of racism and discrimination, and the effects of social diversification on social cohesion.
Climate change	
OMT4	The INSPQ will take greater account of the impact of climate change on the issues it addresses and facilitate the development of knowledge that will inform the actions and decisions of the public health sector, its partners, and civil society.
Increasing frequency and scale of health threats and emergencies	
OMT5	The INSPQ will strengthen its capacity to anticipate, detect, and respond to health threats and emergencies and their impacts, including their long-term psychosocial repercussions.
Digital transformation of society	
OMT6	The INSPQ will facilitate the development of knowledge on the effects of digital transformation on social cohesion, population health, and SIH, in addition to strengthening its expertise and acquiring best information practices.
Evolution of the world of work	
OMT7	The INSPQ will be actively involved in monitoring and evaluating emerging phenomena affecting the world of work to document their effects and determine best practices for minimizing their impact on workers.

Orientations for scientific activities	
Common to several scientific activities	
OSA1	Together with its partners, the INSPQ will work to broaden access to data, develop new sources, and facilitate their integration and analysis to produce timely and relevant scientific knowledge.
Specialized laboratory services – Laboratoire de santé publique du Québec	
OSA2	The INSPQ will further implement genomics and bioinformatics to improve infectious disease monitoring, surveillance, and diagnosis.
Specialized Laboratory Services – Centre de toxicologie du Québec	
OSA3	The INSPQ will continue to develop its technological capabilities, enabling it to remain efficient, cutting-edge, and innovative, in order to monitor exposure to emerging contaminants.
Surveillance and monitoring	
OSA4	The INSPQ will develop new methods and expertise, including economic burden analysis and participatory surveillance, to ensure that surveillance is adapted to the changing context, more integrated and agile.
OSA5	The INSPQ will equip itself with innovative and flexible expertise, tools, and methods, including modelling and wastewater, to provide integrated analyses and adapt to new threats.
Analysis, synthesis, and knowledge translation	
OSA6	The INSPQ will adapt its production approaches and evaluate the impact of its products, so that it can more easily integrate a diversity of knowledge into its work and improve its practices in the current context of information overload.
Research and development	
OSA7	The INSPQ will seize opportunities for partnerships and external funding to advance knowledge related to orientations and priorities for scientific development, and to develop innovative methodologies and tools, including artificial intelligence.
Evaluation	
OSA8	The INSPQ will develop new methodologies, such as contribution analysis and evolutionary evaluation, and new expertise, linked to economic analysis and the evaluation of threat vigilance systems, so that evaluation practice is better adapted to the changing context and increasingly complex issues.

Priorities for scientific development (themes)	
Family environment and early childhood	
PSD1	Better understand interventions (e.g., public policies) that act on structural factors and social determinants of health to reduce their negative effects on families and young children.
PSD2	Better understand the impact of parents' working and employment conditions on families' mental health.
PSD3	Better understand the mechanisms and factors of vulnerability by which climate change will affect the health and well-being of families and young children.
Youth development, educational success, and safety	
PSD4	Better monitor and understand the mental health, well-being (loneliness, isolation, etc.), lifestyle, and consumption habits (psychoactive substances, online gaming, etc.) of young people and their determinants.
PSD5	Better understand the effect of different family support policies on the health and well-being of children, young people, and young adults.
PSD6	Better understand how digital transformation, the economic context, and climate change will affect educational environments, and determine the adaptations required to ensure that schools remain healthy environments conducive to health and success.
Healthy aging	
PSD7	Better monitor and understand all aspects of the health status of aging people (based on the integrated model of healthy aging).
PSD8	Better understand the effects of different interventions aimed at preventing ageism, unintentional trauma, and other problems that affect seniors.
PSD9	Better understand how public policies can influence the living conditions, environmental adaptation, and social participation of seniors from a perspective of intergenerational equity.
Physical and natural environment	
PSD10	Better understand the health effects of contaminants that are new or of emerging concern.
PSD11	Better monitor the exposure of different subgroups of the population to the multiple contaminants and risk factors present in the physical and natural environment.
PSD12	Better understand how individual risk factors can affect the ability to adapt to climate change.
Built environment	
PSD13	Better understand land use that increases resilience to climate change and health equity.
PSD14	Better monitor the housing needs of the population and subgroups living in vulnerable conditions, and better understand the interventions that can improve access to healthy, affordable housing.
PSD15	Better understand the key factors that can improve the healthiness of buildings, their resilience to climate change, and their adaptability to the needs of people of all ages.

Workplaces	
PSD16	Better monitor and understand the evolution of new occupational diseases, emerging work-related risk factors, and new work methods.
PSD17	Assess the impact of labour and employment policies and of modifications to programs and interventions resulting from legislative changes, particularly on workers living in vulnerable conditions.
PSD18	Better understand the effects of workforce diversification on health risks and SIH.
Social and community environments	
PSD19	Better understand the impact of structural factors and social determinants on the health of different minority subgroups of the population or those living in conditions of vulnerability.
PSD20	Better understand the impact of major trends on the changing characteristics of social and community environments that influence health problems and population well-being.
PSD21	Better understand how different migratory routes affect migrants' health and well-being, inclusion, and social cohesion.
Lifestyle habits	
PSD22	Better monitor and understand the influence of commercial determinants on lifestyle habits.
PSD23	Better monitor and understand the impact of climate change and the socio-economic context on lifestyle habits.
PSD24	Better understand the impact of screen use on the health and well-being of individuals of all ages, and the interrelationships with other lifestyle habits.
Psychoactive substances and addiction	
PSD25	Better understand the effects of the legal framework for PAS and GMC and their application, including the analysis and evaluation of public policies.
PSD26	Better understand how population-based interventions can help reduce the health problems and harms associated with PAS and GMC use.
PSD27	Use innovative methods to better monitor the consumption habits of PAS and GMC, their determinants, their effects on health, and the resulting health and economic burden.
Safety and violence prevention	
PSD28	Better monitor and understand different types of violence (known and emerging), including their scale, associated factors, determinants, and avenues for intervention, notably by using new data sources (social networks, AI).
PSD29	Better understand the impact of exposure to violence in different living environments on the population's sense of security, social cohesion, and collective well-being.

Immunization	
PSD30	Strengthen the assessment of vaccination programs implemented in Québec and of new immunizing products, so as to optimize vaccine strategies.
PSD31	Develop new tools and methodologies such as modelling, projections, and genomics to document the burden of vaccine-preventable diseases and monitor vaccine efficacy and safety.
PSD32	Better monitor and understand trust in and adherence to immunization programs among the population and healthcare professionals, in order to identify barriers to vaccine acceptability and effective strategies for addressing them.
Infectious risks in healthcare settings	
PSD33	Better track nosocomial infections, including emerging and antimicrobial-resistant pathogens.
PSD34	Develop new tools and specialized analyses to support the assessment and management of epidemiological situations in healthcare settings.
PSD35	Develop new knowledge translation tools and a renewed training offering to support the expansion and maintenance of expertise in IPC and MDR.
Transmission of infections in the community	
PSD36	Better anticipate, monitor, and understand the transmission, emergence, and re-emergence of infectious agents, including antimicrobial-resistant pathogens, notably through the use of genomics and modelling.
PSD37	Identify best practices in infectious disease prevention and control to support intervention, particularly for subgroups of the population and individuals with cumulative risk factors for acquisition, transmission, and complications.
Threat identification	
PSD38	Develop a capacity to monitor, detect, and identify emerging threats through innovative methods and making greater use of interdisciplinary expertise.
PSD39	Develop new modalities and tools to rapidly assess and communicate the risk and potential effects of threats of various kinds and propose options for intervention to inform decision-making.
Emergency and disaster preparedness and response	
PSD40	Improve knowledge of best practices for preventing, preparing for, responding to, and recovering from public health emergencies, using a multi-hazard approach to increase the effectiveness of interventions, particularly for people living in vulnerable conditions.
PSD41	Better understand the long-term psychological and social impacts of disasters in order to better rebuild and strengthen the resilience and well-being of affected populations.

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