POPULATION HEALTH INTERVENTION RESEARCH

Concepts, Methods, Applications

François Alla
Linda Cambon
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IRD Éditions

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collection
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SUMMARY

INTRODUCTION

The Covid-19 pandemic has revealed an ambivalence in the design and implementation of health interventions (policies, strategies, actions). Indeed, despite a recognition that these must go beyond the framework of the healthcare system to involve all sectors and all people concerned, the crisis has highlighted the entrenchment of public health in an inappropriate biomedical approach (waging "war" on a virus without thinking about the social impacts, imposing measures on the entire population without modulating them according to needs and risks, prioritizing those most biologically vulnerable without deploying actions to reach the most disadvantaged people, etc.).

Moreover, there have been real difficulties in supporting the development of these interventions and studying them using a multidisciplinary, evidence-based approach anchored in the diversity of territorial and population realities. The crisis thus mobilised decision-making processes that did not involve the populations and too rarely interdisciplinary expertise. It was driven by resources, for once unlimited, rather than by scientifically supported objectives oriented towards equity in addition to effectiveness. In particular, these processes did not incorporate the vulnerabilities of individuals and populations, apart from biomedical vulnerabilities, and often contributed to maintaining, if not reinforcing, pre-existing social inequalities in health.

Yet the field of research on population health interventions is well established internationally and could have contributed to public health thinking and decision-making. However, this research and its use in decision-making remain marginal in the French-speaking world, from North to South and from East to West. The crisis we have just experienced shows how essential it is to explain more clearly what population health intervention research (PHIR) is and how, through its interdisciplinary approach and rigour, it can support policy decisions and practices to improve population health and reduce social inequalities in health, both locally and internationally.

Population health intervention research is an emerging field. There is a very strong demand from the research, decision-making, practitioner, and student communities for training and support to design, implement, and evaluate this type of intervention in the international francophone context.

To respond to this need, we present this guide that is both theoretical and practical for all parties concerned. We define PHIR as a multidisciplinary scientific process for producing cumulative and iterative knowledge on population health interventions. It combines complementary methods to answer an array of questions in order to comprehend the complexity of interventions, their contextual grounding, and the social utility of their conclusions, while taking into consideration the reduction of social inequalities in health. This book makes an original contribution to the analysis of health interventions. It is presented as a counterbalance to the proliferation of books and scientific publications in the field of health that have, until now, focused on experimental approaches derived from clinical research, which are not well suited to this type of intervention.

This book is based on 20 years of research practice by the three authors on several continents, in several health fields, and with a myriad of different approaches: actions within the healthcare system (the mobilisation of primary care services) and outside it (the distribution of green spaces in a city); individual (vaccination, smoking) or collective approaches (working conditions); the development by researchers of organizational or technical innovations; or the analysis of interventions implemented in the context of public policies. It presents, in an accessible manner, the foundations and concepts of PHIR using numerous examples of their application in several countries.

Our aim in this book is to show that this approach applies to all interventions, whether implemented in Bordeaux, Paris, Bamako, or Ouagadougou. While the contexts may change, the methodological approaches must be adaptable and provide optimal solutions for obtaining empirical data to answer the original research questions. The examples in this book explain how these approaches are mobilised to study vaccination against Covid-19 in France, dengue or malaria and their vectors in Burkina Faso, or access to healthcare in Mali and Niger.

The text is supported by some 20 tables and figures and more than 25 boxes to highlight the specific issues related to PHIR in various contexts. Finally, our aim in this book is to identify and explain the particular features of this research and its requirements in terms of openness, contextual grounding,

population participation, multidisciplinarity, and knowledge sharing for informed decision-making. It is extensively referenced and structured in six chapters addressing the conceptual and methodological aspects of PHIR.

The first chapter defines PHIR and describes it in relation to other research approaches in the field of health with regard to its specific objects, approaches, and methods, as well as its dual purpose, cognitive (like all research) and conative (social utility). This social utility purpose questions not only perspectives, objectives, and methods, but also the approach itself, which can only be contextually anchored (often local) and participatory. The second chapter discusses research questions and how to formulate them in a PHIR context. The third chapter presents the main associated methods that should make it possible to answer these questions. The diversity of methods used in PHIR and coming from various research traditions reflects not only this multidisciplinary cross-fertilization, but also the diversity of research objects and questions. The issue of effectiveness, central to biomedical research in a controlled context, is one research question among others that are equally fundamental to PHIR, such as processes, relevance, or the scaling up of interventions and their impacts. The fourth chapter explains the approaches to data production and analysis, whether from a qualitative, quantitative, or mixed methods perspective. Finally, PHIR is not just a technical process and not focused only on methodological issues. Thus, the fifth chapter shows how it is embedded in power issues among a myriad of actors who must be taken into account and involved, while paying attention to inclusion and diversity. Finally, the sixth chapter highlights the ultimate goal of PHIR, which is that the results must be not only rigorous and useful, but at the very least, used. However, this is not achieved through magic; specific activities conducive to knowledge transfer must be planned and organized. Actors and knowledge transfer go hand-in-hand, because the use of results is not an "after-sales service" of research, but a rigorous, continuous, and inclusive process that also depends on how the research is conducted and, in particular, on the ways in which partners are mobilised.

Thus, we hope this book will contribute to its readers' current thinking on how to produce scientific knowledge on public health interventions, which are by nature complex and therefore cannot be reduced to studies anchored in a necessarily reductive biomedical approach. It is becoming urgent that the international francophone community, from Dakar to Quebec City, via Marseille and Tangiers, be able to better adopt, fund, organize, and publish on the PHIR approach. This is the ambition of this introductory book.

CHAPTER 1

POPULATION HEALTH INTERVENTION RESEARCH

Action research, interventional research, evaluation, applied research, experimentation: the science of population health intervention takes on different forms, names, and concepts, whether in Europe, Africa, or elsewhere. Behind each of them, paradigms, approaches, methods, and disciplines intersect, or not, and debates persist on how to differentiate among them.

This chapter presents the different forms of interventional research, their characteristics, differences, and complementarity. The aim is to identify, if not a definition, at least a set of attributes that distinguish this research practice from other forms of research. We also aim to counterbalance a historical trend in the public health and global health literature, which up to now has focused mainly on experimental methods to the detriment of a more open, holistic, and diverse vision of paradigmatic and methodological approaches.

THE CONCEPT OF POPULATION HEALTH INTERVENTION

The concept of population health arises from a recognition of the limitations of considering health phenomena solely from an individual biomedical perspective, that is, explaining health conditions on the

basis of personal factors, and in particular behavioural factors (e.g. smoking, physical activity), and proposing levers, again individually oriented, that generally involve the healthcare system (e.g. vaccination) (Szreter, 2003). In fact, while this view facilitates the orientation of public health interventions (e.g. health objectives, thematic plans), it limits their impact, since each person is part of a system where very many parameters, such as social status (Burtram, 1996), education level (Berkman & Kawachi, 2014), and living conditions (Eckersley, 2001; Kawachi et al., 1999; Leon & Walt, 2000; Marmot & Wilkinson, 2005), as well as interactions with other people making up the population, influence the person's health and development (Hosseini Shokouh et al., 2017). Thus, and without setting individual health and population health in opposition, population health results from dynamic and interactive relationships between individuals, between individuals and their environments, and between individuals and the services to which they have access and which they do, or do not, use (Diez Roux, 2016).

This brings us to two fundamental principles of population health: 1) the need to take into account factors operating at multiple levels of organisation in order to understand health and take action to improve it (involving both social and biological processes), and 2) an explicit concern for health equity, since it is not possible to substantially improve the health of the population as a whole without addressing health inequalities (Diez Roux, 2016). Thus, while this population health approach does not exclude healthcare services (such as preventive clinical practices, particularly in the context of the primary healthcare reorganisation called for in the 1978 Alma-Ata Declaration or the 1989 Ottawa Charter), it does encompass many sectors. Population health will, in fact, strive for a health equilibrium, which calls for looking at all the determinants of health and their inter-influence. For example, while lockdown measures imposed to limit hospitalisations of severe cases of Covid-19 among the elderly and vulnerable are understandable from a public health standpoint, they raise questions from a population health standpoint with regard to potential consequences for the population at large (including the youngest or most vulnerable) in terms of deteriorating mental health, recourse to care, standard of living and quality of life, and health equity (Cambon et al., 2021; Campeau et al., 2018; Turcotte-Tremblay et al., 2017). In this respect, the concept of population health is closely aligned with that of health promotion,

which has the distinction of adding a clear objective of strengthening empowerment (i.e. the ability of individuals or groups to be able to act on the social, economic, political, or ecological conditions they face). For example, we saw in Africa that it was the younger populations, who are in the majority, that often spoke out, sometimes violently, against these restrictive measures because they did not feel concerned by the pandemic. Moreover, there are currently heated debates around the objectives of conducting mass vaccinations against Covid-19 rather than focusing on the most vulnerable in the context of a shortage of inputs for West Africa when the majority of the population has already been naturally immunised. Finally, population health is directly interested in translating science into action (on factors and determinants) and considers science and action to be intimately linked and mutually reinforcing (Diez Roux, 2016).

Table 1 explains the different approaches and their intersections, showing their complexity in a context where there is still no consensus on this matter.

Table 1 | Proposed clarifications of the different concepts.

	Underlying process	Main objective
Public health	Technocratic (vertical) vision, organised by pathology, focused on healthcare systems broadened to include prevention and health safety	To improve the health of individuals
Community health	Focused on the participation of all and the community-based approach	To foster self-reliance in health
Health promotion	Calls for a macroscopic and integrative view of the intervention along five complementary axes (public policy, supportive environments, community actions, individual skills, reorientation of health services)	To strengthen empowerment and improve the structural, social, and physical determinants of health
Population health	Fully incorporates action from outside the health system and the inclusion of science in defining that action	To reinforce equity in health

Source: Adapted from Ridde (2007).

Consequently, in the population health context, the concept of intervention takes a different form from conventional definitions. For example, the World Health Organization classification of health interventions defines *health intervention* as "an act performed for, with or on behalf of a person or a population, whose purpose is to assess, improve, maintain, promote or modify health, functioning or health conditions" (WHO, 2023). It expresses, in fact, a goal directly focused on health status, whereas population health calls for goals centred on more distal determinants, described as structural. Some describe intervention as a "set of means (physical, human, financial, symbolic) organised in a particular context, at a given time, to produce goods or services to modify a problematic situation" (Brousselle et al., 2018). Plante (1994) describes a programme as a "consistent, organised, and structured set of objectives, means, and people to drive it. It is justified based on needs defined as a deficiency or lack that affects individuals, a community, or a society, and it is under the control of one or more persons responsible for the quality of its formulation and functioning. It is set up to transform things or the state of something" (Plante, 1994). As with conventional definitions of public policy, both definitions posit a fundamental principle of having a problem to solve around which resources are marshalled, with Plante emphasising the notion of transformation. This is often a challenge in countries dependent on international public aid, where standard solutions are usually applied before discerning the details of the problems by involving the people concerned in the reflection. Nevertheless, they effectively dismiss a more salutogenic (i.e. not waiting until a health problem occurs) (Bruchon-Schweitzer & Boujut, 2014) and contextual conception of the intervention. Finally, Hawe and Potvin (2009) describe population health interventions as "policies or programmes that shift the distribution of health risk by addressing the underlying social, economic and environmental conditions". For them, "these interventions might be programmes or policies designed and developed in the health sector, but they are more likely to be in sectors elsewhere, such as education, housing or employment". They thus reflect a shift in objectives from the individual to the population, focusing on the reduction of health disparities within the population (rather than on the health of individuals) and stressing the need to study responses outside the healthcare system. As mentioned by Ridde and Guichard (2008), this displacement is not without its own debates around the best strategies for curbing these inequalities (intervening

on the social determinants of health at the population level, targeting actions on the most vulnerable populations, combining strategies, etc.) and poses challenges for evaluation. In particular, the latter can no longer be approached in the traditional way of using methods derived from clinical evaluation.

This notion of intervention then becomes very rich and increasingly complex to define. One solution is to define its attributes, which should be considered as marks of its differentiation from public health interventions. This marking is all the more important in that it can then be used to legitimise the methodological approaches required in research on these interventions.

Thus, we propose the following attributes of a population health intervention:

POPULATION-BASED VISION

The population health intervention integrates a population-based conception that looks at the collective and systemic nature of the health process in a population and does not consider the population's health status to be the sum of the health statuses of the individuals who constitute it. This implies considering intervention goals that are sometimes very indirect (e.g. increasing autonomy, literacy, social ties) and taking into account the disparities that individuals face, whether those are related to personal resources, access to services, or the existence of environments that are (even very indirectly) supportive or detrimental to health.

INTERSECTORAL AND OPERATIONAL CONCEPTION

If its aim is to maintain, increase, and support equity in health and well-being within the population, the population health intervention can mobilise or leverage multiple strategies characterised by sectoral (i.e. education, employment, income, gender equity, land-use planning) and operational (i.e. access measures, regulations, built or natural environments, communication, education, etc.) diversity, as well as by clearly identifiable (traceable, recognisable) and concrete activities and

resources.

CONTEXTUAL GROUNDING

The population health intervention is based on, and enters into a relationship with, a context that will shape and transform it. An intervention deployed to accommodate the city of Marseille will not necessarily be accepted by the inhabitants of Bamako. In other words, the elements of this context, which could be related to stakeholder characteristics, including the population, their relationships, their environments, and their individual and collective histories, are part of an interventional system that must be considered when talking about population health interventions (Cambon et al., 2019). This implies, in fact, and as a prerequisite, that the population is one of the stakeholders, and even the main stakeholder, in this intervention, adopting the principles of community health, widely developed in Africa since the 1970s. Organisations, regardless of their nature (community, professional, etc.), are part of this context but do not in themselves constitute population health interventions.

MULTIPLE ACTORS

Due to its nature and contextual grounding, the population health intervention mobilises a multitude of actors (including the population), who play many roles that influence both its conduct and its impact (such as international aid donors). They can observe, support, curb, or contribute – or even all of these at the same time – depending on the development of the intervention and its organisational context (see Chapter 5).

OBJECTIVES OF IMPROVING HEALTH AND HEALTH EQUITY

While a population health intervention is obviously aimed at maintaining and improving population health and health equity, these objectives may be focused more or less directly on the latter, depending on the determinants targeted by the strategies and interventions. Moreover, the interdependence of these determinants may, by its very nature, induce

unexpected effects related to changes in their equilibrium, which must be taken into account.

PLURALISTIC NATURE

In terms not only of its objective and means of action, but also its grounding and the influence of the actors being mobilised, the population health intervention takes on very variable levels of complexity (simple, complicated, complex) that must be considered and addressed (Brownson et al., 2017). This includes accepting a significant level of uncertainty about the relationships between what is being touched, observed, received, and/or undergone. This characteristic, once again, has implications in terms of the methods needed to understand these interventions and the effects they produce. The use of not only scientific data, but also experiential and local knowledge, to construct the content of the population health intervention is also a key dimension of its pluralistic nature. This plurality of approaches, methods, procedures, and contexts must be called upon during all the processes involved in developing the intervention, from its design, implementation, and evaluation (see Chapter 3) to the methods for using the knowledge produced by this evaluation (see Chapter 6).

Thus, these attributes remind us that it is illusory to try to isolate an intervention from its context, and that it would be better, during a research process, to focus on the notion of an interventional system (Cambon et al., 2019). This notion of *system* is important because it considers not only the fact that the same cause does not always produce the same effects, but also that a system learns, adapts, transforms, and changes over time. Thus, this notion of an interventional system takes into account in particular 1) the relationships among the different interventional, historical, processual, and contextual elements, and 2) the notion of a cascade of effects, in particular by making explicit not only the mechanisms of the effects, but also the multiple effects that may be observed over the more or less long term. For example, an intervention may slow the spread of a disease (e.g. Covid-19 lockdowns) but have impacts on other health factors related to life contexts and further degrade the health that was intended to be protected (e.g. the effects of lockdowns on mental health, learning, domestic violence, delayed care, etc.). Some interventions may have an individual but socially differentiated benefit, thereby increasing inequalities within the same population

and consequently generating other health problems in a fraction of the population. Thus, considering an intervention in isolation may result in shifting the burden off to the medium or longer term, or in a more or less visible way, depending on the outcomes intended.

POPULATION HEALTH INTERVENTION RESEARCH

With these attributes in mind, it is easier to understand the characteristics of the research that focuses on these interventions: PHIR. Some have proposed that it be defined as the "science of solutions" (Potvin et al., 2014), as opposed to the "science of problems" in relation to studies that characterise population health status and analyse its determinants. Rather, we will talk about the "science of the study of solutions", to emphasise the fact that it is not a question of producing solutions considered unequivocal, but rather of analysing them from all angles, including their ability to disrupt the balance of the determinants mentioned above.

This intervention research has certain characteristics that we wish to highlight here.

POSITIVE OR NEGATIVE EFFECTS

The first is that PHIR aims to understand how the different attributes of the intervention combine to produce positive or negative, expected or unexpected, direct or indirect effects on health and the distribution of health within populations and by what mechanisms these effects occur and persist over time. Indeed, as presented in Figure 1 by Turcotte-Tremblay et al. (2017), based on her thesis project conducted in Burkina Faso, four categories of elements can interact and influence the consequences of an intervention: 1) its intrinsic characteristics (degree of complexity, compatibility with needs, benefit, etc.); 2) the characteristics of members of the social system in which it is implemented (e.g. socio-economic status, health status, access to available resources, perceptions and attitudes, etc.; 3) the nature of that social system, including local norms and environment; and 4) the implementation of the intervention.

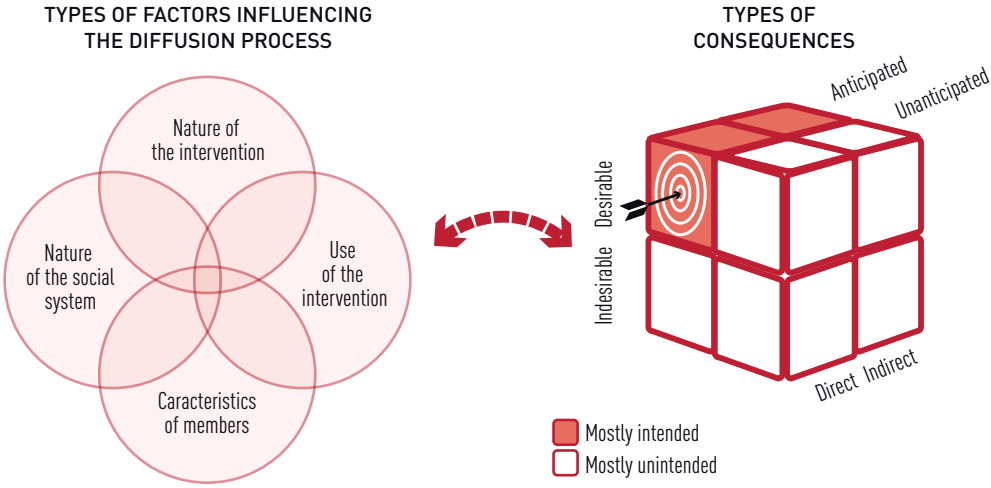

Figure 1 | Framework for the Study of Unintended Consequences.
Source: Turcotte-Tremblay et al. (2017).

This difficulty in understanding how these elements work together to produce an effect requires that we step back from the myths of experimental research (Hawe & Potvin, 2009) and, in particular, from the idea that the objective of the research is to analyse effects exclusively, that it *de facto* excludes the participation of communities and populations, or that it requires reliance on randomised controlled trials, regarded as the sole guarantors of the demonstration of causality (see Chapter 3). Also, and above all, the specific attributes of clinical research are incompatible with the attributes of population health intervention. For example, the experimental situation may impede the consideration of contextual grounding. Moreover, these specific attributes do not allow us to understand how the intervention works or why it achieves its objectives, or not. This understanding raises a plethora of questions about effects and mechanisms, as well as the conditions under which they arise. Our aim in this book is not to adopt a biased view, or to deny any usefulness to this latter type of evaluative approach, which has historically been put forward in public health and global health, particularly for clinical research, but rather to show that it is not the most appropriate in the context of complex interventions or interventional systems, as is the case with population health. This is particularly true in global health research, where contexts are so unstable and interventions so numerous due to the presence of a myriad of funders, that isolating effects, or even

conducting such trials, is almost impossible.

THE SOCIAL UTILITY

The second characteristic of PHIR is its social utility. Indeed, if PHIR is a science of the study of solutions, then the ultimate goal is surely to transform the system by ensuring that it can adopt the solutions developed. PHIR should support and guide policy decisions, professional practices, and, where appropriate, changes in people's behaviours. This mandate has direct implications for how research is conducted, since it should lead to concrete conclusions that can be directly used by the actors in this system (see Chapter 5), that is, conclusions that are acceptable, adaptable, viable, and sustainable (see Chapter 3). In this context, the concepts of transferability (i.e. the ability of an intervention to achieve the same results in another context) (Wang et al., 2006) and viability (i.e. the ability of an intervention to meet stakeholders' needs) (Chen, 2010) must be considered when choosing methodologies for designing and analysing an intervention and when drawing conclusions. These methodological choices relate not only to options for data collection and analysis, but also to the manner in which the research is conducted and the stakeholders are involved in it (see Chapter 4).

THE PLURALITY OF METHODS

The third characteristic relates to the plurality of methods used in a PHIR (see Chapter 4), whereas randomised controlled trials often use single, quantitative methods. Indeed, in a PHIR, stakeholders and researchers ask a multitude of questions (see Chapter 2), each of which calls for specific methods (Chapters 2 and 3). The question should guide the method, not the other way around. Thus, if the objective is to study solutions (e.g. to fight malaria or reduce road accidents) and how they work, then multiple methods are needed, because some methods quantify while others seek to understand, and some establish correlations while others differentiate each element's relative share in the production of a mechanism or an effect. Using these methods in combination is thus necessary to understand the interventional system under study. This methodological plurality requires a multidisciplinary approach to PHIR, without which the interventional phenomenon can only be viewed in a fragmentary

manner, thereby producing erroneous conclusions.

THE PARADIGMATIC CROSS-FERTILISATION

The fourth characteristic refers to the paradigmatic cross-fertilisation called for by PHIR. The methods chosen depend on the paradigms in which the researchers are embedded, i.e. their epistemological field (i.e. their worldview, the distance they maintain from their analyses, and the legitimacy they assign to those analyses to describe what they observe), their ontological field (i.e. their comprehension of the lived world through a single reality as opposed to several), their methodological field (i.e. the techniques they use to apprehend the lived world), and their teleological field (i.e. the purposes and benefits of PHIR) (Gendron, 2001). The multiplicity of questions inherent in the ambition to understand *how it works* rather than to observe *what works* calls for this paradigmatic cross-fertilisation, thus reinforcing again the necessary multidisciplinarity of this research. Here, in concrete terms, the point is to observe the intervention and its effects (expected or not) through a network of differentiated analyses and postures, rather than favouring one.

Moreover, since PHIR consists of (often) identifiable and concrete activities aimed at populations, research that focuses, for example, on healthcare organisations (health services research), therapeutics (clinical research), or technologies (research on health technologies) is not actually included. This is because such research (even if it may also be interventional) is more concerned with patients than with populations and their subgroups and therefore constitutes another type of research, equally essential to science, but not considered in this book as part of PHIR. However, these types of research and their experimental approaches receive the major portion of health research funding, as is the case in France, for example. This shows all the challenges and needs for developing PHIR in the French-speaking world.

Finally, a distinction must be made between PHIR and the evaluation of health interventions. For some, the two are identical under a common term – applied health research – on the grounds that they use the same methods and lead to the same conclusions (reinforced by the social utility dimension of PHIR) (Barker et al., 2016; Donaldson et al., 2015). Hawe and Potvin (2009) offer two arguments for distinguishing between evaluation and intervention research.

The first is that PHIR encompasses multiple research questions that go beyond the outcomes and process questions to which evaluation is often confined. These questions aim to capture the full range of attributes of population health interventions in the context in which they are embedded.

The second is that the conclusions of PHIR are much broader than those of an intervention evaluation. They produce a body of knowledge whose scope is more extensive because it is less specific than that produced in an evaluation.

However, the boundaries may appear thin and porous if we look mainly at the methods and analyses, provided the evaluation is conducted with rigour and is not vague on certain aspects, given the social utility dimension of PHIR. In fact, PHIR can: 1) result in scientific publications for the international community (e.g. contribute to debates on the Sustainable Development Goals) and an internal report addressing key questions raised by decision-makers (e.g. the evaluation of an intervention); 2) pursue an objective of producing knowledge that also addresses societal questions and issues (e.g. evaluation); 3) lead to research perspectives and recommendations for action (e.g. evaluation); and 4) be funded by calls for research projects, international global health organisations (Unitaid, Global Fund, Echo, WHO, etc.), and grants from health operators or non-governmental organisations (e.g. evaluation) as part of an evidence-based policy. Consequently, the distinction may lie more in the fundamentals of the science guiding the scientific posture and approach of a PHIR, and particularly the fact that it:

– produces only **original knowledge that contributes** to advancing science and the state of knowledge in the field;

– builds on a **preliminary analysis of this state of the art,** and in particular on a (systematic) review of the scientific literature;

– grounds its hypotheses and analyses in **theoretical bases** and proven conceptual frameworks;

– remains **objective and transparent in the choice of methods** (each one justified with regard to its scientific strengths and weaknesses);

– is **rigorous** in their application and their analysis;

– and remains **neutral** in the interpretation and presentation of results

(results are not truncated, transformed, or hidden).

Of course, these fundamentals also apply to scientific approaches in public health other than PHIR.

THE DIFFERENT FORMS OF PHIR

Given the complexity of the interventions studied and the multiplicity of questions that can be asked, a PHIR implementation faces many challenges. Thus, researchers interested in this field have contributed to developing the types of evaluative approaches by comparing, combining, hybridising, and sometimes even "tinkering" with paradigms and methods.

Thus, several types of research exist. The aim here is not to be exhaustive but to present the best known and most widely used, as well as their specific features, in order to understand this field of research not only in its contradictions, but also its complementarities, and even its overlaps.

CONTROLLED TRIAL

The controlled trial is still considered by many health research teams and funders as the best research approach (design, specifications) to identify a causal relationship between an intervention and an effect, all else being equal. For example, the French Development Agency (AFD) has just launched the Fund for Intervention in Development for the poorest countries, where it strongly recommends the use of these cluster randomised controlled trials.

The focus is on evaluating the effectiveness of the intervention by attempting to standardise both the intervention modalities and the effect that the context (including population characteristics) might have on the outcomes. The context is considered as both a variable and a bias that must be eliminated to produce generalisable conclusions of causality. Similarly, the elements of the intervention and the way the population is exposed to it are under the control of the research team to compare the outcomes with a population that is not exposed. The

design with the highest internal validity according to proponents of this approach is the individually randomised controlled trial (Campbell & Stanley, 1966).

Because this study design is modelled on the clinical field (e.g. therapeutic drug trials), it has many ethical or methodological limitations in population health (Tarquinio et al., 2015). Thus, adaptations of this research design have been created to consider its limitations (see Chapter 3). Our objective in this book is not to discredit its use, but rather to explain its poor suitability for population health interventions, whether in Europe, Africa, or elsewhere.

Despite these adjustments, the very premises upon which this type of design is based, and in particular that of developing universal laws while deliberately ignoring contextual elements and the heterogeneity of effects, raise questions when, as in the case of PHIR, we need to consider issues of viability and transferability. In other words, what is the point of producing conclusions on an intervention conducted under conditions that will never reoccur or that would occur very differently? The causal inference is indeed validated, but because the conditions under which this intervention operates are neither studied nor taken into account in the conclusions, it is unlikely that, when it is generalised, the same results will be observed. Thus, while the intellectual exercise may make sense, its value in PHIR is low, as it cannot guide decisions and practices. One response to this significant limitation is to back up the experimental studies with an evaluation of the process (including mechanisms) to understand how this intervention works (see Chapter 3).

EVALUATION RESEARCH

Evaluation research aims to produce knowledge about a specific intervention in order to inform a decision. As such, there is a very close link between the object of the research and the decision to be taken (Clarke, 1999; Collins et al., 2004; Patton, 1990). This research is often the result of a request from outside the research team by health managers or actors implementing field interventions. It aims to mobilise scientific methods and tools to study a decision, a transformation, or a public health practice.

The research can therefore have multiple objects: an intervention's effectiveness, its efficiency or cost effectiveness compared to others, the feasibility of its implementation, its acceptability, the conditions for its sustainability, etc. (Clarke, 1999; Collins et al., 2004; Patton, 1990). Consequently, this research can be carried out at different points in the intervention process.

It can thus be useful for improving a programme or a system, in which case it is focused on the design of the intervention. This form of research is usually carried out during the action to improve alignment with the intended goals. For example, this could involve supplementing the development of a programme or service with an analysis of how it operates in real life (Collins et al., 2004). It engages people who are not involved in the design and implementation of the intervention, but it can also mobilise actors who take an active part in the action. It can also be used to validate an intervention or compare it to another, in which case it is oriented towards the decision to continue or stop the intervention. It is conducted at the end of the intervention and is usually entrusted to an external person or organisation that is not directly involved in developing the action or system. It is research aimed at informing a decision that is contingent on policy issues, such as stopping, continuing to fund, or reorienting an intervention.

The limitations of this type of evaluation lie in the difficult balance between the posture of researchers, whose natural curiosity and need for knowledge can take them beyond the questions posed by the decision-maker, and the problematic convergence of research and decision-making agendas, which has been widely studied in research on stakeholder–researcher partnerships (Baker et al., 2004; Bryant, 2002; Dagenais et al., 2009).

ACTION RESEARCH

Action research is defined as an iterative process of collaboration between researchers, practitioners, and the population working together in a series of activities that include problem identification, planning, implementation, and evaluation of solutions, as well as reflection on the process (Avison et al., 1999). Its philosophical foundations owe much to Latin American and African thinkers such as Freire in Brazil, Fals-Borda in Colombia, or Ki-Zerbo in Burkina Faso.

This type of research is rooted in a pragmatic paradigm in which research aims not only at explanation, but also at social change through a cyclical theory/practice interaction (whereas traditional research is often more linear); the theory supports or emerges from the action and is used to understand and act on the real problems encountered on the ground (Hart & Bond, 1995; Sylvestre et al., 2019).

This process relies on the strong participation of the people concerned because it requires consensus among all stakeholders (including the population and researchers) on the objectives and the means. It is focused primarily on the actors' concerns, helping them to transform their practices through the interweaving of research and action (Hagger et al., 2020). Baum speaks of participatory action research to emphasise this characteristic of mobilisation (Baum et al., 2006), as can be seen in much research in India or Africa, for example.

It is thus a particularly valuable type of research in health promotion, where community participation is an objective in itself, beyond intervention (Whitehead et al., 2003). In this context, the researcher is an agent of change, in the same way as the other stakeholders (Reason & Bradbury, 2008).

DEVELOPMENTAL EVALUATION

Developmental evaluation focuses on the use of results by stakeholders (Patton, 2021). Its objective is to make the evaluation relevant and directly useful to the main users by promoting effective use of results. In this way, evaluators can support programme improvement, which is one of their main activities at the heart of the evaluation process.

This type of evaluation therefore involves active collaboration between the evaluator and the main expected users of the evaluation and, above all, the parties involved in organising the activities. It helps prepare the change linked to using the results, and supports decision-making and the development of interventions (Gamble, 2008; Patton & LaBossière, 2012). As with action research, the underlying theory (which makes it a type of research, even if it is called evaluation) is modified to allow for the emergence of new evaluative knowledge and to support adaptation to changes introduced by the intervention. It therefore takes into account the elements of the context and reports on them over the course

of the development. Again, the process is not linear but dynamic. Users react continuously to the data, adjust the intervention with the support of the researchers, and engage in reflexive work on their lived experience (Fagen et al., 2011).

Thus, this type of evaluation is suitable for interventions implemented in complex environments, such as population health interventions. These contextual elements and the needs of users are constantly feeding into the reflections of researchers (and their team). In this type of evaluation, therefore, the cross-fertilisation of methods and viewpoints is a *sine qua non* condition, since the aim is to understand the dynamics linked to the context and the complexity of the intervention within that context, and above all, to devise, in an iterative process, innovative strategies to support the development of the intervention (Dozois et al., 2010; Patton, 2010).

EMBEDDED RESEARCH

Embedded research, like action research and developmental evaluation, is aimed at facilitating the integration of evidence into practice (McGinity & Salokangas, 2014). It has recently been strongly promoted by the World Health Organization for health systems research in Latin America or the Middle East. In this type of research, researchers work within health management organisations to identify, design, and conduct studies and share results that address the needs of the organisation's agents and are in line with their professional objectives and contexts. This research is therefore directly linked to the organisation's mandate (Marshall et al., 2014; McGinity & Salokangas, 2014). Through this insertion into the organisation, the researcher is able to share in the worldview of the organisation and its partners and interact closely with the users of the research results, since they are involved in the reflexive process and have rapid access to data emerging from the research.

It is a particularly effective knowledge transfer strategy, as it promotes co-production of evidence (Armstrong et al., 2013; Buffett et al., 2007; Gervais et al., 2013; Souffez & Laurendeau, 2011). The researcher is nevertheless obliged to back up this collaboration, and in particular this vision of the world, with an academic theoretical reflexivity. In this respect, the researcher differs from knowledge brokers (see

Chapter 6), who promote networking and knowledge transfer within the organisation and help strengthen the capacity to use it (Burnett et al., 2002; CHSRF, 2003). Even though, like knowledge brokers, they are on the border between two worlds (Lewis & Russell, 2011), "embedded" researchers focus on the (co)production of knowledge and are not responsible for its actual use. To this end, researchers and host organisation staff work together to co-create, refine, implement, and assess the impact of new and existing knowledge in relation to the context (Langlois et al., 2017). This approach differs from action research in that the researchers have a somewhat larger role in the process and the end goal is not necessarily social change and empowerment.

Here, the challenge for the researcher is to maintain a reflexivity that is independent of the context and of the political agenda of the organisation implementing the population health intervention, even though these must be taken into account, in the sense that the research programme is shared with the organisation in a mutually advantageous relationship.

NATURAL EXPERIMENTS

Natural experiments are studies in which the intervention is neither decided nor organised by the researchers (Craig, Cooper et al., 2012). Examples of this are a study of the effect on population health in France of a decision to ban smoking in public places and another of a ban on travel between regions in Senegal during the Covid-19 pandemic. Natural experiments are of particular interest because they broaden the range of interventions that can be usefully evaluated when it is neither ethical nor possible to implement the intervention specifically for research (Benmarhnia & Fuller, 2019).

Such studies should follow good practice in the conduct of observational studies, such as the prior specification of hypotheses, clear definitions of target populations, explicit sampling criteria, and valid and reliable exposure and outcome measures (West, 2009). They require comparison of exposed and non-exposed groups (or groups with varying degrees of exposure) to identify the effect of the intervention (Meyer, 1995). When studying the intervention's effectiveness, the challenges of causality can be addressed by statistical methods of accounting for confounding factors.

The absence of any manipulation of the intervention inherently introduces biases that limit the study's internal validity and, consequently, the strength of the evidence for causal inference, such as would be observed in experimental studies. For this reason, these studies are conducted when the intervention can reasonably be expected to have a significant impact on population health but there is still scientific uncertainty as to the extent or nature of the effects and whether the intervention or the underlying principles can be replicated, extended, or generalised (Craig, Cooper et al., 2012).

Thus, Petticrew et al. (2005) consider this type of research particularly appropriate to study interventions on the structural determinants of health (e.g. employment, housing, pricing of noxious products, etc.) at the heart of population health.

CONCLUSION

The most notable difference between these types of studies, which we clearly have not inventoried exhaustively and which are the subject of many other writings, is that experimental studies are aimed particularly at producing universal and immutable laws, whereas the others, contextually anchored, take a more pragmatic view of what they observe in order to support operational decision-making. In this respect, their ambitions overlap with those of two other streams of research: 1) implementation science, which aims to understand how interventions produce their effects by uncovering the factors associated with effective implementation and the intervention's capacity to adapt to actors and contexts; and 2) implementation research, which aims to produce knowledge on how interventions take into account and integrate evidence into the formulation of their content to be more effective (Ridde & Turcotte-Tremblay, 2019).

Clearly, these different types of research have certain characteristics that either overlap or diverge, such that they cannot be unambiguously differentiated, as these differences can be quite subtle. To our knowledge, there is no international consensus in this respect. For example, action research, like developmental evaluation and embedded research, is

based on very strong collaboration among the actors involved (researchers, population, users), but it considers the transformation of practices and situations to be an objective in itself (it is the participation that produces change, more than the results produced), whereas, in the other two, transformation comes from the use of the results, whose genesis is determined by the actors' agendas. Some study designs are more suited to evaluating "simple" or even complicated interventions, while others allow for the analysis of complexity, related to the types of intervention and their more or less direct effects, to the malleability of the intervention components within the context, to the impact of this context on those components, as well as to the roles of the various actors and the population in the research process, which can certainly influence the researcher's reflexivity.

Table 2 presents the main characteristics of each type of research design according to six parameters of a PHIR: 1) the roles of the actors in the research (including the population); 2) the objective; 3) the purpose; 4) the role of the context; 5) the type of validity emphasised; and 6) the data collection methods (see Table 1). However, this list is arbitrary because in real life the issues, like the methods, may be hybridised. For example, developmental and embedded evaluations ultimately differ only in the researcher's position, external in one case and agent of the organisation in the other, which in the first case will produce conclusions specific to an intervention, and in the second, conclusions about an intervention within a specific organisational vision. Civil society organisations and non-governmental organisations (NGO) working in the field of development aid often favour these latter two approaches. Along the same lines, evaluative research does not preclude active stakeholder participation, which could, over the course of the process, foster reflexivity and a change in practices, as is observed in action research. International global health organisations often set up evaluation monitoring committees but prefer expert approaches in which the participation of those concerned is reduced. Similarly, in each of the designs, except for the experimental study, stakeholders' involvement and the production of concrete recommendations for decision-makers can be introduced.

In the PHIR context, each type of study is relevant, insofar as its development and/or hybridisation can be conceptualised in terms of the following characteristics:

Table 2 | Key characteristics of types of population health research.

	Role of non-researchers	Objective	Nuances in terms of goals	Role of context	Validity emphasised	Methodological approach	Methods
Controlled trial	Not systematically associated	Evaluate the effectiveness of an intervention, all else being equal	Produce generalisable knowledge	Considered a bias	Internal validity	Randomised counterfactual	Quantitative
Evaluative research	Research sponsors	Generate knowledge about an intervention in order to inform a decision	Support decision-making on the intervention	Depends on the question	Depends on the question	Depends on the question	Depends on the question
Action research	Sponsors involved in the research	Study and analyse practices and their evolution over the course of an intervention	Change social practices and conditions	Essential	External validity	Observational	Mixed, mostly qualitative
Developmental evaluation	Sponsors and users of results	Generate knowledge that supports decision-making and the development of interventions	Support decision-making	Important	External validity	Observational	Mixed
Embedded research	Guide the search and use the results	Foster within an organisation the co-production of evidence consistent with its mandates	Support decision-making	Important	External validity	Observational	Mixed
Natural experiments	Sponsor and use the results	Assess the effects of interventions organised without researcher involvement	Generate knowledge	Important	Balance between internal and external validity	Generally counterfactual	Quantitative or mixed

– **Convergence between the originality of the knowledge produced and its social utility:** This involves combining, in the objectives, the aim of producing original knowledge and the requisite pragmatism to be applied in producing, and even supporting, the recommendations emerging from this research (see Chapter 6).

– **The consideration of context as a determinant of results:** This means rejecting methods that would exclude from the conclusions the influence of contextual components and considering transferability and sustainability as matters of necessity (see Chapter 3).

– **The participatory dimension of research:** This involves recognising the multiplicity of actors involved in the research and the value of their role in studying the complexity of the intervention, rejecting the illusion of personal neutrality and objectivity (i.e. the researcher being external and outside of the action) in favour of collective neutrality and objectivity (i.e. the convergence of different views and subjective perceptions) in the interpretation of the phenomenon under study (see Chapter 5).

– **The need to address a wide range of interdependent issues and consequently multidisciplinarity:** This means shifting the object of the research away from the effectiveness of interventions alone, as would be done in clinical research or controlled trial methods, and recognising that this notion of effectiveness only makes sense when coupled with other equally important questions (how, under what conditions, with/by whom, to what extent, etc.). This implies the need to develop this research in a multidisciplinary manner to bring together different views and interpretations of the same phenomenon (see Chapter 2).

– **Acceptance of all methods:** To study the entire interventional system, methodological hybridisation is necessary, provided that the methods used are justified and rigorously implemented (see Chapters 3 and 4).

> We propose to define PHIR as **a multidisciplinary scientific process for producing cumulative and iterative knowledge on population health interventions. It combines complementary methods to address a range of questions with a view to understanding the interventions' complexity, their contextual anchorage, and the necessary social utility of the conclusions while considering the reduction of social inequalities in health.**

Thus, PHIR can only be conducted and be meaningful if it can be done without dogmatism (which often arises in debates about methods), and in a multidisciplinary and pragmatic manner, while reconciling the particular characteristics of population health interventions with the specific requirements of science. As such, Figure 2 presents the particular characteristics of PHIR in terms of the equilibrium created in combining these two elements (see Figure 2).

Following this introductory text, the following chapters describe possible research questions (Chapter 2), the approaches (Chapter 3),

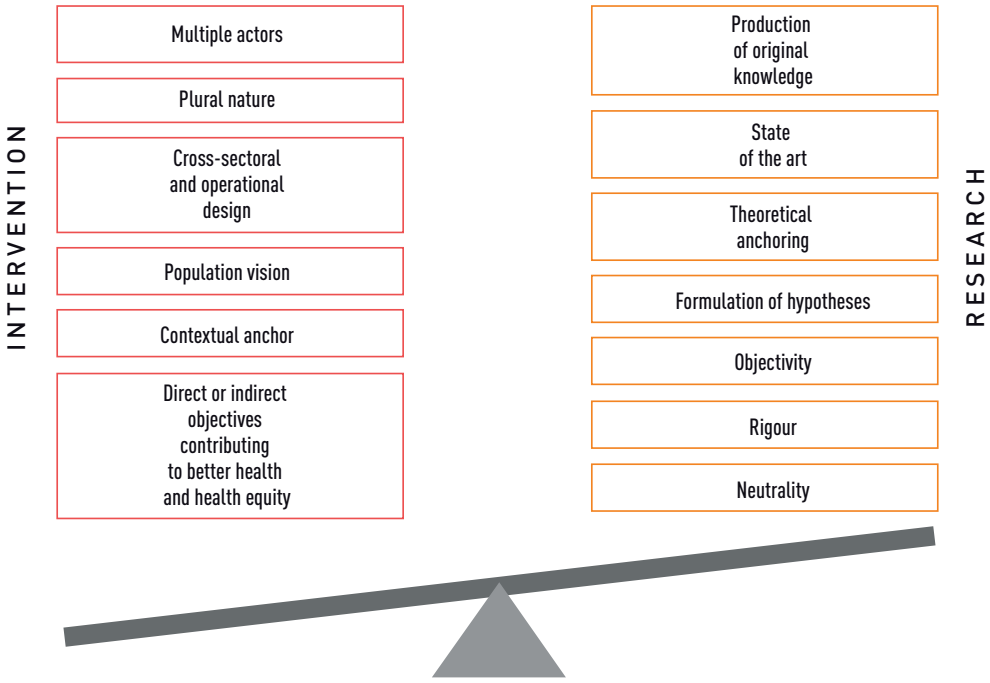

Figure 2 | Population Health Intervention Research.

the methods (Chapter 4), the types of actors involved and their roles (Chapter 5), and ways of using PHIR results (Chapter 6).

CHAPTER 2

RESEARCH QUESTIONS IN PHIR

PHIR, like any scientific approach, starts with a research question that the study must try to answer. In this context, the demand expressed by the stakeholders (decision-makers, population, research funders, practitioners, researchers…) is often and legitimately focused on results (effectiveness of the intervention). However, it is misguided to consider that effectiveness is the only, or even the main, research question in PHIR. If we accept the social utility purpose of PHIR (see Chapters 1 and 6), there are other equally important research questions to consider. Clearly, the choice of the question should be the subject of a consultation process among all stakeholders and take into account multiple issues related to data, budget, relevance, time, etc. (Bamberger & Mabry, 2007). This choice is, in fact, not neutral. For example, as in other types of research, the same PHIR can lead to different conclusions depending on whether the choice is made to base them on a broadly formulated population-based result or on a result that considers differences between social groups.

The aim of this chapter is to present and illustrate the main research questions in PHIR. These questions are neither exclusive nor exhaustive; the same study can sometimes address several questions. In addition, a PHIR can be one step in a multi-step research programme, and each step can contribute to answering one or more of the questions. The list of potential questions could be very long; Patton (2008) has proposed more than 100 in one of his books on evaluation. In order not

to overload this chapter, we will limit ourselves to the main research questions most often encountered in PHIR projects and in our experience. There are several ways to categorize these research questions. We have chosen to present them according to the stage of the intervention development process in which they most often feature (see Figure 3), even though we are well aware that a stepwise or linear process does not sufficiently capture the complexity and customisation of this development process. Finally, this diagram applies to *de novo* interventions developed within the study context. Thus, some steps do not apply to existing interventions that may be the subject of study.

Figure 3 | Stages in the development of a population health intervention and evaluative questions.

DESIGNING THE INTERVENTION: CONSTRUCTING, REFINING AND VALIDATING THE INTERVENTION THEORY

The design of the intervention may be an object of study in a PHIR project. This object may, moreover, be quite complex to grasp, if the intervention is considered not as separate from the context, but rather as part of an interventional system (Cambon et al., 2019), i.e. assuming, on the one hand, permeability between the interventional and

contextual components and, on the other, a complex dynamic of action and effect.

To structure this process, the theory-based approach offers several advantages: it explains and provides arguments for the strategies and activities mobilised by the intervention; it describes the cascade of expected effects (by which causal mechanisms each activity or strategy and their interactions contribute to the outcomes); and it takes into account the population or contextual factors that may interact with these activities. Thus, an intervention design process should begin with the conception of an intervention theory. This can only be done by paying attention to the definition of what is called theory (Cambon & Alla, 2021; Moore et al., 2019), which should not be limited, as is often the case, to so-called classical causal theories, such as protection motivation theory (Maddux & Rogers, 1983) or social cognitive theory (Bandura, 1989). These theories, in fact, generally take a decontextualised and often monodisciplinary view of a subject. On the contrary, the theory must integrate concrete elements linked to the implementation context. The intervention theory must thus integrate multiple constructs describing the constitutive hypotheses of the interventional system to be studied during the PHIR. Table 3 presents, for each type of theoretical approach, an example of a definition.

Table 3 | Theories and four models of causality.

1- Theory of intervention	"Hypotheses on which people, consciously or unconsciously, build their interventions." (Weiss, 1998)
2- Framework	"A structure, overview, outline, system or plan consisting of various descriptive categories, e.g. concepts, constructs or variables, and the relations between them that are presumed to account for a phenomenon." (Nilsen, 2015)
3- Middle range theories	"Theories that lie between the minor but necessary working hypotheses that evolve in abundance during day-to-day research and the all-inclusive systematic efforts to develop a unified theory...." (Merton, 1968)
4- Grand theory	"Theory that will explain all the observed uniformities of social behaviour, social organization and social change." (Merton, 1968)

Source: Ridde, Pérez et al. (2020).

In line with Chen's work, Cambon & Alla (2021) define intervention theory as the combination of:

– **the causal theory**, which explains the mechanisms (Box 1) of the effects activated by the intervention components and their hybridisation with all the contextual determinants likely to act as obstacles or facilitators of the expected (or unexpected) outcomes;

– **the action model**, which provides concrete elements for implementing the intervention components used to guide the process in order to achieve the objectives. The key feature of the action model is that it focuses not only on activities related to the outcomes, but also on the sequences, resources, actors, and preconditions necessary for their implementation.

BOX 1

MECHANISMS: WHAT ARE WE TALKING ABOUT?

The notion of mechanism has various definitions, depending on disciplines and epistemological approaches. Machamer et al. (2000) define mechanisms as "entities and activities organized such that they are productive of regular changes". Others define them more as preconditions for results, as in the realist approach, where a mechanism is "an element of reasoning and reactions of agents in regard to the resources available in a given context to bring about changes through the implementation of an intervention" (Lacouture et al., 2015). In the field of health psychology, they are defined as the processes by which a behaviour change technique regulates behaviour (Michie et al., 2013). This may refer, for example, to how practitioners perceive the utility of an intervention or how individuals perceive their ability to change their behaviour.

In combining contextual and interventional components, the change process produces mechanisms, which in turn produce effects (final and intermediate results). For example, we could envision that a motivational interview for smoking cessation might produce different psychosocial mechanisms, such as intention to quit in the short term, a perception of the usefulness of quitting, and the feeling of being able to do so (perceived self-efficacy). These mechanisms influence smoking cessation. This constitutes a causal chain, defined here as the way in which each event in an ordered sequence causes the next event in the chain. These mechanisms, as a system, can also affect their own contextual or interventional components. For example, the feeling of self-efficacy could influence the choice of smoking cessation aids.

Source: Cambon et al. (2019).

Figure 4 presents the intervention theory for the interventional system.

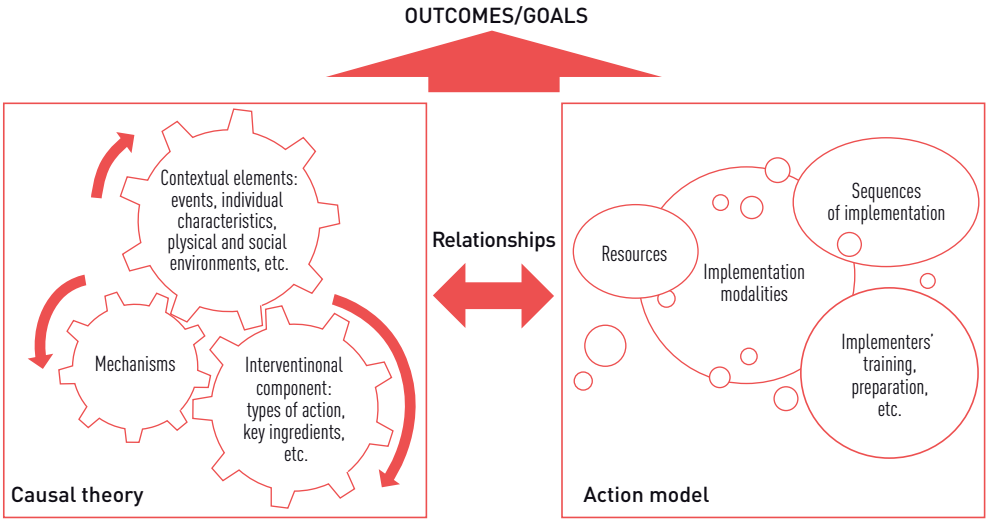

Figure 4 | Interventional System Intervention Theory.
Source: Cambon & Alla (2021).

Developing the intervention theory is a partnership-based process by nature (Box 2). It can only be developed with the relevant stakeholders by mobilising several sources of information: 1) existing theoretical frameworks (e.g. behavioural change models); 2) evidence from the literature or from previous or concurrent studies (e.g. on causal links, the effects of interventions, the influence of context); and 3) stakeholder expertise (what change is likely to occur by implementing this activity, and how and why it will occur).

The subsequent steps (Figure 3) can help refine and empirically validate the intervention theory in the pilot study. This validation may also be carried out during the evaluation with a view to analysing, using qualitative and quantitative methods, the effectiveness of the intervention in real-life conditions and the mechanisms leading to this effectiveness (see Chapter 3).

This work of constructing the intervention theory can also be carried out after interventions have been implemented. This is the case

when evaluations are conducted for existing interventions. In these situations, having an intervention theory could also make it possible to explore questions on the conventional elements of intervention evaluation, which are relevance (are the intervention and its components appropriate for addressing health needs in this given context?) and especially coherence (are the activities consistent with the intervention objectives and with each other?) (Contandriopoulos et al., 2011).

BOX 2

DESIGN OF A COVID-19 VACCINE HESITATION INTERVENTION THEORY

In the Covamax study (Sponsor: University Hospital of Bordeaux, ANR Funding), the first step was to develop an intervention theory prior to the implementation of a Covid-19 vaccination campaign.

To develop it, the research team, with the help of a group of healthcare stakeholders, carried out a cross-analysis of the CoVaPred survey on the acceptability of anti-Covid measures (Schwarzinger et al., 2021) and a review of meta-analyses and systematic reviews of factors involved in the vaccination decision (in particular for seasonal influenza) and predictive theories of behaviour.

On this basis, the team was able to develop an intervention theory that specified the key elements of action for a future vaccination campaign:

- **Interventional components:** 1) positive communication based on collective immunity and not on individual vulnerability for people not at serious risk of severe illness; 2) mobilisation of local relays and actors in an outreach strategy.

- **Implementation methods, resources, and sequencing:** 1) health professionals (doctors, nurses, midwives, pharmacists) playing pivotal roles in the vaccination campaign in communication and in the act of vaccination, rather than vaccination centres; 2) training of health professionals to respond to patients' concerns and questions.

- **Contextual conditions for success:** 1) individual access, free of charge and without delay; 2) a vaccination procedure performed at the time when information is provided.

Activating the following mechanisms: confidence in the vaccine and the word of the professional, sense of control, perception of vulnerability to the disease, adherence to the norm.

This intervention theory can be used to develop a theory-based intervention or to evaluate *a posteriori* a vaccination campaign that was actually implemented.

ASSESSING VIABILITY

Viability (described by Chen as "viability validity", to supplement internal and external validity) is defined as the extent to which an evaluation provides evidence that an intervention is a success in the real world (Chen, 2010). This notion of success refers to the following dimensions of the intervention from the stakeholders' standpoint:

– Useful: do stakeholders perceive the intervention as useful for mitigating the problems or improving well-being?

– Affordable: do the funders see the intervention as feasible in terms of their capacity to fund it?

– Practicable: are the relevant professionals in the field able to implement it with their resources and expertise?

– Workable: can existing organisations routinely coordinate and implement activities related to the intervention?

– Evaluable: is it possible to evaluate the outcomes of this intervention (i.e. is there a hypothesis regarding the link between intervention components and potential health effects)?

Viability thus goes beyond feasibility (the possibility of implementing an intervention) to focus on its capacity to be implemented, sustained, and scaled up, in routine conditions, by the usual actors (and not, for example, as might be seen in a research scenario with specific funding, an adapted legal framework, ad hoc actors, etc.).

Assessing the viability of an intervention should be a prerequisite to any effectiveness study in order to avoid the risk of concluding that an intervention will be effective, when ultimately it will not be viable in the real world at the end of the research process (Chen, 2010). Thus, the viability assessment should be carried out as early as possible when

developing an intervention. This is one of the purposes of pilot studies (Thabane et al., 2019) in PHIR (Box 3).

BOX 3
VIABILITY STUDY IN THE 5A-QUIT-N CONTROLLED TRIAL

5A-QUIT-N is an organisational innovation designed to manage local resources available in the Nouvelle-Aquitaine region (France) to support smoking cessation among pregnant women.

The research team developed the first version of the organisation based on the scientific literature, recommendations from institutions and scholarly societies, interviews with stakeholders, and analysis of the current organisation of smoking cessation services for pregnant women and existing resources. Based on this first version of the organisation, the viability was studied:

- first, *a priori* (before implementation in the field), based on interviews with professionals and a review of the scientific literature on factors limiting and facilitating the implementation of such organisations;

- then, during a pilot study in one health region, which served to describe the implementation and analyse its obstacles and levers, as well as to gather the opinions of stakeholders, professionals, and pregnant women.

For example, from the perspective of midwives, utility was shown in the concrete outcomes seen in their patients (e.g. smoking cessation); affordability, in the fact that the programme was fully covered by health insurance; practicality, in the ability to integrate the programme into their normal work structures; and adaptation, in the programme's integration into existing regional organisations.

EVALUATING EFFECTIVENESS

EFFICACY, EFFECTIVENESS: EFFECTIVENESS IN THEORY VERSUS IN REAL-LIFE CONDITIONS

English has two words to express effectiveness: *efficacy*, which refers to effects achievable under ideal conditions (or theoretical conditions,

where the influencing factors are highly controlled), and *effectiveness*, referring to effects achieved under real-life conditions (Porta, 2008). Effectiveness under ideal conditions is generally determined by a "classic" randomised controlled trial, while effectiveness under real-life conditions is determined by a pragmatic controlled trial, a quasi-experimental study, or an observational study (natural experimentation). The recent Covid-19 crisis familiarised us with the difference between the two through the evaluation of vaccine effectiveness, in which *efficacy* was assessed using randomised controlled trials and *effectiveness* was assessed by real-life studies carried out, in particular, from medico-administrative databases.

In PHIR, studies are most often *de facto* studies of effectiveness in real-life situations. Indeed, due to the nature of the interventions, researchers very rarely insert themselves into an experimental situation that involves relatively simple, technical interventions, such as the act of vaccinating.

The effectiveness of a population health intervention is judged by health outcomes (morbidity, mortality, well-being, etc.). This effectiveness is what corresponds to the overall objective or purpose of an intervention in the planning process. By default, it can be judged on distal outcomes related to health determinants (decrease in environmental exposure, behavioural change, etc.) or on proximal outcomes of seeking care or using the activities and services offered by the intervention. This is what corresponds to the specific intervention objectives in the planning process. It is often impossible, or irrelevant, to assess the effects of an intervention on health outcomes, especially when they are long-term (e.g. an intervention to strengthen children's psychosocial skills can take decades before producing observable health outcomes). In cases where the results are not health outcomes, arguments are needed to support the relevance of the results in relation to the determinants (i.e. factual elements indicating that a change in exposure to a particular determinant will ultimately lead to a change in terms of health). This can also be one of the uses of the intervention theory discussed in the previous paragraph.

IMPACTS

The term "impact" can have several meanings (see example in Box 4):

– Long-term outcomes, when they are not measurable in the study and it takes a very long time to see their occurrence; for instance, in a programme to reduce smoking among adolescents, the outcome may be smoking prevalence, and the impact (not measurable but modellable), a reduction in cancer incidence.

– Health outcomes, when the study's objective is not formulated in these terms. This is particularly the case in projects based on the Health in All Policies (HiAP) approach. Each policy has its own non-health-related goals that can have indirect effects (or impacts) on health.

– Unintended beneficial or adverse consequences of an intervention (which are not the same as outcomes, which are the *intended* consequences corresponding to the research question) (Turcotte-Tremblay et al., 2021). An example of beneficial unintended consequences might be that of a physical activity programme aimed at increasing the well-being of seniors (expected outcomes), which may have both a positive health impact, i.e. a decrease in cardiovascular morbidity, and a positive social impact, i.e. a strengthening of community bonds. An example of an adverse unintended consequence might be when increasing green spaces in a city to promote physical activity leads to an increased incidence of allergy symptoms in children. Box 5 provides 12 questions that can guide reflections on unintended consequences.

BOX 4
THE IMPACT OF MANAGING THE COVID-19 CRISIS

One example of these impacts is seen in the consequences of anti-Covid measures worldwide. To reduce mortality among people vulnerable to Covid-19, universal measures were taken to reduce human physical interactions. It is now known that these measures had a negative impact on people's mental health and led to increased social inequalities in health, delayed treatment for other pathologies, increased food insecurity in vulnerable households, and increased domestic violence, among others (Cambon et al., 2021).

BOX 5

CONSIDERATIONS FOR TAKING INTO ACCOUNT THE UNINTENDED CONSEQUENCES OF INTERVENTIONS

Based on several empirical studies and a literature review, 12 considerations have been suggested to help research and intervention teams pay closer attention to unintended consequences (Turcotte-Tremblay et al., 2021).

1. Set an explicit objective or research question that addresses unintended consequences
2. Choose and define your terminology
3. Adopt a theory or conceptual framework
4. Determine the study's perspective
5. Clarify the intervention theory
6. Anticipate potential unintended consequences
7. Focus on desirable, undesirable, and even neutral unintended consequences
8. Include flexible, exploratory methods
9. Cast a wide net when collecting data
10. Track the evolution of unintended consequences over time
11. Take equity issues into account
12. Validate the classification of desirable versus undesirable consequences with stakeholders

EFFICIENCY

Effectiveness can be expressed in terms of the resources mobilised to achieve it (human, financial, etc.). This is referred to as *efficiency*. This is the domain of medico-economic studies, with three main approaches (Le Pen & Levy, 2018) corresponding to three types of results (Box 6):

– The cost-effectiveness approach uses an outcome indicator expressed in terms of health or health determinants (e.g. the cost of a heart attack avoided).

– The cost-utility approach uses a generic and composite outcome indicator that includes the intervention's impacts in terms of quantity and quality of life. The Quality-Adjusted Life Year (QALY) is the reference indicator in this regard. This approach has the advantages of integrating all the consequences of an intervention and of allowing different interventions to be compared with different themes.

– The cost-benefit approach also uses a generic indicator, but expressed in monetary rather than health terms.

BOX 6

THE ASSESSING COST EFFECTIVENESS (ACE) PREVENTION SYNTHESIS

ACE Prevention was a massive synthesis funded by the National Health and Medical Research Council (NHMRC). The final report was presented on September 8, 2010. The overall objective of this project was to provide a comprehensive analysis of the incremental cost effectiveness of preventive intervention options for non-communicable diseases in Australia. The experts involved evaluated 123 disease prevention measures to identify those that would prevent the most diseases (cost effectiveness) and premature deaths (cost utility) and those with the highest cost-benefit ratio. The report is available from: https://public-health.uq.edu.au/files/571/ACE-Prevention_final_report.pdf

Source: Vos et al. (2010).

IMPLEMENTATION

The description of an intervention's implementation is an important focus of evaluation (Ridde & Turcotte-Tremblay, 2019). This description can help explain the results and their heterogeneity. For example, it can help determine whether negative outcomes are linked to the intrinsic ineffectiveness of the intervention (intervention theory failure), inadequate or incomplete implementation (implementation failure), or lack of fidelity or adherence to the intervention. The implementation analysis focuses on the role of social actors, power issues, and the internal and external dynamics of the intervention. Social science theories are often used to properly comprehend these implementation processes.

Numerous implementation indicators ("implementation outcomes") are used, including coverage (proportion of the target population actually reached or participating), intervention dose ("quantity" of intervention delivered), fidelity, organisational quality (compliance with standards, benchmarks, best practices), stakeholder satisfaction, etc. (Hoffman et al., 2014; Proctor et al., 2011).

ANALYSING THE MECHANISMS

For complex interventions (which is the case for most population health interventions), analysis of the mechanisms is required to understand how a result was obtained: how it was produced, under what conditions, for whom, and how (Craig, Dieppe et al., 2012). This understanding is crucial not only to perceive the implementation, but also to support the intervention's sustainability, transfer, or scaling up. It refers directly to the social utility dimension of PHIR.

This analysis consists of characterising the causal chains (e.g. why and how a particular activity produces a particular mechanism and outcome), analysing the factors linked to the implementation of an intervention (e.g. what makes an actor take it up or not), and finally, understanding the contribution of contextual and population factors to the intervention and results (e.g. to explain the differential effect that some interventions may have on social and territorial inequalities in health). This contribution analysis of mechanisms can be done in particular within the context of a theory-based evaluation (see Chapter 3).

ANALYSING THE DISSEMINATION FACTORS OF AN INTERVENTION

An intervention is evaluated at a given time, in a given context. One challenge, and this is the social value of PHIR, is to be able to support a process of disseminating the intervention when it has proven to be effective, whether such dissemination is done by perpetuation (over time), transfer, or generalisation (in space). Thus, PHIR can, and indeed should, incorporate research questions that focus on describing and analysing:

– the transfer of intervention from an experimental context to real life and factors related to its adoption by actors and decision-makers;

– the applicability and transferability of the intervention to contexts other than the one in which it was evaluated (Cambon et al., 2013; Schloemer & Schröder-Bäck, 2018) (Box 7);

– the processes and conditions for scaling up;

– the factors related to maintaining the intervention (sustainability, durability).

It should be noted that this analysis of dissemination factors is informed by all the previous steps: developing an intervention theory, analysing viability, analysing processes and mechanisms in order to understand and predict the intervention's capacity to be disseminated, under what conditions and, if necessary, with what adaptations. Thus, while conceptually the dissemination of an intervention is seen as occurring after it has demonstrated its viability and effectiveness, the elements for this analysis are collected throughout the research process.

BOX 7
TRANSFERABILITY CRITERIA

Transferability differs from applicability in that it is focused on results, whereas applicability is focused on implementation criteria. Transferability criteria take into account elements that pertain to the intervention itself (the components and conditions for the implementation) as well as contextual elements that can influence not only the implementation, but also the results more directly. These elements are the characteristics of the populations, stakeholders, and the context in which the intervention is implemented. Thus, this notion of transferability fully integrates that of the interventional system developed earlier, in that it assigns a significant role to context in contributing to outcomes.

As part of an alcohol risk reduction programme tested in an association in Marseille, France, an analysis of transferability showed, for example, that the support programme put in place was effective in terms of recovery indicators if, and only if, certain contextual conditions were met, such as the layout of the premises where the interviews were conducted (in the form of a salon having a reception area with alcohol), the support processes (at home and/or on the premises), and the training and support provided to the workers (social work rather than health work, regular psychological support for the workers). These conditions are important to consider because they strongly influence the potential for implementing this support elsewhere (applicability) and its success, as it directly affects specific mechanisms (e.g. deconstruction of the feeling of shame).

CONCLUSION

This chapter shows that there are numerous PHIR research questions. They are not mutually exclusive and can be articulated concurrently

and/or sequentially. The research questions in the following table are provided for illustrative and indicative purposes. Indeed, each PHIR project is a particular case, and the questions it addresses depend on the research context, time and data constraints, and stakeholders' views.

Table 4 | Research questions.

Evaluation dimensions	Examples of sub-dimensions	Examples of research questions
Designing the intervention	Intervention components Contextual elements to be considered Effect and process mechanisms Intended result	How are the elements of the intervention likely to have an effect? Under what conditions can this intervention have an effect?
Assessing viability	Utility Affordability Practicality and adaptability Evaluability	Useful: e.g. do individuals and other stakeholders see the intervention as useful for mitigating problems or improving well-being? Affordable: e.g. do decision-makers consider the intervention to be financially sustainable? Practicable and workable: e.g. can the intervention be integrated into the organisational practices of professional communities? Evaluable: e.g. is it possible to evaluate the intervention?
Assessing effectiveness and efficiency	Effectiveness Efficiency Impacts	How effective is this intervention? What are the unintended consequences of this intervention? What is the cost-benefit ratio of this intervention? What is the cost effectiveness of this intervention? What is the efficiency of this intervention?
Evaluating the implementation	Coverage (proportion of the target population actually reached) Intervention dose ("quantity" of intervention delivered) Fidelity Mechanisms Quality of delivery (compliance with standards, benchmarks, best practices) Stakeholder satisfaction	Under what conditions does this intervention have an effect? What does this intervention bring to stakeholders? By what mechanisms does this intervention have an effect? How does this intervention have an effect?
Assessing transferability and/or dissemination conditions	Transfer of intervention from an experimental context to real life, factors related to adoption of the intervention by actors and decision-makers Applicability and transferability of the intervention to other contexts than the one in which it was evaluated Processes and conditions for scaling up Factors for maintaining the intervention (sustainability, durability)	To what extent can this intervention achieve the same results in this other context? How can this intervention be adapted to new contexts without losing its effectiveness? How can this intervention be implemented in another context? What are the conditions for maintaining this intervention and what is the degree of sustainability?

CHAPTER 3

METHODOLOGICAL APPROACHES (DESIGNS) IN PHIR

DIFFERENT APPROACHES TO ADDRESS DIFFERENT PHIR QUESTIONS

There are many approaches (designs) for evaluating population health interventions.

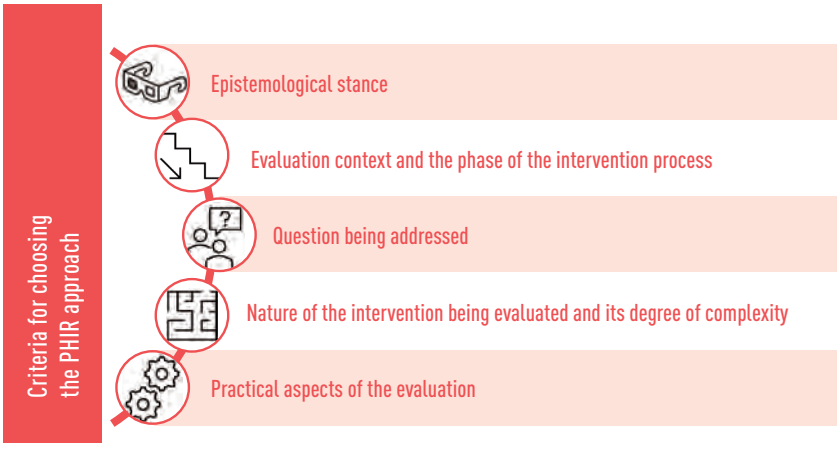

Figure 5 | Criteria for choosing the design.

However, these approaches should not be regarded as a simple toolbox from which to draw. The choice of research design is a scientific activity based on: 1) the epistemological stance (see Chapter 4); 2) the evaluation context and the phase of the intervention process; 3) the question being addressed (see Chapter 2); 4) the nature of the intervention being evaluated and its degree of complexity; and 5) the practical aspects of the evaluation (including data availability).

EPISTEMOLOGICAL STANCE

Schematically, when considering the evaluation of effectiveness, two epistemological views of causality can be discerned.

The first is a linear view (the same cause produces the same effect). This linear view is the source of the experimental paradigm, which is based on a counterfactual approach (inferring the intervention's impact by comparison with a situation in which the intervention is not present). This paradigm assumes: 1) a stability in the relationship, in order to present it, and 2) that all else is equal (which is achieved by randomisation).

In the second, more systemic view, it is considered that the same cause can produce different effects depending on the conditions under which it is mobilised. This is the principle upon which the realistic evaluation approach formalised by Pawson & Tilley (1997) is based: realistic approaches consider human actions and social interactions to be at the very heart of change. It is through the operation of entire systems of social relations that any change in behaviours, events, and social conditions takes place. A key requirement of realistic evaluation therefore is to take into account the different layers of social reality that make up and surround programmes. It is within this framework that we have proposed the notion of an interventional system that includes, beyond the components of the intervention, pre-existing contextual parameters that may be under or outside the control of the designers and the people organising the intervention. Therefore, any evaluation must assume: 1) that the contributions of all components of this interventional system, as well as the effect of their combination, are assessed, and 2) that the conclusions of the study are based in the context, even if 3) some of the conclusions (i.e. the key functions) may be transferable to other contexts (Cambon & Alla, 2021).

This distinction is not trivial; these epistemological stances have anchored scientific cultures for decades. Are they irreconcilable, for all that? This is a matter of debate, as illustrated in particular by the strong reactions to Bonell's proposal to conduct realistic randomised controlled trials combining the two stances in one integrated research design (Marchal et al., 2013). However, managing to integrate them into one global approach is, in fact, a major challenge for the multidisciplinary approach in PHIR.

THE EVALUATION CONTEXT AND THE PHASE OF THE INNOVATION PROCESS

Evaluation can be conducted in two contexts. The first is an innovation context, with an intervention being created *de novo*, possibly by the research teams. The other is an observation context, in which the researchers evaluate an intervention already developed by other actors, and which may have been in place for a long time.

In an innovation context, the development and evaluation of the intervention involve several phases that can sometimes extend over several years. Schematically, the innovation process consists of four broad phases (see the previous chapter):

– the development of an intervention and its theory;

– the piloting of this intervention and the analysis of its viability;

– its wider deployment and the evaluation of its effectiveness and the conditions for its effectiveness (analysis of processes and mechanisms);

– its generalisation/scaling up (and the analysis of transferability factors, impediments, and drivers of its deployment and sustainability).

It should be noted that this phased process is theoretical, even simplistic. In practice, research questions can be articulated in different phases. For example, the intervention theory can be constructed, refined, and validated throughout this process. The most suitable research designs for each phase are different. In particular, the controlled trial can be used to analyse effectiveness. It is generally not appropriate for the other phases.

In an observation context, where the research team is evaluating a pre-existing intervention, the experimental method is generally not feasible

by nature, for reasons of practicality and acceptability, as well as for ethical reasons (it may be considered unethical to take an already disseminated intervention around which there is professional consensus away from a group in order to evaluate it).

THE QUESTION BEING ADDRESSED

The research question is what should drive the choice of research design in the first place. For example, if the researchers are interested in effectiveness, a counterfactual method may be suitable. A realistic evaluation is also possible. If they are interested in mechanisms (including conditions for effectiveness), a theory-based evaluation would be more relevant. Finally, if their focus is more on implementation, a case study in a routine situation would be appropriate. These distinctions are very schematic, and the designs can be combined (Oakley et al., 2006).

Figure 6 presents the main research designs used to evaluate population health interventions along two axes: 1) seeking internal versus external validity; and 2) focusing on outcomes or on processes and mechanisms.

With regard to the concept of validity, it is important to note that research teams often have radically different understandings depending on their epistemological stances. Figure 6 uses Campbellian concepts commonly adopted in clinical and epidemiological research to simplify the presentation of research designs. In reality, however, these concepts are the subject of much debate, since the criteria for scientificness are numerous and not limited to internal and external validity. To the rigour of quantitative approaches across the four dimensions of internal validity, external validity, reliability, and objectivity, the proponents of qualitative approaches suggest adding quality principles across the four dimensions of credibility, transferability, procedural accountability, and confirmation (Regragui et al., 2018). For those using qualitative methods, Laperrière's (1997) work (in French) on these scientific criteria will undeniably be of help.

Figure 6 uses the notions of internal and external validity, which were formalised by Campbell and Stanley (1966). Internal validity reflects the causal relationship in experimental situations; external validity refers to the generalisability to other contexts and populations of results obtained in experimental contexts. The two notions must be seen as the

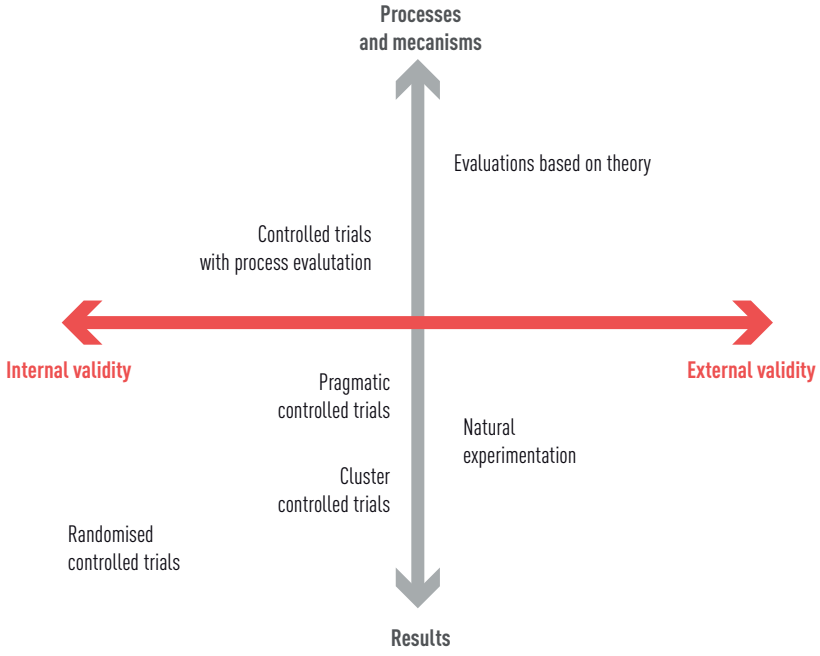

Figure 6 | Research designs most frequently used in PHIR and for related research questions.
Source: Adapted from Minary et al. (2019).

extremes of a continuum that evolve inversely. In other words, in a study, the stronger the internal validity, the weaker the external validity, and vice versa. For example, the experimental condition of the randomised controlled trial is considered by some to be the design with the strongest internal validity (for its ability to demonstrate a causal relationship, all else being equal) but with weak external validity because the conditions and populations included in the controlled trial are not representative of real life. Conversely, observational studies are considered to have weak internal validity (an observed phenomenon may be related to elements other than the intervention, which are not controlled by the researcher) and strong external validity, since by their nature, observational studies observe real life.

A study may be focused on the intervention's results and/or on its processes and mechanisms. In the first case, the aim is to demonstrate that the intervention produces a particular outcome, without questioning how (for example, many programmes assessed as effective abroad are

duplicated in France with no prior reflection on their transferability to a different context). In the second case, the aim is to look beyond the outcome to understand how it was achieved, by whom, and under what conditions. These process and mechanism analyses are particularly important for complex interventions, which is the case for most population health interventions. This is true from the research standpoint (to explain what may have produced a positive outcome, or conversely, in the event of a negative or unintended outcome, to determine whether the latter is linked to the ineffectiveness of the intervention *per se* or to the conditions and modalities of its implementation), as well as from the operationalisation standpoint (if the aim is to transpose, perpetuate, or generalise an intervention, these elements of understanding are essential) (Craig, Dieppe et al., 2012). A controlled trial may be a suitable tool for addressing a question of effectiveness. A realistic evaluation approach will be more appropriate if the focus is on mechanisms.

THE NATURE OF THE INTERVENTION BEING EVALUATED AND ITS DEGREE OF COMPLEXITY

The nature of the intervention will influence the choice of research design. In particular, some interventions cannot be integrated into experimental processes. For example, it is generally not possible to randomly assign a green space. For such an object, an evaluation can only be observational.

Other important scenarios to take into account are actions for which the units of intervention cannot be individualised but rather are collective, such as a change in the environment, a health communication campaign, an action to modify the practices of professionals, etc. In such cases, individual randomisation does not make sense (we cannot randomise within a city who may or may not use a bicycle path or who may or may not see a poster). For such cases, the more appropriate approaches are those in which the intervention modalities being compared are composed not of individuals but of groups of individuals (a city, a school, a patient population), referred to as a *cluster*. The same issue arises for individual interventions with potentially collective effects (e.g. contamination), such as vaccination (a vaccinated person's immunity can indirectly protect those around them) or health education (a behaviour change can spread within a social group). For such interventions, a cluster approach might also be considered.

The complexity of the intervention being evaluated is also a determining factor in the choice of method. It is not a binary matter, with interventions being either simple or complex (Box 8). Complexity depends on the dimensions attributed to it; in interventions, multiple components interact (Craig, Dieppe et al., 2012). With respect to context, there is dynamic interaction among intervention components and contextual factors (Cambon et al., 2019). Thus, an intervention considered simple by some definitions might be seen as complex by others.

BOX 8
SIMPLE OR COMPLEX

The act of vaccination is a simple intervention; a vaccination campaign is a complex intervention if we take into account the organisational and social aspects of vaccine acceptance in the population.

A complex intervention can undergo simple assessment, depending on the question asked. For example, an urban policy aimed at promoting soft mobility is highly complex but can be simply assessed using a comparative measurement of behaviour (physical activity) (Moore et al., 2017; Szreter, 2003).

PRACTICAL ASPECTS OF EVALUATION

The proposed research designs have different constraints in terms of legal framework, costs, feasibility, access to data, implementation time, social acceptability, etc. These also factor into the selection criteria for choosing a research design. Thus, external contingencies sometimes constrain the choice, over and above the necessary discussions with stakeholders.

Depending on their nature, research designs can also facilitate to a greater or lesser extent a process of partnership research (see Chapter 5) or of knowledge transfer from research results to practice and decision-making (see Chapter 6). These factors are also part of the selection criteria. For example, research designs that focus on processes and mechanisms or that use consensus-building tools (e.g. Delphi, concept mapping) make it easier to involve stakeholders from the outset of the research process (see Chapter 4).

MAIN RESEARCH DESIGNS USED

We have chosen to present the research designs according to the main question they address:

– counterfactual, experimental, quasi-experimental, and observational approaches that generally focus on outcomes;

– more comprehensive approaches that incorporate analyses of processes and mechanisms and theory-based evaluations.

It should be kept in mind that research designs are not mutually exclusive. They can be combined (process evaluations integrated into controlled trials) and/or used concurrently or successively in the innovation process. For example, a realistic evaluation might be used in a pilot study, followed by a controlled trial to evaluate the results. Or conversely, a controlled trial might be followed by a case study to analyse the conditions of effectiveness, or a theory-based evaluation might be followed by a natural experiment conducted as part of the scaling-up process.

These research designs may involve quantitative, qualitative, or mixed methods for data collection and analysis (see Chapter 4).

Finally, some of these research designs may apply to the case study principle. A case study consists of an in-depth analysis of a case, i.e. a specific intervention. Case studies are widely used in social sciences for individual (e.g. in psychology) or collective cases (e.g. in sociology). In PHIR, the intervention units are instead population-based, according to where the interventions are organised (a living area, a school, an institution, etc.). The case study method is useful for analysing an intervention in its context to address the various research questions (see Chapter 2). A case study is a scientific approach that can use quantitative, qualitative, or mixed methods (see Chapter 4). In PHIR, the study may be based on a single case (e.g. as in a pilot and viability study), or on a series of concurrent or successive cases (e.g. a realistic evaluation), using a multiple case study approach (Yin & Ridde, 2012).

Some research designs may also involve modelling, in whole or in part (see Chapter 4).

THE EXPERIMENTAL RANDOMISED CONTROLLED TRIAL APPROACH

For evaluating population health interventions, the randomised controlled trial has been and still is often presented as the best method (gold standard). This may be due to the transposition of the principles of evidence-based medicine to public health in the late 1990s (Jenicek, 1997). It may also be linked to the social experimentation trend prevalent since the 1960s in North America (Campbell & Stanley, 1966) and recently brought forward by the work of certain development economists (Evans, 2021; Jatteau, 2021).

The controlled trial is an experimental research design based on the principle of comparing (health) outcomes between one group that receives an intervention and a control group without that intervention or receiving a different intervention. Assignment to one of the two groups is randomised by individual draw (i.e. participants selected one at a time). This method is considered by some to be the gold standard for assessing the effectiveness of interventions because random assignment balances the characteristics (demographic, social, etc.) of the two groups. Thereafter, if a difference in outcomes is observed, it can only be attributed to the intervention alone. This type of study is considered the most suitable for demonstrating causality. However, there are conditions for this (Bédécarrats et al., 2022). In particular, the initial comparability conferred by random assignment must be maintained; the behaviours of the study participants and the conditions under which they are monitored by the researchers must be similar, hence the practice of double blinding (in which neither the participant nor the researcher knows to which group the participant belongs). It is to ensure this double blinding that placebos are used in drug trials.

The controlled trial is one of many research designs that can be used to assess the effectiveness of population health interventions. This approach should not, however, be regarded as the gold standard, as it would be in therapeutic drug trials. Indeed, applied to the field of population health interventions, this approach can be criticised from three angles: purpose, epistemology, and methodology.

– Purpose. A controlled trial addresses the question of effectiveness. However, the matter being assessed during PHIR may be something else entirely (see Chapter 2). A trial is not the best method for addressing

questions of process, viability, acceptability, etc. Moreover, not all interventions lend themselves to a random assignment; for example, it is difficult (if not impossible) to randomly assign an item of legislation.

– Epistemology. A controlled trial addresses the question of an intervention's effectiveness with "all else being equal". This implies "decontextualising" perspective by setting up an experimental situation in which a "pure" effect of the intervention, that is, one without the influence of external factors, can be observed. However, if the outcome of an intervention is considered as the product of interaction between interventional and contextual elements (see previous chapters) (Cambon et al., 2019), then what is the significance of a causal relationship obtained under conditions never observed in a real-life situation? (Zwarenstein & Treweek, 2009). Conversely, a negative outcome obtained in a controlled trial might not be due to the inefficiency per se of the intervention, but rather to the experimental conditions under which the intervention was implemented. In other words, the conclusion of a controlled trial could, in this field, be not valid or valid but not very relevant.

– Methodology. When applied to population health interventions, controlled trials may be marred by significant biases that compromise the validity of their results.

Biases of randomised controlled trials as applied to PHIR

The biases described in this paragraph are not specific to PHIR. However, they can be so strong in this field that they call into question the very choice of an experimental research design.

These biases are mainly linked to the nature of the intended effects, which generally relate to behaviour, i.e. the behaviours of those delivering or receiving the intervention, and behaviour either as a direct effect of the intervention (e.g. in health education) or as an indirect effect (of actions aimed at providing environmental conditions for a behaviour change, such as installing bicycle paths). A major assumption of the controlled trial in the clinical field is that the biological outcomes observed in the participants are a reflection of these outcomes in the general population. This assumption makes sense in the clinical setting. For example, the hypothesis that the immunity conferred by vaccination in a controlled trial is not different from the immunity conferred by the same vaccination in the general population is plausible. Conversely, when looking at human behaviour during PHIR, this assumption is

not tenable. Indeed, the very fact of participating in a controlled trial, as well as the conditions under which it is carried out, may in themselves determine behaviour or be associated with determinants of behaviour (e.g. a controlled trial may recruit people who are more attentive to their health). Thus, what is observed in the controlled trial may be far removed from what would be observed in real-life conditions. To draw a parallel, controlled trials are to PHIR what animal studies are to clinical research. They can be helpful for generating hypotheses but are generally not sufficient for reaching operational conclusions.

Broadly, we can identify three main types of bias in controlled trials in PHIR (Tarquinio et al., 2015): recruitment bias, bias related to experimental conditions, and bias related to lack of blinding.

Recruitment bias

This family of biases is related to the fact that the subjects participating in the intervention are different from those who do not participate in the intervention. This is particularly salient when an intervention's causal effect can vary depending on the individual. For example, in behaviour change interventions, the same intervention dose will have less impact on people whose needs are less marked (Victora et al., 2004). Among these biases, the voluntary response bias is particularly relevant; it relates to the fact that the factors that induce the subject to participate in a controlled trial also contribute to the outcome (e.g. attention to health, health literacy, and sociocultural and economic factors).

Bias related to experimental conditions

Experimental conditions (e.g. specially trained professionals, intervention framed by standard operating procedures, etc.) are specific. They can be determinants of behaviour that differ from those in real life. In particular, the monitoring of participants (through observations, questionnaires, etc.) in a trial can lead to specific behaviours among these participants. This is the Hawthorne effect, well described in psychology, where participants were found to have changed their behaviour because they knew they were being observed. The simple fact of answering a questionnaire about one's behaviour can be a factor in influencing behaviour (this is, in fact, an interventional tool, identified as a behavioural change technique [Michie et al., 2013]). This helps to explain why, even in control groups without intervention in controlled trials, behaviours are different from those in the general population.

Moreover, the standardisation of interventions, inherent in the experimental approach, is by its very nature at odds with the need to adapt complex interventions to their implementation context (Craig et al., 2013). However, it is known that such adaptation to context is a key factor in effectiveness. Thus, the negative outcome of a controlled trial may not be related to the ineffectiveness of the interventional component per se but rather to the fact that it was implemented in a standardised manner in a constrained context, which could, among other things, limit the actors' commitment.

Bias related to lack of blinding

Knowing about the intervention in which one is participating, and one's perception of it, can influence participants' responses and behaviours and the investigator's judgement. This is the reason for double-blinding.

In particular, in PHIR, there is the risk of resentful demoralisation (demoralisation bias). This may occur, for instance, if control group participants think they are not participating in a desirable intervention and this then negatively affects their attitude and behaviour and, consequently, the controlled trial results.

Likewise, when comparing several interventions, one may be preferred by a particular participant. As well, the outcome of the assessment may depend on the interaction between preferences and the assigned intervention (i.e. better results obtained by people who prefer the intervention to which they have been assigned). This phenomenon is observed in all controlled trials for which blinding is not possible, as is the case in PHIR and in some non-drug clinical interventions. For example, in a comparison of a brief intervention and physiotherapy for neck pain, the results were diametrically opposed according to people's preferences: in those who preferred physiotherapy, the latter was more effective than the brief intervention, and vice versa (Moore et al., 2015). This is particularly important to consider, as the recruitment methods used for a controlled trial can select people with preferences, which then could strongly influence the results in one direction or the other. For instance, a controlled trial aimed at comparing a digital health application with traditional monitoring will not have the same results – or may even have opposite results – if participants are recruited online with an incentive to test a new application or recruited by their treating physician. It is also important to consider, from the standpoint of transferring results in real

life, what is the point of assessing an intervention that does not consider preferences when, in real life, people generally choose the intervention they prefer? Moreover, we know that the preferences of a community can also influence outcomes among individuals participating in an intervention (Ouédraogo et al., 2019).

These specific biases in PHIR help to explain the gap that is often observed between the effectiveness of population health interventions as measured in controlled trials and that observed in real-life situations. This underscores the limitations for PHIR of the experimental approach coming out of clinical research.

OTHER EXPERIMENTAL COUNTERFACTUAL APPROACHES

These are experimental approaches (randomly assigned *de novo* interventions) that are adapted from the conventional randomised controlled trial models to take into account the constraints of population health interventions.

These adaptations are intended to respond to two challenges. The first is how to use an experimental research design (i.e. with randomised selection) for interventions that do not lend themselves to individual randomisation; these are clustered randomised controlled trials. The second is how to position the design in a situation that more closely approximates real life (i.e. to maximise the internal/external validity ratio); these are pragmatic controlled trials and controlled trials that take preferences into account.

These three types of controlled trials are not mutually exclusive and can be broken down into subtypes (e.g. stepped-wedge cluster randomised trials).

Pragmatic controlled trials

Schwartz and Lellouch (1967) proposed a distinction between "explanatory" controlled trials, carried out in ideal conditions, to confirm a hypothesis and "experimental" controlled tests, carried out in real-life conditions, to support decision-making. In other words, an intervention is evaluated compared to other routine interventions (Patsopoulos, 2011; Ridde & Haddad, 2013). As mentioned earlier,

English has two words for *effectiveness*, which are used to distinguish between effectiveness obtained under natural conditions (effectiveness, in pragmatic trials) and that obtained under experimental conditions (efficacy, in classical trials) (Cochrane, 1972).

Of course, there is no binary separation between the two types of controlled trial, but rather a continuum and several dimensions to consider (Thorpe et al., 2009). More than the controlled trial, it is the approach that is described as more or less pragmatic depending on how it is conducted (e.g. involving the usual providers is more practical than involving specially recruited and specifically trained providers in the controlled trial; including the general population is more pragmatic than having strict inclusion criteria that select participants based on medical or social standards, etc.).

A look at the nature of potential providers mobilised by the research illustrates such a continuum, from least to most pragmatic: 1) providers drawn from the research team; 2) the regular providers, selected according to strict criteria (in terms of professional skills, etc.); 3) the regular providers, not specially selected, but specially trained with a guide to good practice to be followed in the research process; and 4) the regular providers, as part of their usual practices. This pragmatic approach is an exception in clinical research (fewer than one trial per 100,000) (Zwarenstein & Treweek, 2009), but is quite normal in population health interventions, which are generally not conducted in research settings but in real-life environments and involve (or should involve) the stakeholders in these environments.

To best conduct a pragmatic approach, it is important to involve the stakeholders in developing the protocol and conducting the controlled trial. This makes it possible to obtain results that can more easily be "routinised" and scaled up.

The reason why these controlled trials are rarer is that they are more challenging to conduct. In particular, it is more difficult to objectivise a result under pragmatic conditions because the variability induced by the situation (greater heterogeneity of people, more variability in professional practices, diversity of contexts, etc.) generates "noise" that makes it more difficult to observe the actual outcome of the intervention. The number of staff involved is thus higher than in conventional trials, and the trials are consequently more expensive.

Cluster randomised controlled trials

In these trials, the unit of randomisation for the intervention in the study is not a person, as in the classic individual controlled trial but rather a group (cluster). For example, the unit of randomisation can be a city, a school, a hospital, a patient population, etc.

To assess the effect of modifications to school timetables on students' physical activity, for example, the randomisation must be done by class, school, or city, since the modification concerns *de facto* all pupils enrolled together.

These controlled trials have known methodological limitations (selection bias, effect dilutions, cluster effect, cluster imbalance, lack of blinding, etc.) (Minary et al., 2019). They also present ethical and regulatory problems. In particular, they raise the question of consent. One of the cardinal principles of health research is the individual consent of the persons taking part in it. But how can consent be given when the intervention is collective and people are subjected to it in the places where they live, work, or obtain healthcare? Other options have been developed and are under consideration at the international level (Weijer et al., 2012).

Several variants exist in terms of methodology. One that is increasingly used in PHIR is the stepped-wedge cluster randomised trial (Hemming et al., 2015). In these trials, all groups receive the intervention to be evaluated. What is randomly assigned is not the intervention, yes or no, but rather the order in which the different groups will receive the intervention, which makes it possible to compare periods with and without the intervention. There are two main advantages to this type of testing: 1) since all groups receive the intervention, it is easier to gain community support (e.g. it is difficult, for example, in a conventional controlled trial to explain to a school community that they will not receive the innovative intervention because they have been assigned to the control group); and 2) operationally, this allows the intervention to be implemented progressively, thereby smoothing out staff requirements over time. The major inconvenience of this type of controlled trial is that the total study time for this research design is longer because of this phased implementation.

Patient preference-controlled trial

To limit biases related to people's preferences for one or another of the interventions being compared, several research designs have been

proposed (Torgerson et al., 1996).

The main ones are (Figure 7):

– **A preference-focused research design,** in which participants are asked

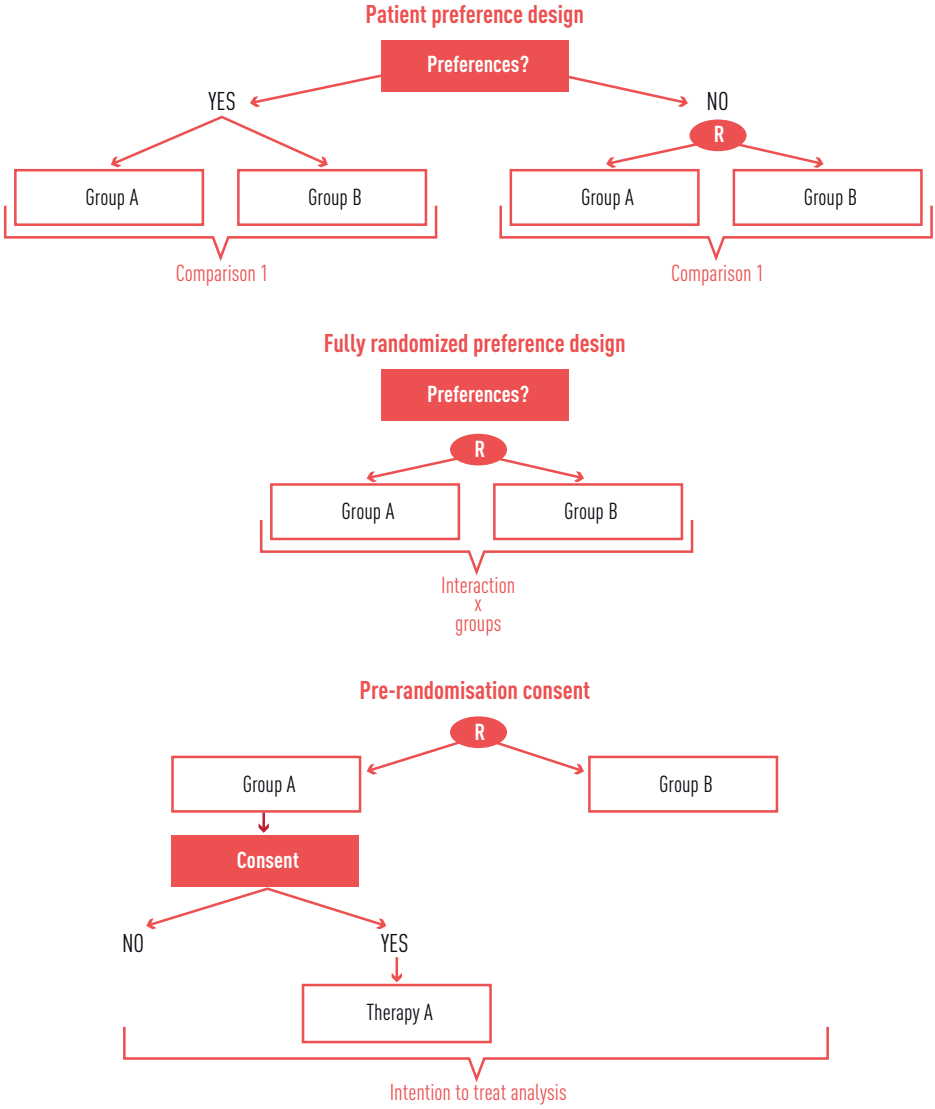

Figure 7 | The main research designs taking into account preferences
(A & B groups = the two arms with alternative interventions; R= Randomisation).
Source: Torgerson & Torgerson (2008).

about their preferences and two pairs of groups are formed, resulting in two comparisons: 1) one comparison among the indifferent, who either receive the intervention, or do not, by randomisation; and 2) one among those who have expressed a preference, who are assigned to their preferred group without randomisation.

– **A research design focused on randomly selected preferences**, in which participants' preferences are recorded after they have given consent in the usual way and before randomisation. The interactions between these preferences and the outcomes are then analysed statistically.

– **A research design with randomisation prior to consent** (Zelen design) involves randomisation of participants before consent. Consent is sought only from those assigned to the experimental group (not the control group), and only those accepting the treatment are included in the experimental group; the others will be assigned to the control group.

These different types of controlled trials that take preferences into account present the advantage of describing preferences, analysing their impact, and using this information to interpret the result. This consideration of preferences is particularly useful from a pragmatic perspective because it reflects reality (in real life, our actions are not the result of a draw but of a choice or preference, even if these are more or less influenced).

QUASI- AND NON-EXPERIMENTAL COUNTERFACTUAL APPROACHES FOCUSED ON RESULTS

As a preamble to this chapter, it should be noted that the terminology is not clear-cut and depends on scientific traditions. *Quasi-experimental studies* generally refer to controlled trials (experimental studies in which the researcher has control over all or part of the intervention) in which the intervention assignment is not randomised. In *observational studies*, researchers observe an existing intervention in which they do not intervene (e.g. the introduction of a new regulation). The term *natural experiment* is sometimes used when referring to observational studies, sometimes to quasi-experimental studies, and sometimes to both. Finally, some use the term quasi-experimental studies to refer to observational studies (de Vocht et al., 2021). We have chosen to refer to controlled trials in which the researcher has an influence (even if partial) on exposure as quasi-experimental studies, and to those where the researcher has no influence as observational studies.

Quasi-experimental studies

Quasi-experimental studies are so called because they have a hybrid format between controlled trials and observational studies (Campbell & Stanley, 1966). They are called "experimental" because an intervention is put in place *de novo* to be evaluated, and "quasi" because there is no random assignment. The two typical research designs in this context are:

– **pre-test/post-test studies,** in which a situation within a population is compared before and after the intervention is implemented;

– **here/there** studies, in which a situation is compared between the group receiving the intervention and another group without the intervention (elsewhere).

There are other types of quasi-experimental studies derived from these two research designs. For example, the two may be combined (one measurement taken beforehand in the intervention group and the control group and one measurement after in both groups). Another example is a research design in which the intervention is withdrawn and three measurements are taken (pre-implementation, post-implementation, post-withdrawal). Time series are another derivative (Box 9). These consist of a series of measurements before the intervention is implemented and a series after. The analysis compares the dynamics of change over time before and after implementation of the intervention; note that time series are also a method used in observational studies (see below).

Such quasi-experimental studies are useful, often for reasons of practicality or acceptability. For example, if a municipality is willing to fund a new intervention, the intervention must be implemented in its jurisdiction (it would not be able to fund the intervention elsewhere), thus precluding random assignment.

They have the drawback, according to some, of having weaker internal validity than controlled trials, because factors other than the implementation of the intervention may explain an outcome (for example, concomitant changes in other contextual factors in pre-test/post-test designs, an intercurrent intervention, a change in legislation, etc.). However, there are many ways to strengthen their internal validity through statistical or contextual methods.

BOX 9

TIME SERIES TO ASSESS POLICY EFFECTIVENESS

Collecting original empirical data is sometimes very costly and sometimes even impossible when an intervention has started before a research design is in place. In such cases, it is possible to use routine, quality-assessed administrative data to evaluate an intervention using time series designs that are interrupted (by the intervention) and controlled (with a control group and background variables). Figure 8 shows the effects of two interventions (vertical bar 1:80% subsidy for deliveries in both groups; vertical bar 2:100% subsidy only in the group of blue districts) on the proportion of facility-based deliveries in four districts in the same region. Statistical models are used to measure the magnitude and duration of these effects.

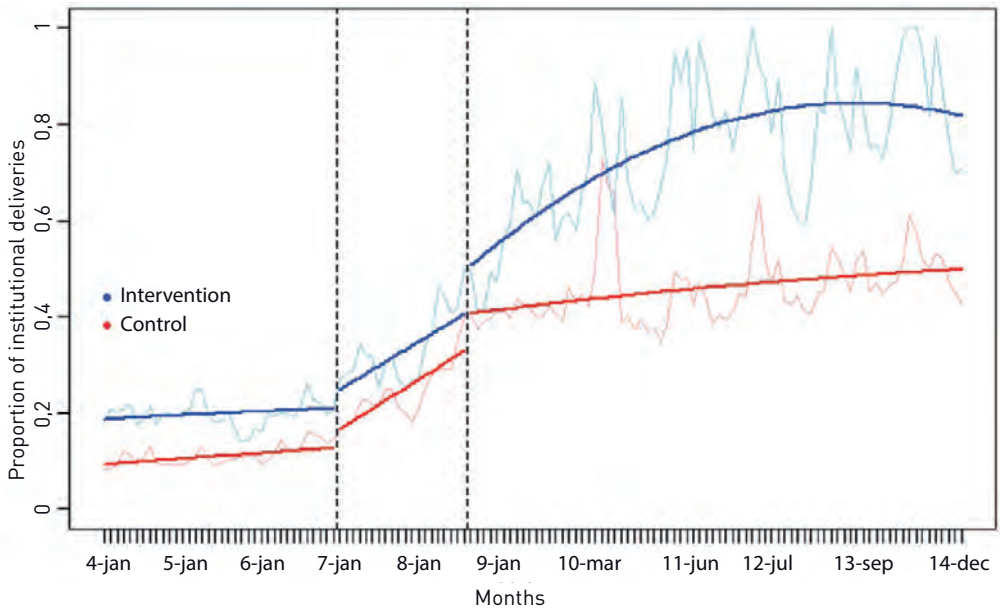

Figure 8 | Evolution of the monthly proportion of facility-based deliveries in the intervention and control groups between January 2004 and December 2014 (observation lines and fitted lines).

Source: Nguyen et al. (2018).

Observational studies (natural experiments)

In what are known as observational studies, the researcher does not instigate an intervention but observes an existing one. These studies, sometimes called natural experiments (Petticrew et al., 2005), have the advantage of very strong external validity, as they observe results under natural conditions. They make it possible to evaluate interventions that have already been implemented. The cost of this type of research is generally lower, because the researcher does not have to bear the cost of the intervention, unlike in trials and quasi-experimental studies.

Their main drawback is weaker internal validity. If an effect is observed, it may be related to factors other than the intervention. For example, the reasons for which the intervention was implemented could be a contributing factor to the outcome, as could other intercurrent interventions. For example, there has been a significant decline in the number of smokers in France in recent years, but it is difficult to attribute this to any one particular intervention because smoking-cessation campaigns have incorporated many levers that have been implemented concomitantly for a long time.

APPROACHES THAT INTEGRATE PROCESS AND MECHANISM ANALYSIS

Process evaluations integrated into controlled trials

While these types of controlled trial could have been included in the first section because they focus on outcomes, they offer a complementary approach in that they focus on processes (Oakley et al., 2006). They thus aim to explain results by explaining the action mechanisms (which intervention components contributed to the results, and how). They can also be used to explain the absence of results (linked to the intervention itself or how it was implemented). Finally, they help explain variations in results between sites or social groups.

The main limitation of these analyses integrated into controlled trials is that the processes under experimental conditions are probably different from those under natural conditions, and therefore the observation is not necessarily reproducible.

Theory-based evaluations

As mentioned earlier, interventions and contextual elements are actually intertwined in what is called the interventional system. Within that system, the core concept is in fact that of mechanisms of effect, which become the real key transferable functions (Cambon & Alla, 2019). These mechanisms result from the combination of human factors (e.g. knowledge, attitudes, representations, psychosocial and technical skills) or material factors within the system. This notion of mechanism can be defined as an agent's reaction in a given context (Lacouture et al., 2015). It characterises and punctuates the change process (agent's reaction, cognitive or social processes). These mechanisms can be psychological (e.g. motivation, self-efficacy, self-control, skills) in a behavioural intervention, or social (e.g. shared values in a community, perception of power-sharing) in a socio-ecological intervention.

Evaluation is therefore about understanding how this system works: on whom, how, and under what conditions does it produce an effect? Thus, approaches that favour contributory analysis of the system's various elements (Mayne 2001; 2010) in relation to the production of outcomes, such as theory-based evaluation (TBE) (Cambon & Alla, 2021; Chen, 1990; De Silva et al., 2014; Weiss, 1997) make sense. This means exploring the pathway by which a phenomenon, such as the desired health outcome, occurs by examining the causal chain involved. In other words, instead of "does the intervention work?" the PHIR question becomes "given the number of components that influence the outcome, how did each contribute significantly to the outcome observed?" To understand how each element of the system, alone or in combination, produces an outcome, the interventional system must be untangled. One solution is to characterise this entanglement by making explicit and validating the causal hypotheses it reveals. This involves understanding how the interventional system works (what are the combinations of parameters that cause these mechanisms?) and the conditions for its transferability (which mechanisms are to be reproduced in another context?).

Evaluations may be conducted alone (e.g. realistic evaluation) and/or combined with a conventional experimental design (Bonell et al., 2012). The most commonly used in health research are realistic evaluation (Pawson & Tilley, 1997) and the theory of change (Chen, 1990; De Silva et al., 2014).

In the first, the effectiveness of the intervention depends on the underlying mechanisms at play in a given context. Evaluation involves identifying the context-mechanism-outcome (CMO) configurations that explain how (by which mechanism, M) a phenomenon (the outcome, desired or not, O) occurs in a specific context (C), with the interventional elements included in the context. These configurations are called middle-range theories. Their recurrence is observed in successive case studies.

In the second, the components or ingredients of the intervention are made explicit and examined separately from those of the context to study how they contribute to producing outcomes. As with realistic evaluations, the initial hypothesis (the intervention in theory) is based on hypotheses that are empirical (i.e. from previous evaluations) or theoretical (i.e. from social or psychosocial theories). What is validated (or not) is the extent to which the explanatory theory, including the implementation parameters, fits with the observations. In both categories, the objective is to generate hypotheses about combinations of components by formulating a theory based on scientific evidence, multidisciplinary expertise, and empirical investigations. If the theory is confirmed by empirical evidence, causality can be inferred.

Finally, the most arduous part of the process is defining the theory (or theories), which must of necessity be grounded in a scientific rationale about what is called theory. In fact, a theory is an organised set of constructs/variables designed to structure how we observe, understand, and explain the world. To be usable, the theory should explain how a programme produces effects (i.e. why and how the intervention works) by defining a set of explicit or implicit hypotheses. In the interventional system approach, this theory should incorporate implementation processes, contextual elements, links between activities and mechanisms they trigger, and links between mechanisms and contextual factors. This interventional system theory (Cambon & Alla, 2021): 1) is explanatory, in considering which causal pathway is supposed to achieve the objective; 2) postulates hypotheses about the specific actions and implementation sequences that contribute to that pathway; and 3) considers that contextual elements and their influence exist and must be taken into account. As explained in Chapter 2, it is thus both a causal theory and a model of action.

This interventional system theory approach is not inconsistent with the theory of change or realistic evaluation. For example, in the theory of

change, the focus is on the links between the intervention components, implementation, and outcomes. To embrace the concept of interventional system, we only need to add the mechanisms of effects and the contextual elements. In realistic evaluation, the contextual elements and mechanisms are considered central to medium-range theories, but not the interventional components (Box 10).

BOX 10
ILLUSTRATION – THE TC-REG PROJECT

The TC-REG study aims to evaluate the conditions for successful knowledge transfer strategies about prevention implemented in local associations and regional health agencies (Affret et al., 2020; Cambon, Petit et al., 2017). In the TC-REG study, the final middle-range theories defined at the end of data collection include:

- external factors, called CE (external context): e.g. initial stakeholder training, interest in disseminating knowledge transfer programmes, leader profiles, political support within the organisations, time required to study evidence, team size;

- interventional components, called CI (interventional context): e.g. access to evidence, training, seminars, knowledge brokering activities;

- mechanisms (M) triggered by combining the two: perceived benefit of using evidence, motivation for evidence-based decision-making, self-efficacy in analysing and adapting evidence in practice, etc.;

- outcomes (O): use of evidence in practice and in decision-making.

Realistic trials are hybrid research designs proposed by Bonell and colleagues, aimed at combining the respective advantages of experimental and realistic approaches (Bonell et al., 2012). Realistic evaluation is integrated into an experimental research design with a view to ensuring that the evaluation refines and tests hypotheses about how the context interacts with the intervention mechanisms to generate outcomes. This hybrid research design has been criticised not only from an epistemological standpoint (see the introduction to this chapter) but also from an operational standpoint: i.e. can a randomised trial have a sufficiently heterogeneous range of situations to construct and validate CMO? (Marchal et al., 2012).

Finally, it is essential to study this theory throughout the innovation process, from the pilot study through to the dissemination of the intervention, including the design of the intervention and the evaluation of the conditions for its effectiveness. In the Ocaprev study (Aromatario

et al., 2019), for example, the theory-based approach made it possible to design an evidence-based and theory-based health application as part of a pilot study before the application was developed and evaluated. In the EE-TIS study (Cambon, Bergman, et al., 2017), the randomised controlled trial includes a contribution analysis to evaluate a smoking-cessation application (Tabac Info Service); this is currently in the evaluation stage. In addition to collecting results, the study aimed to understand how each activity proposed by the app works to stop smoking through the mechanisms triggered (e.g. self-efficacy, perception of utility, confidence in the application) and the contextual parameters that can influence smoking cessation (e.g. smoking status of the domestic partner, the existence of children, support from others to quit, family and social or professional events, etc.).

The defined theory is validated through multiple data collection processes, which may be qualitative, quantitative, or mixed (Creswell, 2009). There are no specific rules; the choice depends on the study design and/or the desire to combine several. For example, outcomes or change objectives can be collected through questionnaires or secondary use of health data, as in any other study. Mechanisms and contextual conditions, on the other hand, are more likely to be collected qualitatively through interviews (especially for mechanisms) or observation (especially for contextual conditions). However, if a primary qualitative survey is used to identify contextual elements and mechanisms that remain to be validated on a large scale, mixed methods can be applied (Qual-Quan) or analytical methods such as structural equation modelling to validate the theory (Beran & Violato, 2010).

CONCLUSION

In this chapter, the aim has been to show the range of approaches that can be used in PHIR. The choice of the most suitable research design is a rigorous process that encompasses the epistemological stance, the specificity of the research questions being investigated, the feasibility and pragmatism that make it possible to conduct the research in the best conditions while validating the hypotheses, and the desire to

produce socially valuable results. Thus, the research designs are situated along a continuum graded according to these different dimensions, and combining them can present a good option for satisfying the various requirements of PHIR (see Chapter 1): balance between originality and social utility; context as an element influencing the outcome; the participatory dimension of research (see Chapter 5); the plurality of questions, with no hierarchy; and consequently, multidisciplinarity and the acceptance of all methods.

CHAPTER 4

METHODS OF DATA PRODUCTION AND ANALYSIS IN PHIR

Population health intervention research is essentially empirical (see Chapter 1). Thus, this approach is based on collecting and analysing primary or secondary data, regardless of their nature or source.

The types of data to be mobilised and the methods for analysing them are defined based on the research question (see Chapter 2). They may also be a function of research traditions and disciplinary approaches (there are several ways to address the same question). Finally, the identification, production, transformation, and analysis of data must respect methodological, ethical, and legal principles and best practices.

This chapter will review these principles (Figure 9) and describe some of the methods of data collection and analysis most commonly used in PHIR, without presuming to cover all practices exhaustively.

PRINCIPLES

PROBLEMATISATION

The first of the principles to be considered in PHIR is problematisation, i.e. the scope of the questions about the intervention that the research is intended to answer. As we have seen in previous chapters, the aim of PHIR is to understand how actions work rather than to produce universal results, leading to multiple possible and interdependent questions.

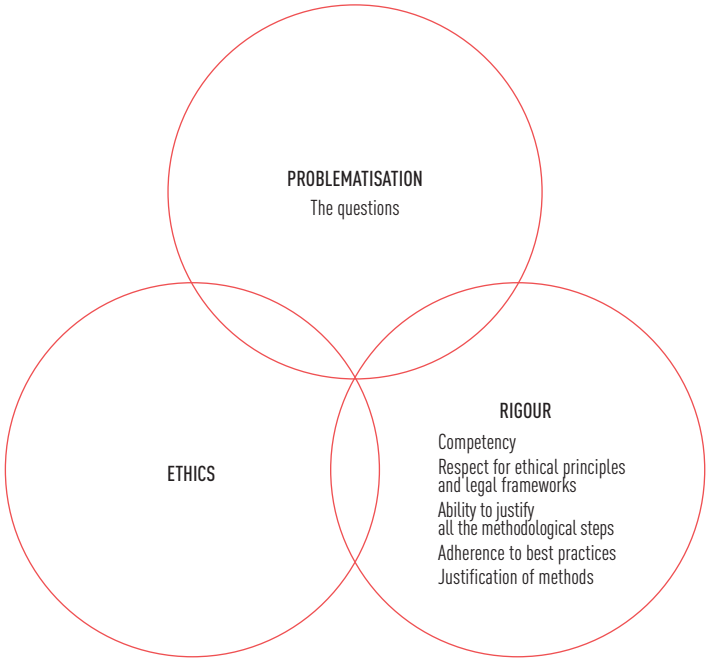

Figure 9 | Some key principles.

PHIR attempts to propose, use, validate, or adjust explicit or implicit theories (Ridde, Pérez et al., 2020), such as: 1) intervention theories (i.e. hypotheses upon which people, consciously or not, construct their programme plans and actions); 2) explanatory frameworks (i.e. structure, overview, schema, system, or plan made up of various descriptive categories; it describes empirical phenomena by bringing them into a set of categories without explaining their interactions); 3) middle-range theories (i.e. theories linking hypotheses that are detailed and clear but highly evolving, with an attempt to generalise and abstract); and 4) grand theories (i.e. theories that explain all observed uniformities in social behaviour, social organisation, and social change).

Thus, the diversity of the questions that PHIR seeks to answer requires a combination of relevance (which methods are most appropriate to answer the question?), rigour (how to apply these methods as rigorously as possible to obtain valid data?), and sensitivity to unanticipated effects and contexts (Turcotte-Tremblay et al., 2017). These characteristics must therefore be taken into account when choosing data collection and analysis methods.

RIGOUR

Whatever the data collection approach, its implementation requires rigour. First of all, it should be made clear that, contrary to what disciplinary controversies have been suggesting for too long, there are no methods that are inherently more rigorous than others (i.e. the conventional opposition between quantitative and qualitative methods) (Olivier de Sardan, 2008). Nor is one approach more objective than another, or one methodological approach more influenced by values than another? (Hassall et al., 2020). It is the entire process of conducting a PHIR that must be as rigorous as possible, regardless of the method or approach used, in order to yield results that are meaningful, valid, and validated, regardless of the scientific criteria applied (see Chapter 3). As we have previously explained, pragmatism is a core feature of PHIR approaches, and those who follow this process consider that "there is now room for both subjectivity and objectivity to be useful at different points within an evaluation or applied research study" (Donaldson et al., 2009). Thus, in each approach, there is a rigorous way of conducting a research process.

If we were to summarise, rigour in PHIR could be considered to have the following dimensions:

– researcher/team's competence with respect to the nature of the data being used;

– respect for ethical principles and legal frameworks;

– ability to substantiate all the methodological steps (e.g. how a questionnaire or interview guide was developed, from what sources, how it was pretested, by whom);

– compliance with best practices intrinsic to the type of research (e.g. double entry for quantitative data, transcription of interviews and prolonged field immersion for qualitative data);

– justification of the methods used to meet the objective.

For example, it is often thought that quantitative methods are more rigorous because they are more objective, while qualitative methods produce results more susceptible to the analyst's subjectivity. However, the reality is that the subjectivity of which qualitative analysts are accused can be found, in quantitative methods, in the orientation towards often restricted data collection tools (e.g. reduced number of questions, closed response modalities). These restrictions are likely to limit the scope of

possible responses, thereby inducing subjectivity upstream, whereas it is seen downstream in qualitative study designs. The issue of rigour, therefore, does not involve comparing methods but rather refers to each method's compliance with specific and detailed criteria to ensure its soundness and validity. These are the criteria of scientificness, which include:

– the transferability criterion, which refers to the reproducibility of the results and their applicability in other situations;

– the reliability criterion, which refers to the reproducibility of the results if the same conditions for collection are followed;

– the confirmability criterion, which realigns the notion of neutral judgement in accordance with facts and not the researcher's values;

– the credibility criterion, which ensures that what is produced reflects the nature of the data and not the researcher's interpretation.

There is a great deal of literature on this subject, looking at quantitative (Olivier de Sardan, 2008), qualitative (Bujold et al., 2018), or mixed methods (Laperrière, 1997).

ETHICS

Ethics is not just a legal matter of what steps to follow. Ethics is, first and foremost, a set of fundamental principles for health research, including research based on questionnaires and interviews. Indeed, a data collection process may not be innocuous. In addition to the methodological issues it raises by its influence on behaviours (of both researchers and respondents), it can also, like any intervention, raise ethical questions, as it can cause negative feelings, contribute to stigmatisation, or create expectations that cannot be met.

As such, research should only be undertaken: 1) if it is potentially useful (hence, a precondition is that the state of the art justifies the relevance of the research question); 2) if it meets the criteria for rigour so that the results can be used; and 3) if the risks generated by the research are either minimal or counterbalanced by benefits for those taking part in it. The ethical or non-ethical nature of the research should not be determined based on the researcher's personal interpretation, but rather on an independent collegial process.

SOME METHODS OF DATA COLLECTION AND ANALYSIS

QUANTITATIVE, QUALITATIVE AND MIXED METHODS

Generally speaking, there are different approaches (quantitative, qualitative, mixed) and a variety of data sources, which can be secondary (e.g. routine data) or primary (e.g. questionnaires, interviews, observations). It is not our intention here to go into detail about the wide range of methods, which have been extensively developed in numerous reference works (Campbell & Stanley, 1966; Candy et al., 2011; Creswell, 2009; Malterud, 2001; Mason, 2005; Patton, 1990; Sandelowski et al., 2009), but rather to summarise their broad outlines (see Table 4).

BOX 11
TYPES OF MIXED METHODS

In the sequential option, the researcher seeks to explain or expand on the results of one method through another method used subsequently; for example, a qualitative study (exploration) could be followed by a quantitative analysis (generalisation of results). The different types of data are collected one after the other.

In the concurrent or convergent option, quantitative and qualitative data are brought together to provide a comprehensive analysis of the research question. Both forms of data are collected at the same time and integrated into the interpretation of the overall results. For example, in a project to evaluate a support system for vulnerable people, we developed a convergent multi-case approach. The objective was to assess, within a facility that serves a highly precarious, marginalised, and stigmatised drug user clientele, how it could help realign the users' position within their health, social, and civic environment by applying approaches such as empowerment and community building. In particular, this involved identifying the processes and mechanisms at play (transferability and sustainability). To do this, the study deployed a series of investigations combining user and stakeholder interviews, observations, documentary analyses, and questionnaires. The data were analysed together to formulate a conclusion regarding the effect and the conditions for this effect.

In the third option, known as the quasi-mixed method or conversion design, the researcher collects only one type of data (qualitative or quantitative) and transforms it into another; for example, qualitative data (interviews) might be transformed into quantitative data (word counts).

Table 5 | The different research methods.

Quantitative method	Qualitative method	Mixed methods
Philosophical stance		
Social worldview: The social world has an existence independent of humans. Social facts are objectifiable, in that they follow rules/laws that can be apprehended through measurement. **Research objective:** To define the laws that govern this social world. This scientific knowledge is based on the core principle of the reproducibility of facts, which is not very compatible with PHIR. **Reference paradigm:** positivist approach	**Social worldview:** Reality is socially constructed, i.e. based on the meaning given to it by the actors. **Research objective:** To gain an understanding, without presuming to generalise, of the systems of values, beliefs, and culture that underly the behaviours, forms of action, and thinking of people in society. **Reference paradigm:** interpretive or constructivist approach	**Social worldview:** In PHIR, the objects of research are often complex. This precludes studying only a small part of the system in isolation or trying to oversimplify it. The researcher must develop a research design and collect data that will make it possible to answer all the research questions. **Reference paradigm:** pragmatic approach
Interpretative approach		
The analysis of phenomena is based on a deductive approach of interpretation and of hypotheses to be tested. It is based on causal relationships between variables characterised by quantifiable and measurable attributes. Objectivity in the research is asserted and concretised by controlling for the roles among these different variables when testing hypotheses, in particular through comparisons and by applying the principle of "all else being equal."	The analysis of phenomena is based on interpretation of the meaning given to those phenomena by the actors. Actions within these phenomena are not reduced to quantifiable, measurable attributes. Understanding them requires a connection between the actor and the researcher, since the researcher seeks to mediate the meaning attributed to them by the actors.	Methodological choices are determined by the research question rather than by epistemological hypotheses. Combining methodologies allows for innovative ways of understanding and studying the world: it makes it possible to monitor and measure phenomena while taking into account the context in which they are rooted and which they shape.
The analysis process		
Statistics are the tool of excellence for measuring the association between an exhibition (e.g. an intervention) and an effect. The study designs are based on methods of experimentation structured on the principle of comparison, which reinforces the mechanics of causality in accordance with the principle of "all else being equal."	It is the meanings given to actions and behaviours by actors (including their own actions and behaviours), and not their iterations or recurrences, that are sought to uncover the complexity of the processes through which the facts are constructed. The objective is to disentangle the social phenomena from the ways in which actors make sense of them through different techniques: participant observation, interviews, focus groups, life stories, etc. The analysis focuses on singularity and dissimilarity.	Mixed methods are generally classified according to three dimensions (Box 8): time frame (concurrent or sequential), weighting (equivalent status or dominant status), and procedure for combination (merger, integration, and connection) (Box 6).

We present the main characteristics of the different categories of data collection methods according to three dimensions: 1) epistemological stance (i.e. each method produces different accounts of the same reality, reflecting a particular conception of the world); 2) the interpretative approach (i.e. the data interpretation principles applied); and 3) the analytical approach (i.e. the means, process, or approach for accessing what is thought to represent reality). For the sake of clarity, this presentation assumes an inevitable Manichaeism. The debates and controversies, as well as the middle courses and nuances, are numerous and continue to fuel scientific writings to this day. An example of a mixed methods approach is presented in Box 11.

MODELLING AND METHODS USING EXISTING DATA

The development of large databases whose use is facilitated by the expansion of computer processing capabilities is an opportunity for PHIR. Such data can be integrated into empirical studies and can even replace them. This is important for PHIR researchers to consider, because these models can help answer questions that were difficult to answer without these tools. This can also reduce the costs and logistical constraints of research (primarily through using existing data rather than generating new data).

Underlying these generic terms, *modelling* and *databases*, are many objectives and potential uses. We list the main ones here.

To construct and validate intervention theories

Literally, modelling refers to the construction of a model to describe or explain a complex system. Developing and validating an intervention theory thus, by definition, constitutes a modelling exercise. As we have seen, a variety of sources can be used to develop a theory, and its validation can be based on both qualitative and quantitative methods.

To use existing data in various experimental and non-experimental research designs

In health, there are many routine data, related, for example, to the production of care (reimbursement databases, monitoring of activities), to the sociodemographic characteristics of the population, to environmental factors, etc. These data can be individual (e.g. a person's vocational

status) or collective (e.g. a region's deprivation score). Before generating new data, which is complex, costly, and can pose ethical or legal issues, it is advisable to consider using existing data. This use may take several forms. It could be *to describe a population*; for instance, in a randomised controlled trial, data can be matched based on population characteristics available in sociodemographic databases (such as Insee in France). Or it could be *to supplement a specific data collection*; for example, health events in the medium term may be monitored passively (i.e. without a specific survey) by using reimbursement databases. Or again, it could be *to replace a specific data collection*; for example, several evaluations of the effectiveness of Covid-19 response interventions were based entirely on existing data, i.e. using pre-existing surveys on the implementation of these measures in different territories and correlating these data with epidemic-related health data (incidence, hospitalisations, deaths) from hospital bases and health surveillance systems.

BOX 12

HOW MANY LIVES WERE SAVED THROUGH AN INTERVENTION?

As in many countries, numerous decision-makers in West Africa still believe it is important to charge patients when they visit health centres. Yet this point-of-service payment imposes an insurmountable barrier on most people, especially the poorest. Interventions have thus been implemented to show the effectiveness of abolishing direct payment in expanding healthcare use. Many studies have shown that this has led to increased use of public health centres and reduced family healthcare spending. However, before scaling up this intervention, decision-makers wanted evidence that it reduces mortality and thus saves lives. Yet in these types of interventions it is virtually impossible to obtain this type of data, especially when we know that the causal pattern between access to care and mortality is long (5 to 10 years?) and circuitous, given the many determinants of health. However, to inform the debate, a team decided to model the effects of this intervention on children's health in order to provide decision-makers with data without waiting for the long-time frame of these studies. Using the Lives Saved Tool (LiST) approach, which includes, among other things, measures of changes in coverage of essential services and several scenarios of their impacts, the study showed that scaling up the intervention nationally, assuming the same effects, would save 14,000 to 19,000 children's lives and reduce mortality by 16% to 17% for children under five (Johri et al., 2014).

To model non-existent data

It is not possible to collect all the outcomes of an intervention over the course of a study, particularly for the long-term effects and impacts of an intervention. These can be estimated by modelling based on previous knowledge (Box 12). For example, the WHO has developed the Heat tool, which allows a regional community to estimate the number of lives saved based on behavioural data (cycling and walking)[1].

To use modelling in a research design as an alternative to data collection

These methods were developed in health economics to address questions of effectiveness or efficiency when direct empirical observation was not available. In particular, these are decision-support models in which all available information is modelled statistically to estimate an intervention's effect on health, to compare two strategies indirectly with each other, or to transpose results to another population with different characteristics. These techniques are mainly used to carry out *a priori* evaluations to support decision-making.

METHODS FOR DATA PRODUCTION THROUGH CONSENSUS-BUILDING

The objective of understanding the complexity of PHIR interventions, besides invoking the pragmatic approach called for in mixed methods, also strongly implies considering stakeholders and the public as actors in the research. In fact, whether in formulating interventions and their underlying hypotheses, or in producing data to refine and validate them, the actors' perspectives are a core issue, and specific methods must be implemented to take them into account (see Chapter 5).

PHIR projects therefore incorporate a variety of methods for collecting and pooling these perspectives to advance the research project. These include, for example, methods to construct and validate the intervention theory, to prioritise the strategies to be implemented,

1. See: https://www.villes-sante.com/thematiques/heat/

to share findings on the factors that facilitate or limit programme implementation, etc. Various methods can be applied, such as the Delphi process and the nominal group technique, and these two main methods have many variants. Moreover, technological advances and cross-fertilisation between the qualitative and quantitative aspects of these two techniques enable the development of other methods, such as concept mapping (Péladeau et al., 2017). These three methods of consensus-building can, but do not necessarily, fit into participatory research approaches in which all the processes relating to PHIR are carried out in a co-construction approach (see Chapter 3). In this chapter, we present these methods as means of facilitating, with quantitative analyses, stakeholder involvement. Our aim is to show that stakeholder involvement is not limited to participatory action research approaches nor to qualitative methods, and that figures and numbers can also be useful when we make room in the process for the intervention's stakeholders.

THE DELPHI METHOD

The aim of the Delphi method (Ab Latif et al., 2016; Booto Ekionea et al., 2011; Niederberger & Spranger, 2020; Williams & Webb, 1994) is to determine the extent to which people agree on a given matter in order to obtain a consensus opinion. It can be used for different purposes, such as to identify the current state of knowledge, to refine the hypotheses of an intervention, to resolve controversial situations, to formulate operational recommendations, and to develop monitoring tools or indicators.

The Delphi method is usually conducted using questionnaires. It can be conducted in person or remotely by mail or text message. While focus groups deliberately use group dynamics to spark debate on a topic, the Delphi method preserves the anonymity of participants and limits debates during the different data production rounds (see Box 13). The Delphi method can follow four steps: 1) preparation (i.e. developing criteria for participant selection, assigning an anonymous number, contacting the selected persons); 2) administration of questions, with each person receiving a series of questions on the subject of the study (e.g. on the purpose for evaluating the intervention); 3) consolidation of responses in order to draw up the report for each round until consensus

BOX 13
THE OCAPREV EXAMPLE

As part of a research project to develop an intervention theory of the conditions for effectiveness of nutrition-based applications to support behaviour change, a hybrid Delphi method (online and in-person) was used with two groups of experts: professionals and patients.

The aim was to obtain, at the end of the consensus process, a list of behaviour change techniques (e.g. information on the advantages and disadvantages of physical activity) and one or more mechanisms of effects (e.g. feeling motivated, feeling able to put it into practice).

The work was conducted in four stages: 1) In three series of online questions, the professional group was asked to assign one or more mechanisms (e.g. becoming aware of one's vulnerability, activating the intention to change, strengthening perceived self-efficacy) to each technique (e.g. presenting the benefits of change, encouraging the person to modify their environment to make it conducive to change; anticipating problems and solutions to sustain the change over the long term). On this basis, the mechanism-technique pairing(s) chosen by at least half of the experts were selected. 2) In a second round, the group was asked to validate or adjust this list. Again, the pairings chosen by half of the respondents were selected. 3) At an in-person seminar of patients, they were asked to validate or adjust the mechanism-technique pairings produced by the professionals. They validated them all and added several comments to the e-Delphi software. 4) In the third round of the e-Delphi process, the group of professionals validated the list of pairings thus amended by the patients.

Source: Aromatario et al. (2019).

is reached; and 4) classification of subtopics (if necessary), which is helpful for producing the final report and having it validated by the participants.

This method presents several advantages: rapid consensus, free expression without group influence, low cost of administration and analysis, and the possibility of obtaining large amounts of data. However, it can be long and cumbersome (several survey rounds) because only those who deviate from the norm must explain their position. Also, potential interactions among the hypotheses under consideration are not taken into account.

THE NOMINAL GROUP

The nominal group process (Delbecq et al., 1975) consists of generating proposals on an issue that concerns a small number of people without necessarily reaching a consensus. It is used to address open-ended questions that involve a point of view or opinion, or to gather suggestions or solutions. The nominal question is the question presented to the group. It must be precise, clear, and unambiguous. It must generate responses with the same degree of specificity.

This technique requires intense preparation and precise structuring. The nominal question must absolutely be validated in advance by persons with the same characteristics as those invited to the meeting, so as to generate information based on a common understanding of the question.

It may consist of five steps: 1) production of statements, in which each participant individually produces a list of statements responding to the nominal question (one answer = one idea); 2) data collection, in which the facilitator invites each person to share with the group just one of their ideas and reformulates them, taking care to number them (each participant must propose a statement that is not already listed or else explain how it differs); 3) clarification of the statements, which involves revisiting them and making them concise, clear, and understandable for everyone, so as to be understood by the whole group, but without seeking agreement; 4) individual anonymous voting, in which each person chooses the statements they think best answer the nominal question and orders their choices from most to least important; and 5) analysis and presentation of results, in which the statements for the whole group are cumulatively weighted by adding up the weights given to each statement (it is useful to include for each statement the number of participants who chose it, as well as the total weight assigned by the group).

The advantage of the nominal group process is that it allows everyone to express themselves and it produces a collective view without the participants having to reach consensus (thereby avoiding power plays). Proponents of empowerment evaluation, such as Fetterman (2000), have often suggested using a similar approach to encourage free expression and discussion among intervention stakeholders.

CONCEPT MAPPING

Concept mapping (Kane & Trochim, 2006) aims to produce a collective consensus around the answer to a question that can be helpful not only in developing a conceptual framework to guide the intervention planning or evaluation (Box 14), but also in obtaining empirical data to evaluate an action (e.g. what factors help to sustain the intervention). This method combines creative brainstorming (as with the nominal group) and multivariate statistical analysis to collectively develop statements in response to the question, which are then grouped into categories. This mixed-methods approach confers strong credibility on the consensus results. It was designed to enable a panel of people, using a participatory and iterative process, to identify the key components and dimensions of a concept and to describe how each component is related to the others. With this method, qualitative data can be not only analysed inductively, but also studied using multivariate statistical analyses that combine the ideas expressed by participants into categories and in the form of concept maps. Weights can be applied, and results can be presented graphically. It can be conducted entirely online or in alternating in-person and online phases.

BOX 14
ILLUSTRATION – THE RESEARCH PROJECT THAT PRODUCED THE ASTAIRE GRID

To develop a health promotion analysis tool, known as Astaire, a conceptual mapping method was used to define the criteria to be taken into account when analysing the transferability of interventions (the term having first been defined by a literature review and shared with the experts).

The process involved 18 experts and led, in the first stage, to the generation of 234 criteria, which were then reformulated, standardised, and sorted. Then, through the process of rating and categorisation, two grids were developed. The first grid, which consisted of 18 criteria and 56 sub-criteria, was to be used when designing and describing a primary intervention. The second, with 23 criteria and 69 sub-criteria, was intended to be used when considering the transfer of a primary intervention to a different context, or when assessing *a posteriori* what caused a difference in effects between the primary intervention and the intervention ultimately implemented in the new context.

Source: Cambon et al. (2013).

The process can be grouped into six main steps: 1) preparation, which includes selecting participants and developing the objective of the conceptualisation; 2) generating statements by brainstorming about the question being asked (one answer = one idea; e.g. what are the challenges of implementing the intervention?); 3) structuring the statements by weighting and categorising them; 4) representing the statements in the form of a conceptual map by using multivariate and cluster analyses and/or by calculating the average relevance score for each criterion; 5) interpretation of the maps by the people involved; and 6) use of results.

The advantage of this method is that it arrives relatively quickly at an answer to the question and provides a graphic representation of all significant ideas and their interrelationships.

CONCLUSION

The objective of this chapter has not been to produce an exhaustive list of data collection and analysis methods that can be used in PHIR, but to present the broad outlines of those most commonly used and to highlight their advantages and limitations. It is also essential to consider PHIR objectives from a mixed-methods standpoint and to think about potential ways to innovate in our analyses. In particular, we have presented some key principles of PHIR methods, and in addition to rigour, the emphasis must be primarily on their relevance. In contrast to the usual practice, the research questions should guide the choice of methods, and not the other way around.

Thus, methods should be chosen based on their capacity to answer the research questions and their fit with the type of research design (see Chapter 3) being used. Given the multiplicity of PHIR questions, and assuming a pragmatic approach, this implies using methods either in combination or sequentially in different phases of the research project. Moreover, the methods presented here should serve not only to collect and organise information for the purpose of the research project, but also to create a climate of trust and reciprocity among the stakeholders of a research project (e.g. participatory methods) and foster the interdisciplinarity needed for this field of research.

Chapter 5

ACTORS IN PHIR

As seen in Chapter 1, a population health intervention is not simply a list of activities to be implemented. It is clearly much more complex than that, and the roles played by contexts and actors are key to the success of a population health intervention (Craig et al., 2018), as particularly underscored in the realistic approach described above. The proponents of this approach even argue that, if an intervention is effective, it is not just because the activities were well implemented, but rather, and above all, because the (social) actors decided it was possible. They explain that it is people, through their decisions, intentions, and reasoning, who make a population health intervention work (or not) (Pérez et al., 2021; Robert & Ridde, 2014). We will not address the methodological and epistemological issues of this worldview in this chapter (Pawson, 2013), but it is useful for showing to what extent the actors are at the heart of population health interventions (Gilson, 2012). Like health systems, population health interventions are clearly social phenomena in which the role of individuals is central (Whyle & Olivier, 2020). It is thus essential to understand these different categories of actors and, in the context of PHIR, the various roles they can play.

THE CATEGORISATION OF PHIR ACTORS

This book is not a reflection by sociologists or political scientists (Crozier & Friedberg, 1977; Lipsky, 2010) on the social actors at

the heart of PHIR. Our primary aim is to equip those involved in this subject matter so that they can better understand it. However, the ability to understand the stakeholders in an intervention, and to categorise, analyse, and engage in dialogue with them, is also an essential competency in evaluation and population health (Stevahn et al., 2005). Indeed:

"…failure to attend to the interests, needs, concerns, powers, priorities, and perspectives of stakeholders represents a serious flaw in thinking or action that too often and too predictably leads to poor performance, outright failure, or even disaster." (Bryson et al., 2011).

While this know-how must be applied throughout a PHIR process (Bryson et al., 2011), it will be especially essential at the start, particularly during the pre-evaluation phase (evaluability assessment) (Beaudry & Gauthier, 1992; Soura et al., 2019). Thus, it is useful, both for this chapter and for PHIR practice, to show how different people can propose different approaches for categorising actors. Each person, depending on their circumstances, objectives, and skills, can select the most appropriate methodological approaches for this stakeholder analysis exercise (Brugha & Varvasovszky, 2000; Hurteau et al., 2012). Bryson and colleagues (2011) propose some very useful tools. Moreover, this list is not intended to be exhaustive (as in Chapter 1), but simply to shed light on the possibilities based on a few disciplinary approaches (see Table 6).

Table 6 | Examples of PHIR stakeholder groups across three disciplines.

Evaluation	Public policies	Anthropology
Legitimising	Managers	Strategic Groups
Implementers	Agents	
Beneficiaries	Individuals concerned	

In the field of evaluation, and particularly with regard to the decision-making involved, some have proposed that there are three groups of people. The first are the doers, i.e. those implementing the intervention. The second are the recipients, i.e. those who should benefit from the actions and for whom they have normally been intended. Finally, the third group consists of legitimators, i.e. those who will ultimately formalise

the decisions (Monnier & Spenlehauer, 1992). In the field of policy research, Kingdon (1995) and Lemieux (2002) have proposed dividing actors into four groups according to their position with respect to the government and their expertise in the subject matter. Thus, they propose that there are officials (in government but not specialists), agents (in government and specialists), interested parties (outside government and specialists), and individuals (outside government and non-specialists). These are all groups within which social actors can be placed, with the understanding, of course, that these categories are permeable and that people are mobile. In the context of health system reforms, Rocher (2004) proposes a slightly different set of actors. He thus suggests the existence of reform designers, then promoters, and then modellers, who will be responsible for transforming the ideas into action plans. Next, he describes the existence of couriers and intermediaries who disseminate the reform's ideas to frontline actors in particular (Lipsky, 2010), much like the dissemination entrepreneurs in a health intervention in Mali analysed by Gautier and colleagues (2019). Finally, Rocher (2004) proposes the presence of reform operators, who will implement it, and of opponents, who will use their energy and position to counter and resist the reform. This sociological perspective is in line with the classical thinking of political scientists and the role of power in the analysis of interventions (Béland, 2010). Indeed, we know very well that "it is through the exercise of power that [population health interventions] are, or are not, implemented" (Lemieux, 2002). Reich and Campos (2020) recently suggested a method for analysing the actors in health reforms based on their position with regard to the proposed changes and their power (or influence) over them. In particular, this approach groups actors according to whether they support, oppose, or are neutral about the reform, as well as their level of potential influence. Interest, position, and power are classic dimensions of stakeholder analysis in a health intervention (Balane et al., 2020). Based on a review of the scientific literature, consultation with experts, and a group consensus exercise, Balane and colleagues (2020) propose that stakeholder analysis should study the actors concerned along four dimensions that could have an effect on the intervention: knowledge (its scope), interests (and motivations), power (political, financial, technical, leadership), and position (support, opposition, neutrality). Finally, the last example is from the field of development anthropology, where Bierschenk and Olivier de Sardan (1994) have proposed, after a German sociologist (Evers),

labile groups of actors that they call strategic groups. These groups are starting points for empirical analyses, especially around conflicts and controversies (somewhat similar to actor-network theory), without necessarily becoming the final groups.

This overview of possible approaches for identifying and analysing stakeholders in a health intervention will be useful in the remainder of this chapter to describe the actors involved in PHIR. First, we will present these stakeholder groups and analyse where they fit within PHIR. Then we will focus on the importance of frontline actors and the challenges of working in partnership, which is an essential and integral process in PHIR.

THE ACTORS IN PHIR

The definition of PHIR proposed in Chapter 1 shows the breadth of its complexity and, by extension, the wide range of people involved and concerned. Without prejudging their importance or precedence, and keeping in mind the porosity of these six groups and the mobility of people, we consider the main stakeholders in PHIR to be as shown in Figure 10.

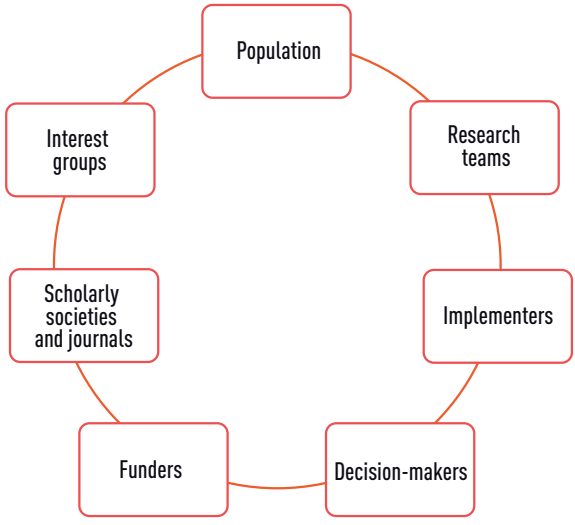

Figure 10 | Seven groups of PHIR actors.

IMPLEMENTERS

These are the people who implement population health intervention activities. They are sometimes involved in upstream design of the intervention, and occasionally in evaluation and research processes, but their main responsibilities are organisation and implementation. Their level of involvement may vary depending on their expertise and skills, and to different degrees of intensity depending to the needs of the intervention and its resources. They may be based at all levels of the organisations responsible for the intervention (from local to national) and may be associated with more closely connected institutions and partners (NGO, associations, etc.).

RESEARCHERS

These individuals are mobilised not only to help design the intervention in relation to the current state of knowledge, but also to produce knowledge on population health intervention. Most often they work independently of the intervention, but sometimes they may be hired as consultants and experts to evaluate it. In most cases, the researchers work in teams, usually interdisciplinary in order to bring a diverse perspective on the intervention. These teams will be able to provide others with the methods, conceptual frameworks, and theories that are needed to understand the actions undertaken, based on the questions raised about the intervention. Unlike in clinical research, where there are many support staff positions (database managers, engineers, research associates, etc.), this is not yet sufficiently the case in PHIR.

DECISION-MAKERS

While this is a loaded term, and undoubtedly overused, since it is rare that a single person takes a decision alone, here we refer to those in charge of organisations, who will (usually) decide on actions to meet a population health need. In a democratic system, decision-makers are accountable to the public and therefore to the people who will benefit from the interventions being evaluated. They will strive to obtain the necessary human and material resources to make the intervention feasible and to implement it. These are also the people who should be able to receive the results of research on the intervention so that

they can understand it better and make decisions about its adaptation, sustainability (or termination), and dissemination. Although it is still rare, intermediate actors (Ridde et al., 2013) can operate at the interface between decision-makers and stakeholders to promote the use of research data. This point will be covered more specifically in Chapter 6.

POPULATION

Whether they are patients, beneficiaries of an intervention, or simply living in the area where it is implemented, the population as a whole is broadly affected by PHIR. As we have noted, the boundaries between these groups are fluid, and those benefiting from the action may also be subject experts or hold positions of responsibility in governing bodies. However, these people are more rarely involved upstream in the intervention's development and later in its evaluation and any research on it.

FUNDERS

These people can sometimes be mistaken for decision-makers, but often the organisations that fund PHIR are less present in executive bodies or governing authorities. Sometimes this funding is provided specifically for the intervention, sometimes for research only, and very rarely for PHIR as a whole. These funding bodies are also found at all levels and ranges of government, from the very local to the international.

LEADERS OF SCHOLARLY SOCIETIES AND JOURNALS, AND EXPERT BODIES THAT PRODUCE RECOMMENDATIONS

PHIR contributes to the construction of population health knowledge while also promoting the use of evidence to define and implement interventions. Thus, it is essential that PHIR results be shared with scholarly societies and scientific journals. These two institutions have real normative power over how knowledge derived from PHIR can be shared (in the form of syntheses, opinions, and scientific papers) and how the scientificness of this type of approach, which is still underdeveloped in the health field, is perceived in this area.

INTEREST GROUPS

A final category of actors consists of multiple interest groups, which are known to be capable of introducing conflicts of interest (see Chapter 6) into the processes of using research results. The potential impacts of these actors, which are still seldom taken into account in PHIR, unlike in clinical research, can be readily understood by observing the commercial determinants of health (de Lacy-Vawdon & Livingstone, 2020).

STAKEHOLDER ANALYSIS AT THREE KEY JUNCTURES OF PHIR

In this section, our aim is to show how these multiple actors play an essential role in the different stages and processes of PHIR. These actors' positions and power plays will obviously depend greatly on the context, the timing of their mobilisation, and their interaction history. However, for this chapter, we propose a general analysis that illustrates the substance of the various possibilities and situations, to serve as a source of inspiration for readers involved in PHIR.

Obviously, the seven categories of actors proposed above could be expanded *ad infinitum*, as could the issues around which it would be useful to organise our reflection. However, we believe the important elements for reflection are the roles and challenges encountered by these categories of actors at different junctures not only in the intervention itself (emergence, implementation, evaluation) but also in the research (design, implementation, knowledge transfer), the two being clearly intertwined, as noted in the definition of PHIR proposed in Chapter 1. It is thus impossible to represent in two dimensions these seven categories of actors, each with this triadic perspective, and with the dual intertwining of intervention and research at the heart of PHIR (7×3×2!). So, to make the reflection more readable, these processes have been grouped into three key junctures of PHIR (Figure 11), to be understood as often concurrent sub-processes (as in Kingdon's [1995] stream theory) and not as linear steps: design, implementation, and knowledge transfer (Ridde & Dagenais, 2019), as spelled out particularly in Chapter 3.

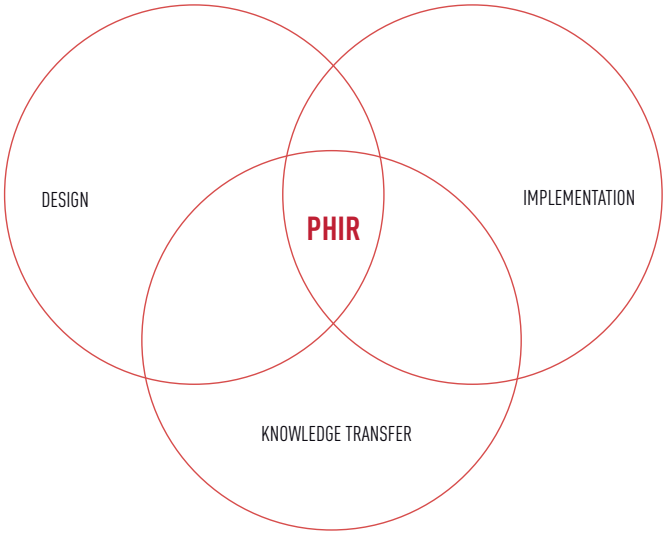

Figure 11 | Three key junctures of PHIR.

DESIGN OF THE PHIR PROJECT

The design of the PHIR project is a crucial juncture for building a partnership (see below) among all the actors involved in understanding the problem driving the solution that will be attempted through a population health intervention. Thus, the actors need to define the content of both the intervention itself and the associated research and knowledge transfer processes (see Table 7).

The implementers normally have a thorough understanding of the context and of population needs with regard to the problem being addressed. As such, their role will be, among other things, to explain the determinants of the problem and propose actions to be implemented. For this, they can call on research teams to better understand the state of knowledge on the subject in question and on the interventions to be implemented. To facilitate the evaluation processes and, in particular, the methodological choices, they must be able to explain the availability of data and the questions they have about the intervention (Bamberger & Rugh, 2012). Implementers can also play a key role in mobilising local actors and adapting solutions to contexts,

Table 7 | Actors' roles and challenges in PHIR design.

	Roles	Challenges
Implementers	Explain the determinants of the problem Propose appropriate solutions Mobilise local actors Take evidence into account Explain data availability Participate in adapting data collection tools Seek funding	Steering discussions and actions Hiding conflicts and history Breaking with routines Understanding evaluation and scientific issues Bringing on researchers late Focusing on efficiency
Population	Explain the problem and its determinants Participate in selecting actions Participate in producing and validating the intervention theory	Overall perception of the problem Representation of diversity Position of experts
Research team	Produce the intervention theory Clarify evaluation issues Propose appropriate methods Answer operational questions and produce scientific knowledge Seek funding	Understanding the intervention logic Understanding local contexts Operational vs. scientific duality Adapting to partners Sharing methodological decision-making Organising an interdisciplinary team
Decision-makers and funders	Identify needs for action Provide funding Participate in the choice of instruments Clarify issues and decision-making processes	Being willing to get involved Being open to complexity Using evidence as a source of decision-making
Interest groups	Promote the interests of their members	Influencing the perception of problems and therefore of solutions

which they often know much better than all the other stakeholders. In particular, they can support the search for funding, but they can also be involved in adapting the tools proposed by the researchers. The challenges are related to their intimate knowledge of the contexts, which allows them to steer the discussions and actions beyond the interests of the population and to ignore pre-existing power issues and prior conflicts that outsiders may not necessarily understand rapidly or readily. Also, implementers may have a tendency to decide on the content of actions without first considering the scientific or theoretical underpinnings and then simply follow their routines. They may also begin thinking about collaborating with a research team on PHIR only after the intervention has been in place for a long time, such that it is impossible or difficult to obtain comparative data. These individuals may also tend to be more interested in analysing the effectiveness of their interventions than in understanding the processes

that led (or not) to the achievement of their objectives. This challenge is compounded by their tendency to overlook or minimise the costs of the evaluative dimensions of PHIR and by their lack of availability or expertise to collaborate with researchers.

Populations will be the primary targets of the intervention and, as users or patients, must be able to be involved at a very early stage in understanding the problem (and its determinants) and the solutions to remedy it. This involvement can be direct, by participating in discussions and workshops to formulate the intervention, or indirect, when the research team conducts a data collection process to gather their perceptions. Whenever possible, a way must be found to involve them in the production and validation of the intervention theory; there are many participatory methods for doing this. Issues related to representativeness and diversity (Ridde et al., 2021) also pose a major challenge. While there may sometimes be neighbourhood representatives or leaders of patient associations, this is not the case for all problems, and this raises the question of the representativeness of the people being included the processes (Saillant, 2004). Moreover, these people sometimes have a limited view of the problem being addressed, being focused on their local context and unaware of the state of scientific knowledge. Conversely, it may happen that the population representatives are also experts in the field being addressed (e.g. a retired doctor or scientist), which poses a different challenge in terms of their ability to consider more experiential knowledge.

In a PHIR process, **research teams** have the role, among other things, of supporting the clarification of the intervention theory based on the expertise of the implementers and others involved, as well as on their own scientific knowledge (and available literature) about how the problem could be tackled. Thus, they are able to enrich the intervention theory with elements that actors on the ground sometimes overlook or are not fully aware of. They also need to make explicit the evaluation issues raised by questions of interest to other stakeholders. In particular, the research teams have to explain not only what is methodologically practicable, but also what is feasible from a budgetary standpoint, while being involved in the search for funding. They have to propose methods adapted to the context and needs, and not necessarily those with which they are most familiar. For the researchers, the challenges will be to understand the local context,

the intervention, and its causal logic. They must be willing to organise an interdisciplinary team to address questions and share their power to leave room for open discussion of epistemological, disciplinary, and methodological issues. The teams need to engage less in basic research and more in mobilising rigorous but useful practical research methods to understand an intervention (and thus respond to implementers' questions), while pursuing their own research agendas to develop scientific knowledge. Research teams are thus challenged to wear two hats, or deal with two sides of the same coin: on the one hand, to mobilise methods to answer relatively operational questions, and on the other, to develop the state of knowledge and contribute to building up the field. Finding funding will be a significant challenge, as PHIR is not yet the norm in the scientific world and in the usual calls for tender (see Box 15).

Decision-makers and funders should have the role of reporting on the needs driving the PHIR and of participating as much as possible in its initial design, which is known to be a factor conducive to its sustainability and to the eventual use of results (see below) (Seppey et al., 2021). They need to make the decision-making processes around the PHIR

BOX 15
DESIGNING A PHIR STUDY AGAINST THE DENGUE VECTOR IN BURKINA FASO

In Burkina Faso, as elsewhere in West Africa, malaria is one of the most common diseases against which interventions are implemented. Thus, other vector-borne diseases are overlooked, such as dengue fever, even though its vector (*Aedes aegypti*) is widespread. A PHIR study was therefore planned in the country's capital to assess the effectiveness of a community-based dengue intervention that involved acting on its vector presence. To decide on the content of the intervention to be deployed, the team used four sources of information: 1) a systematic review of the state of scientific knowledge; 2) conceptual models to guide the choice of intervention theory; 3) an analysis of the local context and a quantitative and qualitative study of the population's preferences with regard to a few promising activities; and 4) an analysis of potential actions according to stakeholders (Ouédraogo et al., 2019). The evaluation showed that the intervention was effective (Ouédraogo et al., 2018).

BOX 16

FUNDERS INVOLVED IN FORMULATING AN INTERVENTION FOR EVIDENCE-BASED ADVOCACY

Malnutrition is a major issue in Burkina Faso, particularly in the north of the country. In this context, access to care is known to be an essential determinant of children's nutrition, particularly since its modelling by Unicef in the 2000s. However, in West Africa, accessing the health system requires fee-for-service for everyone, including the poorest, for whom nutrition is a challenge. Governments have never wanted to become involved in user fee exemption processes. Thus, in the mid-2000s, the European Union's Humanitarian Aid Commission (Echo) launched into funding interventions that would eliminate user fees for children under 5 years of age to show that this improvement in use of care would have an impact on malnutrition. Besides funding NGO interventions, which is its mandate, Echo funded more than 1.2 million Euros of research and knowledge brokering activities over eight years to gather scientific evidence on this approach in order to support its advocacy for policy change, something which this organisation had never done before. Ten years later, the user fee exemption strategy became a state-funded national policy (Ridde & Yaméogo, 2018).

project very explicit so that all stakeholders take these into account in their subsequent involvement. Of course, it is also expected (we can dream) that decision-makers will take into account the latest evidence in defining the content of the interventions they wish to see tested by the PHIR project. One challenge is that they must accept that policy issues are not the only ones to be considered when formulating interventions and that they must provide the financial resources for PHIR. Their responsiveness and openness to complexity (which politics seeks to simplify) are other challenges to consider in interactions with them (Box 16).

Finally, **interest groups** often of a private nature but not exclusively, may try to influence research agendas. Examples of this can be seen in the definitions of strategic research designs in certain very specific fields (nutrition, occupational health, cancer, etc.), where many groups would like to influence how the problem is approached and understood, and subsequently studied. As states increasingly embark on setting national research priorities (sometimes regional, but not often enough), this can carry risks for

how the problem is understood (with solutions viewed through the lens of the interventions studied) if these groups are able to be present directly or to influence indirectly. Examples of this are economic interest groups (commercial determinants of health, influence on alcohol control strategies, etc.), community interest groups (patient associations), and ideological interest groups (faith-based, sexual health strategies, etc.). The social construction of a problem is a classic approach in public policy research (Cobb & Coughlin, 1998), and there is no reason why it should not be applied in the field of PHIR.

IMPLEMENTATION OF A PHIR PROJECT

Organising a PHIR project involves not only implementing the intervention to benefit the population, but also conducting research activities to better understand it and the strategies conducive to results use (see Table 8).

In this process, **implementers** have the role of ensuring the difficult balance between fidelity to the implementation plan, which is often overlooked by researchers using experimental approaches (Pérez et al., 2018), and continuous adaptation to the context, needs, and reactions of frontline actors and populations (see below). They must inform the research teams and decision-makers of such developments or, at the very least, must organise to keep track of them so that the evaluation does not study an intervention that does not exist (or exists only on paper) or that has fundamentally changed (which may, or may not, be a good thing), the notorious type 3 error (Ridde & Haddad, 2013). The arrival of new interventions or the occurrence of significant disruptive events must be promptly explained by the implementers so that the evaluators can factor these into evaluation processes, or decision-makers into their thinking. Implementers must be able to facilitate the research teams' access to and understanding of the field in order to strengthen the quality of the methods they deploy. In the data collection process, the implementers must be committed to provide accurate responses and not to distort reality in order to instrumentalise the intervention, among other things. Nevertheless, PHIR makes no judgements about individuals or personal competencies, but rather about interventions as a whole, which obviously poses a challenge of understanding for implementers involved in actions associated with their positions and salaries.

Table 8 | Actors' roles and challenges in PHIR implementation.

	Roles	Challenges
Implementers	Implement and adapt the intervention plan Inform about contextual developments and (new) actions Facilitate access to the field and collaborate with researchers Interact with decision-makers	Adhering too closely to the plan Distorting the data or orienting the research Instrumentalising the intervention
Populations	Participate in the implementation Be involved in the choice of instruments and activities	Ensuring availability Managing a variety of skills and competencies Supporting mobility Managing power issues and ensuring diversity
Research team	Use appropriate methods Produce valid, useful, and timely knowledge Manage data in ways that are transparent and accessible to everyone Build capacity among partners	Working in interdisciplinarity and with mixed methods Sharing symbolic academic power Engaging in an approach still not highly valued by universities Adopting a reflexive approach
Decision-makers and funders	Monitor the process regularly Participate in decision-making Facilitate access to the field Adapt the ethical issues	Orienting the process in other directions Taking over the intervention politically

In terms of the **population**, patients and participants in PHIR interventions should be able to decide on their involvement in implementation. Their role in this process should not be seen as solely one of passive reception, but rather of participation and even co-construction (of instruments and activities) when relevant and necessary (Daigneault & Jacob, 2012). They must be able to be stakeholders not only in the intervention but also in the evaluation and thus in all the processes of the PHIR project (Ridde, 2006). Obviously, beyond the challenges related to availability for such participation, it must be understood as an option and not an obligation. It is also essential to ensure that people have the means (technical, human, financial) and time (availability and mobility) to participate. If they do not, it is the role of the other PHIR actors to make this possible (Box 17). This can take the form of participatory forums (see below) or capacity-building activities, for example. Power issues can sometimes be exacerbated when participants from the population are included in the PHIR arena, where implementers, decision-makers, and researchers can often have imposing and destabilising symbolic capital if they are not careful. This issue is even more important when it comes to taking

into account diversity issues in PHIR to ensure that all members of society are present and involved (Ridde et al., 2021).

Research teams should ensure that they are able to mobilise within a limited time frame and close to the time of the intervention. The long-time frame of research is not that of PHIR. Methodological rigour must compete with the relatively short time expected by the other PHIR colleagues and the constantly changing contexts (see Chapter 1). The role of the research teams is to serve the evaluation questions about the intervention and not to impose a particular method that the researchers prefer. The principle is to collect the data needed to answer the evaluation questions without engaging in a lengthy and costly wide-ranging collection of data for which there will subsequently be no known use (see Chapter 4). Obviously, this doesn't mean not developing, whenever possible and when the intervention allows it, knowledge that is more theoretical, more academic,

BOX 17
INVOLVING VULNERABLE POPULATIONS IN ACTION RESEARCH

In the previous box, we explained how access to healthcare in Africa was constrained by a significant financial barrier. This barrier is insurmountable for the poorest, whom public policies in West Africa refer to as the indigents. In Burkina Faso and Mali, we undertook several action-research projects to find operational solutions to their access to healthcare. The main challenge that we have not yet been able to overcome is how to involve them in the whole process. In fact, these people live most often in conditions of extreme material and social deprivation and are entirely on the margins of local societies. The conditions for involving them in defining interventions have always been a subject of debate among the actors involved in various action-research projects: ethical issues, the challenge of stigmatisation, issues of power, etc. (Yaogo et al., 2012). Conscious of these issues, the action-research teams decided not to organise a collective gathering of these people to obtain their views, but rather to meet with them individually and to take time to have conversations with them in supportive conditions where they could express their needs. The analysis of their statements, lifestyles, and difficulties around using healthcare thus complemented the contextual analyses and the scientific literature review to define the content of the interventions to be carried out with the implementers (Bonnet et al., 2019; Kadio et al., 2020).

or less evaluative and pragmatic. The challenge for research teams is to maintain a balance between these two facets of the same endeavour specific to PHIR. Data management, both in terms of parsimony and transparency, is a central role for research teams (which need support staff), and all PHIR stakeholders should have access. The rationale for these methods and the use of the data must be explained to everyone, without presuming (and prejudging) anyone's inability to understand them. It is also a matter of sharing power and, to the extent possible, throughout the PHIR, helping to build capacity for evaluation among the implementers, and even among decision-makers and population representatives. The challenge for these teams is to be willing to work in an interdisciplinary manner, as PHIR is fundamentally a venture in which several disciplines must work together harmoniously and in full complementarity (Pluye, 2019). Thus, teamwork, using complementary mixed methods and different disciplinary approaches (Pluye, 2019) and being respectful of each other, is an essential challenge

BOX 18

WHEN EPISTEMOLOGICAL AGREEMENT AMONG RESEARCHERS IS IMPOSSIBLE

In France, a PHIR programme on social inequalities in health was launched. The project was original in that it brought together researchers who had not yet collaborated but who had, on paper, very complementary skills that would be useful *a priori* for understanding the complex subject of interventions aimed at reducing inequalities. They knew each other from a distance, through meetings, conferences, and reading each other's articles. They were a medical epidemiologist, a sociologist, and three researchers in public health and health promotion. The latter advocated using a research design inspired by realistic evaluation (see Chapter 3), still very new in France and not yet well understood by the others. The debates were endless, as the epistemological divide was great, even irreconcilable. During the tense meetings, the students in attendance were baffled, and while they did not dare say anything, they sent each other SMS messages expressing surprise at the virulence of the arguments. The debates became heated in particular around the definition of the concept of "mechanism" (Lacouture et al., 2015), which is at the heart of the realistic approach and is widely debated in the field of sociology, and even anthropology (Olivier de Sardan, 2021). In the end, the programme concluded with no collaboration being possible, and each group putting forward its own ideas (Breton et al., 2017).

in PHIR, as well as being a reflexive approach for moving processes forward (Box 18). However, when researchers act as consultants paid from the same funder's intervention budget, links and conflicts of interest can arise in the PHIR process. While not all links of interest turn into conflicts of interest, it is essential that they be made public, as (almost) all clinical research teams now do. Finally, the vagaries of the intervention itself, as well as those related to mobilising the actors, make PHIR fundamentally dynamic. This can be advantageous, but it also requires researchers to find a balance between rigour and often predetermined methods, on the one hand, and the need for adjustments in knowledge production, on the other (Box 19). Thus, both the research questions and the investigative methods can evolve over the course of the PHIR project (Box 20), similar to a flexible research design (Robson, 2011).

Decision-makers and **funders** should be able to monitor the intervention's implementation on a regular basis and be involved in

BOX 19
OBSESSIVE AND ACADEMIC RESEARCHERS

The research community is a broad constellation of very different people. However, when it comes to engaging in PHIR, research teams must be able to adapt to needs and find a compromise between scientific rigour and timely sharing of results. For instance, despite being well aware of these issues, two researchers had never really been able to resolve this matter, even after having been involved in PHIR many times. They were physicians trained in epidemiology or health economics who had always been obsessed with the accuracy of their analyses. They always pushed for experimental research designs that were impossible to fund, and in their statistical analyses of the effects of interventions, they always sought to validate them over months or even years. Some of their analyses were still unpublished after 10 years, a doctoral thesis in epidemiology never completed. They had many times refused to publish preliminary results for stakeholders until these were published in a scientific journal, even though it is well known that this often takes several years. This attitude is not unique to quantitative scientists, as a medical anthropologist recently refused to write a policy brief on his results until his article was published by a scholarly journal, which only happened a year later, even though he chose a journal with a 40% acceptance rate.

BOX 20
FROM EFFECTIVENESS TO ACCEPTABILITY

In Nouvelle-Aquitaine (France), a PHIR project was undertaken to evaluate in a pilot study the transferability (effectiveness in another setting) of an alcohol consumption harm reduction (HR) strategy in different settings that provide treatment and support to patients (addiction treatment centres, shelters, associations, etc.).

A mixed evaluation protocol was designed to assess not only the effect of the strategy on alcohol consumption, addiction, and indicators for quality of life and recovery (quantitative study), but also the adaptations made to the HR strategy in each treatment and support setting (qualitative survey). However, as time went by and the HR strategy was implemented, ultimately the professionals did not offer it to patients as much as other strategies. It was also poorly accepted by patients, even though it had been very successful in the initial setting in which it was developed.

The team therefore reoriented its research questions by no longer focusing on the conditions for its effectiveness in other settings (i.e. transferability) but rather, on the conditions for its adoption or non-adoption (feasibility, acceptability, etc).

deciding on changes in the PHIR project content over time. For this, occasions for discussion need to be organised (see below). Depending on the context, they can also facilitate access to the field, especially for research teams, and ensure that sufficient resources are deployed. The challenges here relate to the risk that they might seek to orient interventions less towards problems relevant to the population and more towards political or organisational issues. Decision-makers must also be attentive to the ethical standards of PHIR, which cannot duplicate those of health research, often biomedical; rather, the standards must be adapted to the needs of the people concerned by the interventions, especially in a context of vulnerability (Ridde et al., 2016). The challenge, however, is that most ethics committees and their members are very often clinicians or ethicists with little knowledge of the specific ethical issues of PHIR (Hamelin et al., 2018, 2020; Yaogo et al., 2012). Thus, their advice or recommendations can sometimes introduce significant biases into the intervention's acceptability to the individuals involved.

KNOWLEDGE TRANSFER AND PHIR

PHIR is fundamentally concerned with the use of its results, its social function as described in Chapter 1, more than with simply disseminating knowledge in scholarly journals (see above). Thus, at the heart of PHIR is the question of knowledge transfer, an established term that in no way prejudices the interactive and multidirectional nature of the knowledge and strategies (Dagenais et al., 2013). This will be discussed in detail in Chapter 6.

Implementers must be able not only to take into account the state of knowledge when developing their intervention, as noted above, but also to make their needs in this respect explicit in order to obtain the support of research teams or knowledge brokers (Ridde et al., 2013) who will have an intermediary role (see Chapter 6). They should participate actively in all knowledge transfer strategies resulting from their intervention because, while decision-makers are often the primary recipients of these processes, implementers also have everything to gain from reinforcing their actions. They must be able to facilitate these processes and identify the needs and issues of decision-makers and those who are intended to benefit from those processes, in order to support their adaptation to make them as effective as possible. The challenges are related to the need for availability on their part, as well as for funding for these knowledge transfer activities, which implementers often forget to plan for in their intervention budgets. They often tend to be wary of research teams, especially when the latter display superiority behaviours that leave little room for knowledge exchange. This challenge must be overcome if collaboration is to be successful. Implementers sometimes also tend to think they have no role to play in research activities or in influencing of decision-makers, yet their involvement is essential and their investment in this area can be very helpful. Some want to maintain a considerable distance from decision-makers and funders for fear of political co-optation and the instrumentalisation of their interventions in local settings.

Populations are rarely involved in knowledge transfer activities and often relegated to being in the audience at scientific outreach or results dissemination sessions. Yet patient-experts and other people

mobilised in their communities can be key to the success of these strategies (Langer et al., 2016). It is therefore essential to involve them from the beginning in planning knowledge transfer activities and subsequently in all the processes. They can have an important role in influencing decision-makers in their local settings, as populations are also the ones who vote and have close connections with elected officials. The challenges associated with their involvement in knowledge transfer are numerous, having to do with their availability, their expertise in the subject matter, the means and resources to get involved, their willingness to influence decision-makers, and their concern for the wider public, over and above their own interests.

Research teams must be able to understand, from the outset of the PHIR project, the importance of knowledge transfer activities and that their knowledge production is first and foremost at the service of the intervention, which takes precedence over their academic career. Their role is to uncover evidence that is useful for the intervention and accessible to all. Their involvement in the PHIR project must not end once the research is completed; rather, they need to remain active throughout the knowledge transfer processes. Their responsibility is also to share valid results as widely as possible and with the scientific community in a reasonable time frame to facilitate their use, particularly by decision-makers and in interventions. The challenge for researchers is to adapt their terminology, avoid jargon, and make their methods and knowledge accessible without wielding their symbolic power, which creates needless distance between them and other PHIR stakeholders (Box 21). Sometimes researchers move from one project to another without taking the time to finalise their reports or analyses, publishing the results a long time later, which is a significant challenge in PHIR, whose results need to be readily usable. It is also sometimes difficult for research teams to understand the decision-making arenas, to be willing to engage in them, and to understand that decision-makers must contend with multiple influences beyond just the evidence from the intervention (Cairney, 2016). Moreover, academic systems do not yet sufficiently value researchers' involvement in these knowledge transfer processes, thus creating little incentive, among some researchers, to engage in these time-consuming activities that do little for their careers (Ridde, 2009).

BOX 21

RESEARCHERS' JARGON AND ITS EFFECTS ON STAKEHOLDERS

During a malaria control PHIR project, the team decided to organise many knowledge transfer activities. For this, several training courses were first provided to researchers and stakeholders, as we knew that the former sometimes had difficulty adapting their methods and terminology for the latter. This involved improving the quality and readability of the slideshows used by researchers at stakeholder workshops and writing policy briefs that were accessible to as many people as possible while providing operational recommendations. On this occasion, we witnessed the sheer arrogance of certain academics, who thought they knew everything better than the others and who were unable to speak clearly and simply. The socialisation of some of these academics had made them internalise the use of jargon, which was impossible for some stakeholders in the field to understand, but which was indispensable to the academics' status and power games. They refused to adapt their language and their form of writing or presentation, such that the messages were ultimately poorly understood by stakeholders who were too benumbed, intimidated, or simply dubious to dare to ask questions and better understand what was being presented to them about their intervention (Mc Sween-Cadieux et al., 2017).

Decision-makers and **funders** need to assign particular importance to knowledge transfer, especially in the funding they provide for the PHIR project. Too often, these issues are overlooked, and it is only at the end of the intervention that the question of how to make the PHIR results useful comes up, just as, too often, people think about sustainability only when an action is ending (Pluye et al., 2000). They also need to be able to focus on the results, become involved in knowledge transfer processes, and be available to reflect on how they can use the PHIR results in their decision-making. Thus, they need to take this into account and inform the other PHIR partners, including the research teams, of the times and places they think would be appropriate for the results to be presented. They also need to interact with those involved in this sharing to ensure the evidence is understandable and presented in a factual and convincing manner. Their involvement in interpreting the results can be a positive factor in subsequent decision-making, insofar as the intrinsic quality of the study (internal validity, essentially the responsibility of

the research team) and the ability to extrapolate the results to other settings (external validity) are under their responsibility. The challenges are obviously political in nature, in terms of how decision-makers use the results, their capacity to do so, and whether they can take the results into account without picking and choosing what suits them. Their desire to share decision-making and involvement with other PHIR stakeholders must be galvanised. For decision-makers and funders, issues related to their availability and their training (i.e. literacy) in research methods and knowledge transfer can pose challenges to their involvement and understanding of PHIR.

Furthermore, those in charge of **scholarly societies and journals** are less concerned with the design and implementation of interventions than with knowledge transfer. They have an important role to play in making PHIR more prominent. Indeed, especially in the health field, for an interdisciplinary and applied PHIR project to exist and be taken seriously, it must contend with numerous challenges. The health field, and in particular the health of French-speaking populations (Ridde et al., 2021), is still not very open to these issues because it is dominated by a biomedical

Table 9 | Actors' roles and challenges in knowledge transfer.

	Roles	Challenges
Implementers	Use science for the intervention Make their knowledge transfer needs explicit Participate actively and facilitate knowledge transfer activities Identify relevant decision-makers and decisional arenas	Being available Securing knowledge transfer funding Distrust of research and knowledge transfer Distance from decision-makers
Population	Be involved from the beginning Participate in interpreting results Influence decision-makers	Being available Scientific literacy Corporatism/communitarianism Selection of results
Research team	Assign importance to knowledge transfer Produce knowledge in a reasonable time frame Make knowledge accessible Participate in the knowledge transfer process	Understanding decision-making processes Wanting to get involved beyond scientific aspects Pursuing academic recognition
Decision-makers and funders	Be interested in knowledge transfer and be available Participate in interpreting results Secure funding for knowledge transfer Reflect on possible use of the results Inform others about decision-making issues Open up decision-making arenas Interact with knowledge transfer leaders	Political will to use the results Distortion and selection of results Scientific literacy Decision-making time frame Politicisation of results

and Pasteurian approach, which clashes with the logics and approaches of PHIR complexity, as the Covid-19 pandemic crisis has clearly shown again (Paul et al., 2020). Scholarly societies need to make more room for discussion and training in PHIR, whose core competencies are becoming increasingly standardised (Riley et al., 2015). Scientific journals need to assign more value and space to PHIR, both to disseminate results and to provide reflexive analyses of these processes (Alexander et al., 2020) and the challenges involved in creating an effective partnership of multiple actors around an intervention. In particular, one group of researchers has called for more space to be allotted to presenting backgrounds in scientific journals, as these elements are critical to understanding PHIR evidence (Craig et al., 2018). Finally, as discussed earlier, links and conflicts of interest should be a constant concern of scholarly journals, so that the readers of PHIR scientific articles can understand the circumstances, and especially the financial circumstances, surrounding collaboration between researchers and implementers.

THE IMPORTANCE OF FRONTLINE ACTORS

Those familiar with public policy literature will not be surprised to read about the importance, which we wish to underscore, of frontline actors, whom Lipsky (2010) called *street level workers*. In his view, these are the real decision-makers of interventions, more than those responsible upstream for formulating or funding actions. These frontline workers, poised at the interface between those who will (should) benefit from the intervention and those who have decided it should be organised, are at the heart of its potential effectiveness. The support provided to them and their involvement in the organisation are often predictors of success and factors in the quality of implementation (Meyers et al., 2012).

Yet researchers and population health actors still pay too little attention to the role of these people, unlike political scientists, sociologists, or anthropologists, for whom interventions can only be understood "from the bottom up" (Olivier de Sardan, 2021), a term obviously not used pejoratively (Erasmus, 2014). Evaluators are familiar with the concept of intervention fidelity, since it is known that what is stated

in the project documents is very rarely actually implemented on the ground. A society cannot be changed by decree, said Crozier (1979), any more than interventions can be organised with logical frameworks (Giovalucchi & Olivier de Sardan, 2009). Intervention fidelity and adaptation are therefore the two sides of the coin of effective implementation of actions (Pérez et al., 2016). However, these coins are in the wallets of the frontline actors who will, in the end, decide whether they want the intervention to be available and useful for the people involved. In Burkina Faso, for example, research has shown that while regulations to ensure free access to healthcare for the poorest had existed for a very long time, frontline nurses knew little about them and applied them even less (Ridde et al., 2018). Despite this – and many will argue that this is a truism or simply common sense – we still see many interventions formulated with no involvement of those who will have to implement them afterwards, not to mention any involvement of those who should benefit from them or suffer the consequences, as was seen in the Covid-19 crisis. Similarly, there are still many research teams deciding on their own, without stakeholders, which evaluation questions they will seek to answer using their sophisticated methods. Without necessarily falling within the realm of action-research processes (see Chapter 1), where all decisions are taken by and for the persons concerned (Reason & Bradbury, 2001; Sylvestre et al., 2019), PHIR must give prominence to frontline actors, in addition to the fundamental importance of those targeted by the intervention. Clearly, PHIR involves mobilising multiple actors and thus depends on the organisation of partnerships, posing immense challenges for which researchers are rarely trained.

CONCLUSION: PARTNERSHIP CHALLENGES

Embarking on a PHIR project requires a wide range of actors, as we have seen. Players must be brought together from multiple scientific disciplines, with intersectoral expertise in the fields of intervention and population mobilisation. Among scientists, the challenges of interdisciplinary collaboration are known but rarely addressed (Resweber, 2011), notably with regard to training in population health (Ridde et al., 2021). For interventions, the issues related to intersectoral work have been understood

for a long time, particularly in the field of health promotion (Corbin, 2017) and when working with communities (Boutilier et al., 2000). Obviously, issues of power in partnership processes cannot be ignored. Partnership is understood as "a space for interaction among different and socially unequal actors who defend a vision of reality that depends on their identity, their social position, and their history" (Bilodeau et al., 2003). These issues concern almost all PHIR situations. Thus, differences give rise to power issues related to the disciplines of research teams (social sciences versus basic sciences), to the status of individuals (permanent versus trainees and casual contract staff; academics versus association staff), or to the genders and social origins of the individuals involved, etc. The list of differences that trigger power issues is infinite.

Thus, we believe it is important to understand how partnerships work to ensure that PHIR is not only ethical and respectful of diversity, but also effective in addressing the questions being posed. Angèle Bilodeau's advice in this regard is particularly useful (Bilodeau et al., 2003; 2011). She and her team proposed a tool for diagnosing the partnership environment (already in place or to be set up) which can then be helpful in supporting a collaborative endeavour, in our case PHIR. The tool proposes a three-dimensional approach, not necessarily linear (Box 22).

BOX 22
DEVELOPING PARTNERSHIP

Better understand the actors involved and those who should form the partnership:

- Explore all important aspects of the situation to be changed
- Identify the actors already engaged and solicited
- Examine all views and perspectives
- Mobilise strategic and critical actors

Seek to resolve controversies:

- Define a provisional shared PHIR plan
- Use controversy mapping to focus debates on specific disagreements
- Identify potential changing or shifting of actors to resolve controversies

Propose new solutions:

- Adapt and innovate

Source: Bilodeau et al. (2003; 2011).

In a partnership, the quality of a PHIR implementation could be summarised into three factors, following Bilodeau and colleagues (2003): sufficiently dynamic participation by all members, attention paid to equalising power relations, and pooling of knowledge.

Thus, given that power issues, as mentioned, are at the heart of these processes, it is important to find ways to establish as balanced a relationship as possible among the stakeholders involved. It is not a matter of creating constraints, but rather of creating a supportive environment where everyone would be able to use their assets and expertise (which everyone has!) for the community, which is being mobilised here for PHIR. It is therefore essential to recognise that everyone has strengths, but also responsibilities. One challenge, says Angèle Bilodeau, is to maintain this attention to issues of power and competencies constant throughout the PHIR project. It is important for people to have ways of working together even if they have different logics. This issue must be addressed as early as possible in a PHIR project, not only when it is being developed, but throughout the stages of its implementation. Forums for discussion and sharing at all stages can be used to support these reflections (Bilodeau et al., 2006). This can be particularly relevant, for instance, with respect to the perennial conflicts between researchers when it comes to deciding on signatories and their place in the scientific productions resulting from a PHIR project (Ridde et al., 2016).

Chapter 6

PHIR, A PROCESS TO SUPPORT DECISIONS AND INTERVENTIONS

SOCIAL RELEVANCE AT THE HEART OF PHIR

In the field of research in general, scientific relevance, along with methodological rigour, is a core evaluation criterion. It is a matter of showing that the research will improve knowledge on a particular topic. Thus, research teams need to demonstrate that they will not deploy their methods to describe a phenomenon that has been known about for decades (does smoking cause cancer?) or to test a hypothesis that is no longer original (do smoking cessation interventions mostly benefit the least poor?). PHIR being a form of research (see Chapter 1), it must necessarily satisfy the criteria of scientific relevance and methodological rigour (using appropriate and rigorous methods to answer questions). However, given its applied and contextual nature, it must also be analysed in terms of social relevance. In other words, teams (see Chapter 5) that engage in a PHIR process also need to examine how their work serves the purpose of improving practices, actions, and policies, and, in some cases, even social change. While social relevance is at the heart of PHIR, we know from past reflections on the relationship between scholars and politics (Weber, 1963) that these interactions are neither obvious nor linear, let alone automatic (Parkhurst et al., 2018). A

commonly espoused idea is that presenting scientific evidence will help decision-makers to act rationally (Ouimet & Bédard, 2015). Making decisions to change practices based on the results of one PHIR project is definitely not smooth sailing! Thus, the use of the research results does not come naturally. It may happen that political or strategic leaders take up PHIR results, but this is more the exception than the rule, as we saw during the Covid-19 pandemic.

Teams embarking on PHIR must therefore become cognisant very early on of the importance of thinking about and planning activities that will be conducive *a priori* to the use of the results. As will be seen below, the state of knowledge on such activities is beginning to be widely available (Dagenais & Robert, 2012; Langer et al., 2016). Like intervention sustainability (Pluye et al., 2005), research results use must be carefully contemplated at the same time as the PHIR planning. The chances that the results will be both useful and used will be all the greater if this has been planned from the outset of the PHIR project and if specific and potentially supportive activities for their use have been budgeted and implemented. The final customary workshop for disseminating the results of a PHIR to decision-makers will have little influence on their decision-making if not accompanied by numerous knowledge transfer activities beforehand (Mc Sween Cadieux et al., 2017). One useful tool is the production of a knowledge transfer plan, at the time of PHIR planning, to be proposed upstream in the same way as an evaluation protocol or a scaling-up approach. Of course, over and above producing a knowledge transfer plan, forms of PHIR such as action research (Reason & Bradbury, 2001) or developmental evaluation (Patton, 2010) can also significantly increase the chances that results will be used, since this objective is intrinsic to their deployment.

This knowledge transfer plan can be improved with the help of an expert in this field once the PHIR has been funded and launched. However, it can be developed during the drafting of the PHIR project with the collaboration of everyone involved, even if the researcher does not have all the skills to do so. In particular, it should specify:

– what knowledge from the PHIR is to be shared: choose *a priori* the key messages and which specific dimensions of the study to emphasise;

– the people and organisations to whom this knowledge would be addressed for decision-making or influence;

– the knowledge transfer objectives, according the key actors;

– who would organise the knowledge transfer process, and how;

– when these activities should be implemented.

Of course, it is never easy when starting a PHIR project or when just beginning to define its contours to know which knowledge will be most useful and for whom. Yet it is important to understand that producing a knowledge transfer plan is neither an end in itself nor an accountability document. It should be understood as a process to be developed progressively in response to PHIR implementation, needs, knowledge produced, windows of opportunity for putting forward results to inform decision-making, local and national contexts, etc. However, adopting a knowledge transfer posture from the outset and using a collective and participatory approach puts all stakeholders in the same boat when it comes to influencing decision-making with PHIR results. The knowledge transfer plan is not a panacea, but it is a tool that must be actively applied to fit the needs and be made useful. Finally, this knowledge transfer plan needs to be monitored and evaluated not only during the PHIR project, to adjust it based on the indicators to be followed, but also later on, to learn from our practices and improve afterwards. Reflexive practice, like social relevance, is a fundamental value of PHIR (Tremblay & Parent, 2014) and a core knowledge transfer competency, as we shall see below.

PROCESSES THAT SUPPORT FINDINGS USE

There are numerous and long-standing debates about the role of evaluation teams. From one extreme to the other, some (whether anthropologists or epidemiologists) believe these teams should limit their role to producing rigorous data on the intervention, whereas others argue that their involvement in supporting decision-making to improve actions is inherent to their profession. Michael Quinn Patton (2008) is famous, in particular, for having developed a school of practice: utilisation-focused evaluation (see Chapter 1). He recommends that the key question evaluation teams should ask sponsors and stakeholders is: What do

you want to do with the results, and how will that help you? Use is one of the branches in the evaluation story tree (Lemire et al., 2020). For Patton, it is the conversation around the answers to these questions that will influence the evaluative choices and, by extension, how the PHIR project will be organised. While Patton does not mention the knowledge transfer plan, he proposes an evaluative process that is largely focused on it. Bamberger and Rugh (2012) later recommended basing these choices on four essential factors, all of which are constraints on the deliberative processes among PHIR stakeholders (see Chapter 5): time (of the research and intervention); data (availability, quality, and potential use, affecting the choice of approaches and methods, as presented in Chapters 3 and 4); budget (availability and size); and politics (issues related to decision and results use).

This last element, therefore, repositions the issue of PHIR results use in the strategic and political arena, rather than confining it to a purely

BOX 23
AN EXAMPLE OF EFFECTIVE ADVOCACY BASED ON PHIR RESULTS

In Montreal (Canada), some associations have, for many years, exposed the injustice experienced by children of migrant parents without health insurance. The law in Quebec was such that these children, even when born in Quebec, were not entitled to receive care in public health facilities because their parents, often without administrative documents, were not insured under the public system. To report on these situations using a scientific approach, a research team worked with these associations to produce knowledge about the challenges and consequences related to healthcare access among migrants without health insurance (Belaid et al., 2020; Ridde et al., 2020). A partnership was organised, funding mobilised, and scientific and lay articles produced. The research team created knowledge-sharing videos on the situation, and a foundation put together a substantial advocacy file (https://tout-petits.org/publications/dossiers/acces-soins-de-sante-migrants) aimed at influencing legislators. The foundation mobilised all these resources and a very broad coalition of stakeholders to change the law. Finally, in 2021 the law was modified to give these children access to care; however, the law regarding pregnant women has not yet evolved, and the associations have mobilised again. There is still much knowledge transfer work to be done around access to healthcare for migrants in Canada (Merry & Pelaez, 2021).

BOX 24

THE DIFFICULTY OF DETERMINING WHAT 'KNOWLEDGE' MEANS IN PUBLIC HEALTH

In managing the Covid-19 crisis, most countries convened one or more scientific committees to advise them on the measures to be adopted (Rajan et al., 2020). Almost everywhere in the world, these scientific committees or councils brought together infectious disease experts and clinicians, while failing to recognise that epidemic spread is above all a matter of behaviours and structures functioning as a system.

The measures thus implemented were aimed at one focal point (preventing hospital saturation) and on actions specific to these disciplinary sectors in response to the data used (i.e. if the virus is transmitted from one person to another through proximity and contact, then suppress contacts and proximity), with limitations on social interactions going as far as imposing lockdowns on entire populations and, to spur people to comply with these measures, anxiety-provoking communications and sometimes coercive measures.

These measures led to population exhaustion (pandemic fatigue), altered mental health, reduced access to non-Covid-19 care, and increased health inequalities. They also contributed to shifting a Covid-19 burden centred on seniors towards the younger population, on whom the measures had a major impact completely out of proportion to their vulnerability to Covid-19 (Cambon et al., 2021). Confronted with this observation, the decision-makers defended their use of scientific data mobilised by their experts, without ever calling into questioning the ways in which they had chosen and used that data, nor how well the data represented the problem. Thus, in the first year, very little use was made of evidence about the measures' acceptability over the long term, their negative impacts on overall health and on inequalities, the least detrimental communication channels, or the environmental risk reduction measures that could be applied (e.g. air purifiers and CO_2 detectors); and in fact, this evidence was still hardly being mobilised in France in the second year.

This example shows how a mono-disciplinary approach can be harmful and can lead to detrimental health policy, especially when certain data (from this discipline) are chosen to be mobilised to the exclusion of others. Thus, using evidence is not a virtue in itself if the question is poorly asked, if the answers are not interdisciplinary, and if the modalities and processes used to respond to it are poorly defined. If those scientific committees had included other public health experts, such as specialists in prevention strategies, psychologists, sociologists, or stakeholders from the living environments, to consider less deleterious adjustments to the measures, the responses would undoubtedly have been different.

technical and methodological dimension, but still without pivoting towards the advocacy of activist associations. This does not mean, of course, that organisations with advocacy mandates cannot take up PHIR results or collaborate with PHIR teams to change practices and policies (Box 23). PHIR remains a form of research on public health interventions (see Chapter 1). As such, it clearly has practical and political implications – many public health journals now require authors to add a specific section on these implications – but the use of participatory action research from a social change perspective, such as for feminist or indigenous issues (Wehipeihana, 2019), is still (too) rare.

However, is it really accurate to say that these Quebec legislators used this scientific knowledge to make decisions? Might it not be more complex than that, as the Covid-19 pandemic has just reaffirmed? What uses and what knowledge are we talking about? What determines their choices or their ignorance (see Box 24)?

FROM RESULTS USE TO KNOWLEDGE INFLUENCE

In the history of reflection on research use (Parkhurst et al., 2018), reference is often made to the work of Weiss (1979), who proposed three forms of use, which have since been widely disseminated. Thus, she suggested that research results use can be:

– instrumental: to change practices, actions, policies;

– conceptual: to strengthen the understanding of a phenomenon;

– symbolic: to legitimise a decision, sometimes (often) already taken.

This trilogy has given rise to many debates and refinements (Alkin & Taut, 2002), and the body of literature on the question of research use is growing (Cousins & Shulha, 2006). Some authors have since proposed not limiting the question of use to research results (*findings use*) but expanding it to include research processes (*process use*); they argue that PHIR stakeholders can also use research results while implementing an intervention (Cousins, 2008). This verges on Patton's developmental evaluation approach (Patton, 2010), in which the evaluation

team is not an outsider, but rather a stakeholder in the intervention. The team tries to ensure that the intervention is guided by the evaluation results, and that these results are shared as they emerge, without waiting for the long process of producing analyses and reports. This is, in a sense, what is referred to by the catch phrase *implementation research*, but over the life of the intervention and not only when it is being formulated, as proposed by the proponents of this concept (Peters et al., 2013).

Thus, in a famous article, Karen Kirkhart (2000) proposed to advance the reflection on this question of research use by instead using the term *influence*, in the sense of the capacity of PHIR results to produce effects on decision-making through means that are indirect and thus, subtler than the sometimes instrumental and direct vision of the term *use*. By using the term *influence*, she proposed to widen the focus of research effects in a multidirectional (multiple sources), temporal (over the life of the intervention), or intentional (or not) perspective. The issue of non-use or even misuse has also been addressed in the literature on this topic (Cousins, 2004).

Given that PHIR also aims to make knowledge useful for decision-making, this latter concept must also be examined. What knowledge are we talking about in the context of PHIR? Obviously, in the health sector, the reflex is to think of evidence, proof, and research results. This question of evidence is not new to PHIR, as it has been the subject of much debate, particularly among actors in health promotion (IUHPE, 2004; O'Neill, 2003), who have had–and still have–to fight to show that knowledge gained from their approaches, different from those of health sciences, evidence-based medicine (Sackett et al., 1996) (see Chapter 1), and other experimental methods, is equally valid to support and influence decision-making. This evidence can also be referred to as tacit or explicit knowledge, obtained not only from research, but also from evaluation or public health databases. For example, routine data collected daily in health facilities can be powerful information for evaluating natural experiments (Petticrew et al., 2005; Shadish et al., 2022) in the PHIR context using quasi-experimental designs (see Chapter 1) and time series. The effectiveness evaluation of a maternal health intervention funded by the Agence Française de Développement (AFD) in Chad recently showed the relevance of these routine data (Manoufi et al., 2021), even in a difficult context such as this country, which is regularly shaken by political turmoil. However, these data must also be accessible at the right time for

BOX 25

FREE ONLINE KNOWLEDGE TRANSFER TRAINING COURSES (IN FRENCH AND ENGLISH)

The Renard team in Quebec (https://www.equiperenard.org), a research partnership team on knowledge transfer, in collaboration with the Institut de recherche pour le développement (IRD) in France have developed three free online courses in French. In response to the growing demand for knowledge transfer training for PHIR stakeholders (see Chapter 5), they decided to roll out these courses on a large scale to make them accessible to as many people as possible in the French-speaking world. The content of these online courses has largely inspired this chapter. Three courses are now available: introduction to knowledge transfer (20 hours); producing policy briefs (15 hours); and knowledge brokering (15 hours).

1. See: https://catalogue.edulib.org/en/cours/renard101-en/ for the english courses.

PHIR, not to mention the challenges inherent in the ethics (and associated bureaucracy) of their use through requests for authorisation submitted to the administration and ethics committees.

However, there is "no knowledge that is explicit in itself" (Catinaud, 2015). It is always contextual and influenced by social issues, as has been clearly demonstrated for health policies in Africa, for example (Fillol et al., 2020). Research results use and knowledge transfer are necessarily part of this contextualisation of evidence. Thus, beyond the knowledge derived from research, it is also essential to understand and consider the experiential knowledge and know-how of public health workers, which is not always systematically uncovered, even though it should be equally taken into account.

Finally, the political analysis of knowledge production and of the epistemic and cognitive injustices it can generate should not be neglected (Piron et al., 2016). PHIR processes, in which power issues can be important, must necessarily take this question into account, especially (but not only) when working with populations living in difficult situations, such as migrants without administrative status, racialised people[1], or indigenous

1. Simona Tersigni explains that "a racialised person is subject to a process of categorisation and differentiation according to hereditary somato-psychological characteristics socially instituted as natural" (Crenn & Tersigni, 2012).

populations, to take only these examples. PHIR must also become more inclusive. "Nothing should be done for them without them", as Émilie Robert and her colleagues have proposed (Robert et al., 2018).

There are, therefore, many kinds of PHIR results, and their use in interventions or at the end of analyses to influence decisions and practices is neither simple nor obvious. Training for stakeholders in knowledge transfer is as urgent to develop as it is essential to institutionalise (Box 25). Indeed, research and experience have shown that results use can be influenced by multiple factors (Dagenais et al., 2013), as summarised in the next section.

FACTORS THAT INFLUENCE FINDINGS USE

The strategies implemented to promote the use of PHIR results are one of the key factors influencing results use and will be discussed in detail in the next section. Here, however, we can stress the importance of choosing the most relevant strategy in line with needs and windows of opportunity; a morning coffee with a minister is sometimes more useful than a three-day workshop with 300 people…but not always. Also, regular, sustained, and direct contacts need to be established with potential users of PHIR results over the long term. This requires tenacity and resilience. It is also important to adapt the knowledge produced, not only to promote its uptake, but also to be able – which is never easy – to make it operational so that it is potentially usable. Finally (and there are numerous debates on this subject) some suggest that research teams should not confine their role to knowledge production, including in a co-construction process (Dupin et al., 2015), but continue to support decision-makers and stakeholders by accompanying them in the practice changes or policies they wish to implement. Thus, from this perspective, we can see how the current and traditional organisation of the research world (e.g. its methods of recruitment, evaluation, or funding) makes these processes difficult to implement (Ridde, 2009).

Not all actors involved in PHIR (see Chapter 5) necessarily have the desire or the competencies to engage in knowledge transfer processes. In fact, there are many competencies, and a community of practice has proposed

a list of essential ones (https://www.inspq.qc.ca/nos-productions/videos/referentiel-en-transfert-connaissances). This document sets out the knowledge required and the resources needed to conduct knowledge transfer and the behaviours to be adopted. These competencies are organised around five dimensions of a knowledge transfer process, akin to the processes deemed *a priori* effective according to a synthesis review carried out a few years ago on the science of using science (Langer et al., 2016):

– adaptation of knowledge transfer knowledge and production of knowledge transfer tools;

– knowledge dissemination and sharing;

– support for the organisation of practices and knowledge appropriation;

– support for the evaluation of knowledge transfer products, activities, and strategies;

– support for the development of organisational capacity for knowledge transfer.

The tool then proposes six essential competencies that are further subdivided into tasks within the five dimensions:

– establishing and maintaining links and collaborations among stakeholders;

– identifying knowledge transfer needs;

– planning and managing knowledge transfer projects;

– developing specific and relevant tools;

– collecting, analysing, and synthesising information and evidence;

– writing and presenting knowledge in an accessible way;

– adopting a reflexive approach.

Continuing with these factors, it is clear that research teams, through their own characteristics as well as their attitudes and competencies, influence results use. There are countless researchers who do not wish to get involved beyond the production of scientific articles, and arrogant professors who are unable to speak and communicate without jargon (from the use of the concept of epistemology to that of the odds ratio) and are complacent towards workers in the field, who are often eager to contribute to the research (Dagenais & Ridde, 2020). Humility is a rare competency in research (The Lancet Global Health, 2021), but it is fundamental to navigating and constructing with PHIR actors

(see Chapter 5). Because PHIR is interdisciplinary in nature, the spirit of openness to other scientific disciplines and methods is paramount. In fact, in order to obtain data to share in this field, one must be able to study interventions in their totality. For example, there are sometimes endless debates between statisticians and sociologists about the nature of causality or evidence in PHIR. Without pragmatic compromises and decisions, it becomes difficult to propose relevant specifications (see Chapter 3) for evaluating the effectiveness of interventions. In one region of France, researchers wishing to test the heuristic value of the concept of mechanism (Lacouture et al., 2015) in realistic evaluation (see Chapter 3) around a PHIR project never managed to agree, as the sociologists and epidemiologists had a different view of the concept than the public health and evaluation experts (Breton et al., 2017). Researchers also need to be supportive of PHIR, so they should be interested in the use of rigorous methods, but not exclusively. They should be willing to venture into research to answer relatively operational questions. While theoretical, conceptual, or methodological analyses are essential to science, they are generally less of a priority in PHIR. As a result, research teams must be willing and able to maintain regular contact with implementers and decision-makers and ready to go outside of both their scientific comfort zone and their ivory tower (even if this image remains a myth). Human skills are just as important as technical skills.

With regard to organisations, let us first consider the research centres or universities where the above-mentioned teams work. Indeed, these teams need to feel, and actually be, supported in these PHIR practices and be recognised in terms of career advancement. This type of research is often difficult to fund, and the long time required to build partnerships (see Chapter 5) does not allow them to publish as much as they might if using available databases, nor in journals with the greatest impact factors. Without abandoning the rigour inherent in any scientific approach, the traditional criteria for evaluating research teams should take this into account, for example, by giving more consideration to the building of long-term partnerships, rather than to the quantity of publications; the writing of articles in collaboration with field actors; and the production of documents and tools other than articles in peer-reviewed journals, etc. Similarly, organisations responsible for implementing interventions must be open to research and give their collaborators time to work with the research teams. The research

community's involvement in public health intervention organisations sometimes entails different time frames, greater rigour, as well as immersion in activities that provide or collect data for PHIR. Consider, for instance, the availability required from stakeholders when research teams need data to assess an intervention's implementation fidelity (Pérez et al., 2019), or from focus groups that researchers conduct with teams to understand the intervention theory or the implementation challenges. This time dedicated to the research could be perceived as lost to the intervention but as gained for the PHIR project, and thus ultimately for the intervention. These issues also apply to organisations that make decisions based on PHIR results. They also need to have processes and policies in place to make the most of the products of research and promote evidence-based decision-making, even if no one has any illusions about the real influence of science. However, science is sometimes useful, and we should not despair; rather, everything must be done to sustain it. Resilience is also a quality demanded of both researchers – the example of those working on social health inequalities is eloquent (Ridde, 2019) – and decision-makers. As the Covid-19 pandemic crisis has clearly shown, scientific culture is still not very deeply ingrained in the thought patterns of those at the heart of policy decisions in many countries.

On the stakeholder side, the front-line actors – the real policy makers (Lipsky 2010) – are in direct contact with the people for whom the actions are intended, and their attitude towards the world of research and their willingness to break with routines are important factors in the use of evidence. Like decision-makers, they may be more or less supportive of research and have basic knowledge of how evidence is produced in the context of an intervention evaluation. If they see the research as an activity to monitor their actions, this could discourage their involvement in PHIR, or even any reflection on the value of science upstream, when formulating their interventions. Obviously, it is never easy for anyone to examine themselves or to be willing to innovate by changing their usual practices. Moreover, many people involved in interventions have had negative experiences with research teams that, for example, patronised them or never returned to share their analyses of the data, which had in fact been collected collaboratively.

The organisations that fund the research or intervention also play an important role in the use of results. These funders are still too often

in separate camps, with those financially supporting the interventions being reluctant to see too much budget allocated to research (sometimes even refusing it) and those focused on research not really understanding why the researchers are so close to the actions. These organisations need to better understand the role of PHIR; those focused on the intervention need to understand that science (not consultation) is useful in developing and evaluating interventions, and those focused on research, that PHIR is just as useful and rigorous as biomedical or clinical research (see Chapter 3 on the scientificness of research approaches). Until more PHIR-specific funding organisations are available, both types of funders must accept that researchers will request budget for knowledge transfer activities and that interventions will plan on expenditures to conduct research with their academic collaborators. Some research funding agencies are just beginning to accept these expenses and to request knowledge transfer plans in protocols submitted in response to their calls for proposals. However, they should understand that innovation is needed and that strategies cannot be limited to a dozen lines at the end of the protocol where research teams say they are planning a final workshop to disseminate results and publish scientific papers. Thus, a greater sensitivity to, or even requirement for, knowledge transfer on the part of funders could influence practices and the use of science in decision-making. Unfortunately, money is often, but not exclusively, an effective incentive.

The Covid-19 pandemic has reminded us of the extent to which the media play a role in how research data are taken into account when making individual decisions (e.g. vaccination) or collective decisions (e.g. the treatment of government measures) (Cambon et al., 2021). The situation in this regard is very mixed globally, as some countries have an independent press with a few scientific journalists, while others have none of this, with a press that is sometimes under government orders (Box 19), or mainly driven by the impetus to produce announcements. In Senegal, the controlled trial of the meningitis vaccine in 2007 gave rise to numerous controversies among the public and researchers, revealing journalists' lack of scientific literacy and an attempt at political instrumentalisation (Ouvrier, 2015). Elsewhere, the Covid-19 pandemic period saw a proliferation of epidemiology training courses to equip journalists to process information, because their role was so crucial. In France, physicians with no real competency

BOX 26

SCIENCE AS SEEN BY THE PRESS IN MALI

In Mali, a 2017 analysis of about 100 newspapers and 14 interviews with their journalists provided valuable insight into how science is treated by the press in this West African country. For example, in the 2,500 printed pages of 242 editions found on newsstands over a two-week period, only 101 articles used scientific data. Health and the economy were the two sectors where they were most used; in the health area, medical issues were the primary focus. On the other hand, in the political area, which was very prominent in the press galleries, science was almost absent (only 15 articles). The study showed that "half of the articles use the scientific material 'badly': data not presented or inaccurate, low level of analysis, no citation of sources". It also showed that the journalists who wrote articles in which science was present and well understood were those with stronger initial and continuing education, regardless of the diversity of their backgrounds. Others often settled for official documents or those handed out by people associated with the events or organisations they had to cover, without bothering to check their accuracy or to seek scientific data elsewhere. Their scientific literacy was generally very limited, and they often confused the notion of science with mathematics, numbers, and other percentages. This is reminiscent of Canadian biomedical researchers' inadequate knowledge about qualitative research, showing the universal nature of training needs! (Albert et al., 2008).

Source: Escot (2019).

in epidemiology made boastful predictions in the media to journalists, who did not have the competency required to discuss or question the validity of their statements, and some journalists even made their own predictive calculations[2]. Better research use thus requires, among other things, increased knowledge on the part of media actors and channels to better disseminate PHIR results. This does not mean resorting to commercial appeals, but rather, sharing knowledge with teams of journalists who need to be able to inform society fairly and rigorously. For example, in recent years, in public policy formulation, the emphasis has been on taking into account the weight of influence of commercial industries, to the detriment of population health (de Lacy-Vawdon & Livingstone, 2020). Since the analysis of tobacco companies' strategies

2. See: https://www.lemonde.fr/planete/article/2021/06/18/le-lourd-cout-humain-d-un-troisieme-confinement-tardif-en-france_6084619_3244.html

(Breton et al., 2008), in particular, we know how much these industries can manipulate or distort research results through certain media and journalists. We also know that social media can be powerful vectors for, or against, the dissemination of evidence and debates on "fake news" (in French, *infox*) (Box 26). For example, in France, during the first part of the Covid-19 crisis, it was social media that publicised the value of wearing masks, even though the official position was the opposite, probably to conceal information on the absence of a national stockpile. Many PHIR projects are now trying to work with social media influencers to reach certain target audiences – especially, but not only, the younger ones.

Faced with these multiple factors of influence, we must not give up and do nothing. The heart of PHIR is its social relevance, as we have said. It is therefore essential to engage in processes and activities aimed at increasing the likelihood that PHIR results will be used.

PROCESSES AND TOOLS TO STRENGTHEN FINDINGS USE

Rather than describing tools or activities, it may be more advisable to discuss knowledge transfer processes, since these should be multidirectional, interactive, and nearly continuous. As emphasised in the definition at the beginning of this chapter, the word "transfer" does not assume that some people know things and others do not, or that some people should transfer their knowledge to those without that knowledge. Rather, the concept of transfer evokes the notion of discussion and the need for multiple interactions. In fact, research has shown that unidirectional processes are not the most effective, regardless of whether these involve moving from science to practice (*science–push*) or from practice to science (*demand–pull*). Although the state of knowledge still warrants much development on this topic, the interactive approach appears to be a promising compromise between these two long-standing practices (Landry et al., 2006) to highlight the need for regular and sustained collaboration between research teams, decision-makers, and implementers (and other actors) for better use of PHIR results. The

analysis of a knowledge transfer process aimed at using research results to reduce the consequences of road accidents in Burkina Faso resulted in five recommendations (Dagenais et al., 2021):

– produce research data useful to stakeholders in the field;

– ensure the acceptability of the technologies used for data collection;

– use collaborative approaches for research and knowledge translation;

– give visibility to actors in the field to provide them with more effective mechanisms for action;

– involve high-level decision-makers more closely in the process to maximise the impact of the research.

However, it is not easy to navigate these interactive approaches, as there are a plethora of conceptual models and frameworks attempting to explain how to support the transition from research to action (Graham et al., 2006). For example, the Institut national de la santé publique du Québec (INSPQ) proposes marking out the knowledge transfer process in seven steps (or sub-processes, for those averse to linearity): knowledge (co)production, adaptation, dissemination, reception, adoption by users, appropriation, and ultimately, use. The INSPQ makes a clear distinction between knowledge dissemination strategies and knowledge appropriation strategies and notes that the effectiveness of the approach depends essentially on the interaction, throughout the process, between research producers and users (Lemire et al., 2009). It is here that the question of the people or organisations at the interface of these two worlds must be raised, because very often these are two peoples inhabiting different planets. As such, it may seem difficult to organise any interaction between these two environments, and it may be more effective to use intermediaries.

However, these intermediaries can be multidimensional, and navigating them is never easy. Thus, some authors recommend organising these functions along a continuum ranging from an informational role to a more systemic function within an organisation, to collaborate and build stakeholders' capacities through a functional relationship in order to connect the PHIR actors and strengthen co-production (Shaxson et al., 2012). In this model, four types of intermediaries (Neal et al., 2021), not mutually exclusive, could be involved in these processes depending on the proposed approaches:

– information disseminator: facilitates access to search results (informs, compiles data);

– knowledge populariser: helps people understand and apply search results (shares, translates, communicates);

– knowledge broker: improves the use of research results for decision-making; facilitates the co-production of knowledge (creates links, organises and supports meetings and interactions, networking);

– innovation broker: influences the context more broadly to facilitate innovations (negotiates, develops, collaborates).

The third type of intermediary, the knowledge broker, is increasingly discussed in the knowledge transfer literature (Munerol et al., 2013; Ridde et al., 2013) and is not new (Meyer, 2010). It has been the subject of experiments and evaluations to assess its effectiveness and explain its implementation challenges, in both North America and West Africa (Dobbins et al., 2009; Mc Sween-Cadieux et al., 2019). Indeed, knowledge brokering is certainly an intermediation profession of the future (Neal et al., 2021) in the world of PHIR, given that the two worlds, as mentioned above, are not always located in the same galaxy and that the people or organisations at the interface can undoubtedly contribute significantly. This person (or persons, within an organisation) can also engage in research if they feel they have the time and the skills for it. Some even feel they would have more legitimacy than non-researchers, which recalls the challenges related to humility in research and the ability to collaborate with a knowledge broker, thereby leaving research teams time to focus on the more scientific functions for which they have been better trained. This person will have to: assess the knowledge needs of potential users of PHIR results; identify and synthesise knowledge, and make it available to better develop intervention content and promote research use; organise regular meetings among PHIR stakeholders and create networks by playing, in particular, the role of liaison and exchange agent; strengthen capacities in knowledge transfer for stakeholders, but also more specifically, for example, in research methods for decision-makers and scientific communications for researchers; etc. These tasks will be multiple and varied, and will evolve according to needs and contexts. It is thus essential to find people for this role who have not only basic scientific knowledge, but also, if not more importantly, the social skills that are essential to the role of intermediary. Clearly, this person's credibility with potential users is important, and it is never easy to find someone with all these qualities.

These brokers obviously cannot claim to work alone, and they should be able to collaborate with researchers who are more expert in the subject and therefore more legitimately able to discuss it. However, we know that research teams struggle to find time for these interactions, as they are so taken up by their profession (research) and… administration.

In one pilot project, the knowledge broker, who had been trained and mentored for two years by knowledge transfer experts, threw in the towel, largely because the Ministry of Health officials afforded him little time, space, and legitimacy. They considered that his master's degree in sociology and his research training did not make him as credible, in conducting public health knowledge transfer, as a physician would have been, even one without a scientific doctorate. In fact, one minister of health understood the importance of these issues and created a knowledge mobilisation support unit. However, he was compelled by the regulations to recruit physicians, who were, in the end, neither trained nor interested in these knowledge transfer issues and who never got involved in setting up this unit. Thus, it continued to exist, but only on paper, and with the change of minister it was ultimately forgotten (Dagenais, 2021). Clearly, issues of power (symbolic or not) and context must be considered just as much as the budgets that should ideally be allocated to these intermediation functions. However, if the rare pearl cannot be found, it is conceivable to work as a team.

Unfortunately, the broker described above did not have the support of the senior public health physician who was supposed to help him in his duties. The latter did not wish to get involved in this brokering with high authorities, no doubt so as not to compromise his lucrative consulting activities in an environment where criticism is a delicate matter (Olivier de Sardan, 2011). In this case, the knowledge broker was able to mobilise the researchers' scientific credibility in a specific and ad hoc way when his analysis of the context and the timing indicated that it was relevant to do so. An example of brokering activities and the qualities required for this person is presented in Figure 12. A systematic review proposed a list of 10 potential knowledge brokering activities around three main functions: knowledge management, exchange and link management, and capacity building (Bornbaum et al., 2015).

Given the many possible knowledge transfer activities, which can sometimes be specific to particular contexts (Siron et al., 2015), a research team conducted a mammoth review to understand the different levels

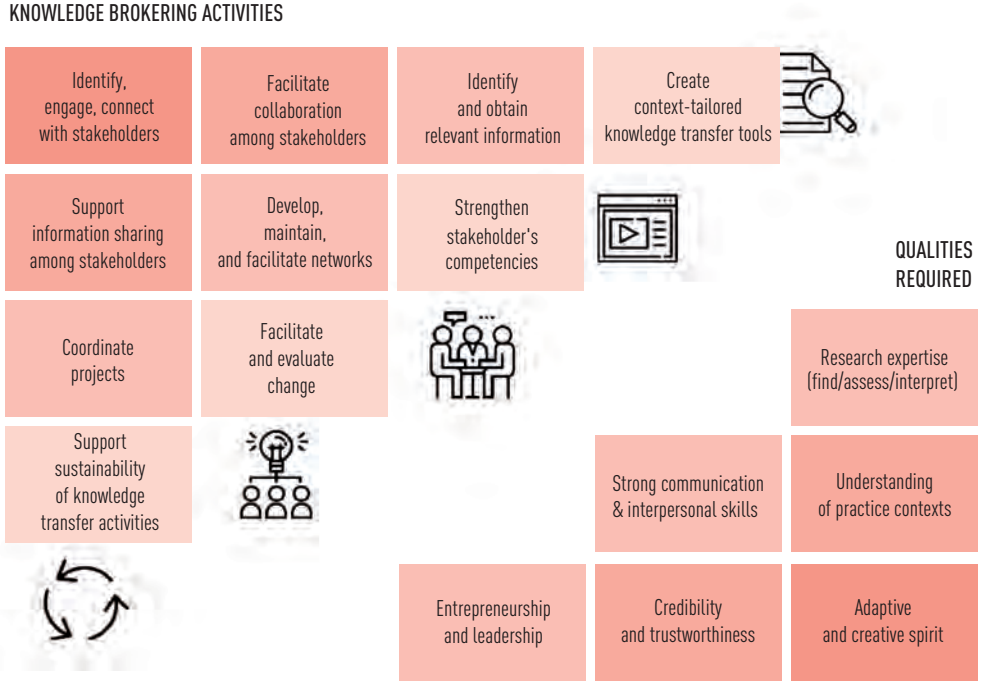

Figure 12 | Example of knowledge brokering activities and qualities required.
Source: Mc Sween-Cadieux (https://ideas4development.org/en/research-development-knowledge-brokering/).

of effectiveness (Langer et al., 2016). From that review, they proposed a list of six *a priori* effective mechanisms for knowledge transfer:

– raising awareness and fostering positive attitudes towards the use of evidence;

– building consensus on and adapting knowledge about PHIR issues relevant to those who will make decisions;

– strengthening communication and access to evidence;

– facilitating interactions among decision-makers and research teams;

– developing skills for accessing and understanding evidence;

– influencing decision-making structures and processes.

In a recent review, another team identified no fewer than 38 strategies that would be effective for using research results (Zhao et al., 2020). Finally, as part of a PHIR project conducted in France, a taxonomy of knowledge transfer activities was created and assessed as relevant for

deployment when implementing prevention policies in local settings. Thus, 18 standardised knowledge transfer activities (each with a specific objective and wording) were produced, grouped into 11 categories of activities (Affret et al., 2020).

We will spare you these long lists, which are accessible in the two articles. Beyond these processes and activities, there are also specific and useful tools that cannot all be described in this book: infographics, cartoons (see Box 27), videos, websites, communities of practice, etc.

BOX 27
USING CARTOONS TO SHARE SEARCH RESULTS

In Burkina Faso, a team of researchers, helped by a knowledge broker and members of an association that organised an intervention being analysed as part of a PHIR project on the elimination of user fees for children's healthcare, partnered with a cartoonist to disseminate the results. The use of cartoons was one knowledge transfer activity among the many others organised by the team (workshops, policy briefs, website, press, etc.). However, the cartoons were a very innovative device, because the idea was to share serious and rigorous research results, but in an accessible and humorous way.

A great deal of work was done upstream to ensure that the researchers explained the research results so that the graphic artist could assimilate the content for cartooning. A researcher and a knowledge broker worked extensively with the cartoonist, particularly on several drafts, to ensure the scientific and contextual relevance of the content presented. The intervention stakeholders were also asked to verify the social acceptability of the drawings, as humour is obviously cultural. The collaboration with a cartoonist who is well known in Burkina Faso and West Africa greatly enhanced the relevance of the proposals and their dissemination. Humour made it possible, on many occasions (but not always), to spark debate on the PHIR results. For example, the idea that eliminating user fees would cost too much for the State to subsidise was illustrated by comparing this cost with the cost of three beers. These cartoons were used in an album that was both in print format and online[1], and was presented at press conferences, national workshops, and international conferences.

1. See: https://www.acfas.ca/publications/magazine/2015/04/caricatures-partage-savoirs-contrer-oulipo-academique

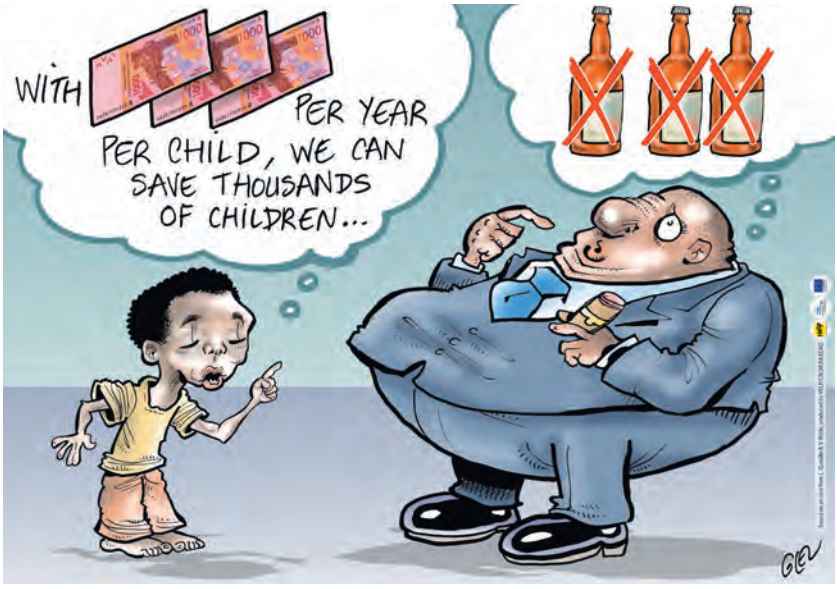

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Figure 13 | Financing access to health services for children in West Africa costs less than $5 per child per year and requires the political will of decision-makers.

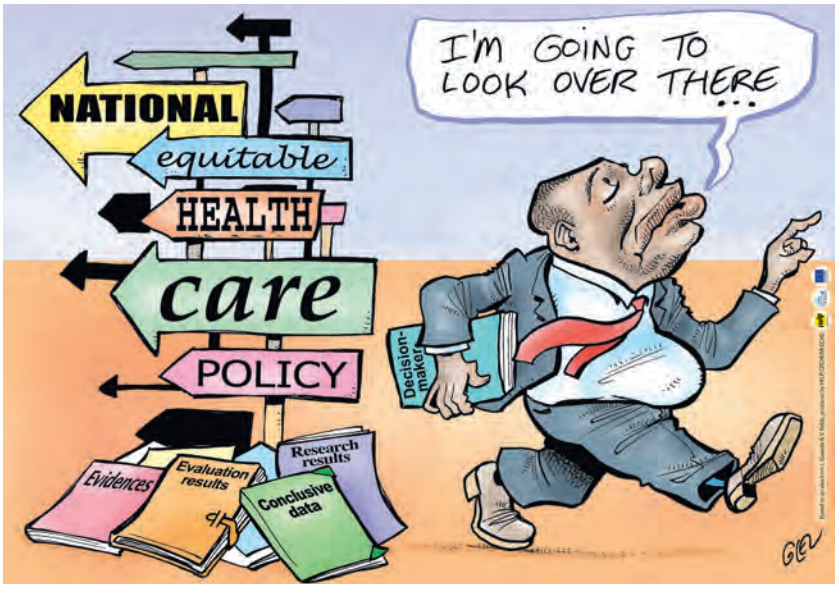

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Figure 14 | Using caricatures as a tool for knowledge transfer.

BOX 28
POLICY BRIEF DESIGN

Size: Maximum 4 pages printed on both sides; 1,000 to 1,500 words depending on the use of images.

Title: Short, punchy, informative.

Summary: Persuade the reader to keep reading.

Highlights: 3 or 4 messages in a box.

Introduction: Explain why this topic is important, why the reader should care, what the objectives of the PHIR were.

Approaches and results: Summarise facts, background, and available data; reduce details to what the reader needs to know about the PHIR project; provide concrete examples to support your claims and operational recommendations.

Conclusion: Base it on the results presented; provide concrete conclusions and supported claims.

Sources consulted or suggested: Research report or articles on which the brief is based (web link).

Recommendations for action: The key measures or actions you suggest (to be done by whom, when, where?) that are realistic and feasible.

Source: Dagenais & Ridde (2018).

However, while there are numerous knowledge transfer tools, policy briefs and deliberative workshops are innovative ways that definitely should be used more widely.

Policy briefs are short texts written in plain language and presented in an attractive format (Dagenais & Ridde, 2018). A brief summarises the research results and makes operational recommendations to decision-makers and stakeholders, proposing solutions identified in the PHIR project to improve practices, interventions, or policies. It differs from research summaries and other research notes or research snapshots in that its purpose is not only to present PHIR results, but also, if not above all, to make practical recommendations to inform decision-making, for example, at a deliberative workshop (see below). The brief can be written in the format presented in Box 28. It should serve as a basis for dialogue with stakeholders interested in or affected by an issue. It is essential to take the time to prepare and write this brief well in advance and to test its content and form with a sample of target individuals to

BOX 29

LESSONS LEARNED FROM CONDUCTING DELIBERATIVE WORKSHOPS

- Vary the types of data presented from practical experiments and both qualitative and quantitative research.
- Ensure the presence of a diverse group of stakeholders concerned by the PHIR project.
- Provide advance notice and prepare participants for what is expected of them during the workshop.
- Make data and presentations viewable and accessible (form and background).
- Allow time for deliberation, debate, and discussion.
- Create small working groups to explore certain topics in greater depth.
- Produce operational recommendations that are solidly grounded in research and experiential data.
- Take into account power issues in the preparation, organisation, and follow-up.
- Do not turn the workshop into an advocacy exercise for a particular project or solution.
- Prepare the workshop in advance: prior contacts with decision-makers, presenters, policy briefs, etc.
- Prepare data summaries in the form of briefs, in appropriate language, and distributed (and if possible tested) in advance.
- Allow time at the end of the workshop to clarify the content of the recommendations and present them to everyone before the end.
- Set up a committee to follow up on recommendations and give it the means to function.
- Assess the processes and outcomes of the workshops in order to improve.

Source: Ridde & Dagenais (2017).

ensure that the recommendations are relevant and the language level is appropriate. Otherwise, there is a risk that on the day it is used – for example, during a deliberative workshop – a senior official who was not involved upstream will dwell on details of form (the title is too punchy, it calls into question my agency, etc.) only to denigrate the substance (which they will not have read) because the PHIR results will not correspond to what they wanted to hear or do.

This dialogue can be held particularly during deliberative workshops; it is recommended that policy briefs be distributed beforehand and analysed during the workshop to generate dialogue among PHIR stakeholders (Boyko et al., 2012; Mc Sween-Cadieux et al., 2018). These workshops are defined as: "an evidence-informed, deliberative dialogue process among multiple stakeholders for vigorous and comprehensive policy and practice decision-making" (Nabyonga-Orem et al., 2016). At its heart, this is an interactive approach that brings together all those affected by the problem being addressed by the PHIR project and considers that collective intelligence will be more effective in finding solutions than the intelligence of a few people. As we attempted in Niger (Hamani Souley et al., 2017), for example, the aim is to establish dialogue and deliberation, not debate and confrontation, as is all too often the tendency in the French-speaking world. An environment is needed that will allow stakeholders to collaborate and to discuss the contents of the research results in light of their own empirical knowledge, so they can understand and learn together to make informed choices using PHIR. For this, it is sometimes necessary to call on people with real group management and professional facilitation skills to handle the power issues inherent in these modes of group consensus-building. Based on our collective experience in organising these deliberative processes, we propose in Box 29 some lessons learned for those who would like to engage in these processes.

LINKS AND CONFLICTS OF INTEREST DURING PHIR

To conclude this chapter, we need to address a sensitive issue rarely discussed in public: research independence and links/conflicts of interest in the context of PHIR.

As we have seen in the previous chapters, PHIR is a process that involves multiple actors from different backgrounds and cultures, but which is based on the principle of associating the practice of science with that of action. There are, therefore, significant risks that stakeholders will seek to focus the research on what works well (see Olivier de Sardan's [1995] concept of "*enclicage*"), rather than on the challenges encountered during the intervention, or that the funders will push research teams to show

BOX 30

TWO EXAMPLES OF ATTEMPTS AT INFLUENCE BY A PHIR FUNDER

A development bank carried out an impact evaluation of an intervention for more than 2 million USD. It funded both the entire intervention and the entire evaluation. Its own contracted experts co-authored several scientific papers based on the evaluation. The inconclusive results had not been made public more than two years after the end of the intervention. Yet they had been known for a long time. No official final results workshop was held, and the funder never wanted to organise one. A workshop to share the preliminary results did take place, but no document was given to the participants and they never had access to the slides presented. This strategy should no doubt be attributed to the fact that this bank was negotiating with the government to convince it to continue this approach more than 18 months after the end of the previous project. The report was finally made available online more than two years after it was written.

A public health physician supported an intervention as a consultant for many, many years. One of his first evaluation reports on its effectiveness was quite positive, although the methodology used was not rigorous enough to support such a claim, which no one in the organisation questioned. Later, the funder commissioned researchers to carry out an independent evaluation. It appointed one of its employees, who was also trained in research but did not have an academic position, to follow up on the matter. As time went on, she interfered increasingly in the thinking and methods proposed by the researchers. She became more intrusive, correcting all the details, questioning all the solutions, and, above all, looking for statistical solutions so the evaluation results would be positive. However, nothing worked; the intervention was really not very effective despite the millions invested. A little later, new data, after multiple attempts, showed a positive but relatively weak result. A workshop to plan the next stage of the intervention was organised, to which the researchers were not invited. The consultant attended, and denigrated the results of the research on "his" intervention. Locally, no one dared to question the sustainability of the intervention, which continued, and the consultant was again called upon to support the process. This did not prevent the funder from later stating in a book (coordinated by its employee!) that the work of the research team had been useful and was taken into account to radically change the intervention.

effectiveness where there is none Gorman, 2018). These issues become crucial in settings that are resource-poor or dependent on international aid or national public funding (see Box 23). This is especially true when funders want to disseminate "ready-made" intervention models without

evidence of their effectiveness or adaptability to local contexts (Gautier et al., 2020; Olivier de Sardan, 2021). Similarly, the populations and individuals benefiting from the intervention or its advantages do not always look favourably upon a research team that might call into question this presumed usefulness or effectiveness (see Chapter 2). The "success cartel" is on the prowl (Rajkotia, 2018). For example, some researchers have recently come forward in public health journals with calls for more vigilance around research independence (Storeng et al., 2019) in a context where public funding is increasingly competitive and drying up.

In a PHIR project, there can, in fact, be multiple influences, and conflicts of interest cannot be reduced simply to the familiar ones from the pharmaceutical, tobacco, alcohol, or agri-food industries. What about links of interest when, for example, the director of an association that negotiates with and then receives significant funding from an international organisation to carry out a PHIR project becomes a member of that organisation's management team a few months later? What about a group of global health researchers who say they want to independently influence their country's policy, when they accept funding from that country's development bank and hold their meetings in the offices of a research funding agency in that country? Researchers and evaluators in the field of intervention evaluation are obviously also affected by this (see Box 30). This type of conflict of interest was studied a long time ago by Scheirer (1978), who discussed cognitive mechanisms that could push evaluators to emphasise the positive effects of actions. She cited a review of the 1970s literature showing the challenges of internal evaluations (which have since been largely abandoned in favour of external evaluations) since "evaluators who were affiliated with the evaluated intervention were much more likely to report the success of the programme (58%) than non-affiliated researchers (14%)". There are no magic recipes for dealing with these conflicts or links of interest, but it is essential to talk about them as a team, among PHIR stakeholders, and to make them the subject of calm and dispassionate discussion to find appropriate solutions. This is also recommended when deciding who signs (or not, and in what order) scientific articles resulting from PHIR projects. It is also important to be transparent and honest outside of these groups so that readers of articles that will be published as a result of the PHIR project, or who will listen to a conference presentation on these results, will understand the issues at stake and analyse the results in light of these links of interest.

CONCLUSION

The purpose of Chapter 6 has been to make very clear the importance of knowledge transfer in the field of PHIR. The use of PHIR results is an important criterion of effectiveness. Besides deploying rigorous methods to strengthen the credibility of the results, it is essential to plan and organise specific activities that will increase the potential for their use.

Of course, nothing is easy, and use is never systematic or straightforward. It is mainly a matter of trying to influence decision-making, as there are many constraints on knowledge transfer, whether organisational, institutional, personal, contextual, or cultural. With this in mind, we have provided an overview of knowledge on the effectiveness of certain interventions and tools that should inform your choices in order to strengthen the use of your research.

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GLOSSARY

There are many glossaries and indexes in the field of research and evaluation. The following is not intended to suggest new ones but simply to present definitions of the main concepts used in this book.

Components
The constituents of a system. These can be contextual (prior to and independent of the intervention) or interventional (manipulated by the actors to meet the interventional objective).

Health interventions
Activities performed for, with, or on behalf of a population, whose purpose is to assess, improve, maintain, promote, or modify health and/or its determinants.

Intervention categories
Areas of intervention defined by their nature (e.g. communication, education, coercion, regulation, incentivisation, etc.) or implementation environment (e.g. school interventions).

Intervention levels
Policies or strategies (programme), interventions, activities.

Intervention system
Set of interdependent human and material contextual agents, present in a given space-time, generating effect mechanisms. The intervention becomes a location-specific arrangement of pre-existing contextual parameters that influence their own evolution over time.

Intervention theory
Assumptions upon which people, consciously or unconsciously, build their interventions.

Mechanisms
Reactions of a human agent in a given context.

Methods
Processes used for statistical, qualitative, or mixed analysis.

Methodology
The study of methods.

Process
Dynamics of implementing an intervention, actors, and actions.

Routinisable
Capacity to be implemented under real practice conditions, within existing constraints, and with the resources that the actors have within a given practice environment.

Strategies
Programme of interventions composed of multiple activities.

Sustainability level
State or degree of perpetuation (like a photo).

Sustainability process
Processes to foster sustainability (like a film).

Tools
Products or objects used for data collection: questionnaires, interview or observation guides, Delphi questionnaire, etc.

ABBREVIATIONS AND ACRONYMS

ACE: Assessing cost effectiveness

AFD: Agence française de développement (France)

ANR: Agence nationale de la recherche (France)

Astaire: Tool for analysing the transferability and adaptability of health promotion initiatives

CE: Contexte extérieur (external context)

CHSRF: Canadian health services research foundation

CI: Contexte interventionnel (interventional context)

CMO: Context - mechanism - outcome

Covamax: Study to define a behavioural model of pandemic vaccination (CHU Bordeaux)

Covapred: Study on the acceptance of new vaccines against Covid-19 (Inserm/CHU Bordeaux)

Echo: Directorate-General for Civil Protection and Humanitarian Aid Operations of the European Commission

HR: Harm reduction

Insee: Institut national de la statistique et des études économiques (France)

INSPQ: Institut national de la santé public du Québec (Canada)

IRD: Institut de recherche pour le développement (France)

Ised: Institut de la santé et du développement (Senegal)

Isped: Institut d'épidémiologie, de santé publique et de développement (France)

IUHPE: International union for health promotion and education

LiST: Lives saved tool

Merisp: Methods for intervention research in population health (Isped research theme)

NGO: Non governmental organisation

NHMRC: National health and medical research council (Australia)

Ocaprev: Effectiveness of connected objects and applications in health prevention (research project)

PHIR: Population Health Intervention Research

QALY : Quality-adjusted life year

So-risp : International population health research network

TBE: Theory-based Evaluation

Unitaid: World health agency

WHO: World health organisation

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collection
[santé globale]

In health research, approaches based on biomedical and epidemiological studies fail to capture the complexity of population health interventions. Yet it is essential to study them using approaches adapted to their complexity, the plurality of their mechanisms, and the diversity of local actors and contexts. This is the purpose of population health intervention research (PHIR), as summarized in this book.

Through conceptual and methodological explanations, and illustrations of numerous examples from around the world, the authors aim to address a need for training in this scientific approach among researchers and, more broadly, health-care professionals, by examining essential issues of effectiveness, equity, relevance, implementation, and scaling-up.

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