

Application of Mixed Method Approach in Public Health Research

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Introduction

Public health has followed predominantly a positivist approach based on epidemiology – A quantitative discipline.⁽¹⁾ Positivism considers that the society, like the physical world, operates according to general laws (such as the Newton's Law of Gravity), and the knowledge that is derived from the verified data received by the senses, is the empirical evidence.⁽²⁾ This 'quantitative approach' of epidemiology has served public health in the past in defining health problems (what) and for computing the magnitude of health problems according to time, place, and person characteristics (when, where, and who) as well as for determining the causes of these problems (why and how). However; by the end of 20th century, the emergence of social medicine⁽³⁾ led to a paradigm shift and social epidemiology surfaced.⁽⁴⁾ Non-positivist methodologies evolved for understanding the complex social phenomenon related to human behavior and 'qualitative approach' has gained ground as a valid method for comprehending the 'social reality' as it exists. Qualitative approach aims to develop an in-depth understanding of the social phenomenon, that is, why and how of human behavior or decision making, rather than finding out only the what, when, where, and who aspects of the behavior, by using research methods which rely more on unstructured interviews, focus group discussion (FGD), case study, participant observation, etc.

Currently, positivist and non-positivist methods, that is, quantitative and qualitative approaches are

often combined. This has raised complexities in the perspectives of researchers.⁽⁵⁾ One may wonder, how these two approaches that follow different logic, that is, quantitative is based on deductive and qualitative on inductive logic, can be mixed to draw valid conclusions? Since reality is complex, no single method can express the nature of reality fully. Dialectic method, which has been central to Indian philosophy since antiquity, can be used for resolution of the inherent contradiction between quantitative and qualitative method. In western world also the philosophy of dialectics, as elaborated by Hegel, Marx, and Engels; considered interrelations and interactions as 'inherent' in every field of life, and builds the understanding that the tension or conflict act as a driving force for the change, eventually leading to transformation or dissolution.^(6,7) Therefore, mixed method approaches are required that lead to dialectical understanding of the evolving paradigm. This perspective has been used not only in explaining the changes occurring in the society but has also been utilized to initiate social actions that may transform the society.

Instead of raising a debate about whether quantitative or qualitative method is useful for public health research or not, the focus of this article is on how to carry out research to answer questions that demand a mix of methods. At times both quantitative and qualitative methods need to be considered to have a complete understanding of the public health issue at hand in a complex environment in which policy decisions are made today that affect health of large number of people.

Despite following the quantitative research methods for a long time, some qualitative research studies have appeared recently in public health. Although by the end of the 20th century, a rationale for using mixed method approach had come to the fore in social science disciplines.⁽⁸⁾ However, mixed method research, has

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rarely been experimented in public health.⁽⁹⁻¹³⁾ Partial mixing of quantitative and qualitative methods have been used for triangulation of results.⁽¹⁴⁾ There is general acceptance now that mixed method is a holistic approach which researchers can use for searching answers to complex questions. It has been realized that mixed methods are required for development, initiation, and expansion of new ideas. Therefore, it is necessary to understand the mixed method approach which has emerged now firmly in the scientific arena.⁽¹⁵⁾

What is Mixed Method Approach?

Quantitative method is based on numbers to claim objectivity; whereas, qualitative method generate theories relying on subjectivity. Objectivity means reaching to the truth while keeping ones opinions, perceptions, and experiences at a bay. But others argue that how can 'suffering', for example, can be untrue, though it is a 'subjective feeling', but it is 'real or objective' for the person who is experiencing it. Similarly, how can women health issues be addressed without understanding their perspective on health? Therefore, the debate on objectivity verses subjectivity is not an issue any more. The issue is how to capture the understanding of contexts, perspectives, and cultural influences in real life phenomenon. Hence, mix method approach employs rigorous quantitative research to assess magnitude of the problem and rigorous qualitative research to explore meaning and understanding of the construct and the context. Mixed method is the intentional integration or combination of the two methods, that is, quantitative and qualitative, to draw on the strengths of each to answer real life research questions. It frames investigation within the philosophical and theoretical positions of both quantitative and qualitative methods. A systematic review of 22 implementation research studies on mental health services has presented the rationale of using mixed method research.⁽¹⁶⁾

Mixed Method Designs

Several designs of mixed methods are available. Based on the type of research question, any one of the following designs can be used. Mixed method research designs mentioned below are not meant to be exhaustive, but are intended to be illustrative of several possible approaches that have been used in health science research.⁽¹⁷⁾

1. When the research having both quantitative and qualitative methods is planned at the beginning of the research study to answer the question, it is known as a convergent/parallel or concurrent study design. For example, the data collection and analysis of qualitative and quantitative data was carried out simultaneously in a study to find out the delay in seeking healthcare among men and women having tuberculosis. The qualitative data revealed the causes of delay, while quantitative data provided the delay in terms of months and days of delay in both men and women.⁽¹⁸⁾
2. Mixed method research could also be sequential. It means that one dataset whether quantitative or qualitative is built on the results from the other. Research may begin by a qualitative exploration followed by a quantitative follow-up or by a quantitative analysis which is explained through a qualitative follow-up. The popular approach in the health sciences is the latter in which qualitative data helps to explain the in-depth mechanisms (why and how) underlying the findings of quantitative data (what, who, where, and when). In many studies, qualitative methods are used to develop the tools for quantitative data collection. For example, Creswell *et al.*, found that out of five studies conducted in primary healthcare setup, three studies included a rationale for mixing of qualitative and quantitative methods based on the need to develop a quantitative instrument from the qualitative data or to converge information to understand the research topic.⁽¹⁹⁾
3. Embedded or nested mixed method has also been commonly used in health sciences. Quantitative and qualitative approaches sometimes are picked up and embedded one in the other to provide new insights required in public health. For example, in a randomized controlled trial, which was conducted to compare two doses (high and low) of a nurse-led psycho educational intervention to assist oncology outpatients to effectively manage their pain, qualitative data was collected in the form of audiotapes of the intervention sessions with nurse and patient for exploring the issues, strategies, and interactions experienced during the intervention. The study provided evaluation of the processes along with the outcomes of the intervention.⁽²⁰⁾
4. Multiple phase projects – one quantitative, one qualitative, one mixed, and so forth – are conducted over time with links in place with each other so that one phase builds on to another with the common overall objective of designing and testing a health prevention program. For example, in a study to evaluate a program on smoking prevention, multiple projects (one quantitative, one qualitative, and one mixed method) can be taken up over time with links in place, so that one phase of the study builds on another to meet the overall objective. Such studies are mostly participatory action research where capacity had been built in communities through collaborative approaches. In one such study, researchers captured complexity of social change to intervene for environmental changes. They developed community evaluation strategies that could provide how environmental interventions affect health.⁽²¹⁾

Sampling Schemes and Sample Size

Determining sampling schemes and sample size are important steps in any scientific enquiry. In mixed method approach, the decision for choosing sampling design depends upon the research question. Nearly 24 sampling methods are available for carrying out mixed method research.⁽²²⁾ Six of these fall under the category of probabilistic scheme and other 18 are under the nonprobability scheme. Point to remember here is that nonprobability sampling is being extensively used in qualitative research; whereas, probability sampling is the forte of quantitative research.

There are 35 sampling schemes that depend upon the mixed method research designs such as concurrent, sequential, etc. But literature on mixed method research approach advocates for following accentuated steps to decide the sampling scheme. The first step is to decide the goal of research, followed up by determining research objectives, research purpose, research question, research design, and then at the end of the ladder is the sampling scheme.

The size of the sample varies with the research questions and research design. For quantitative research statistical methods are used to calculate sample size, that is, number of units which can represent the population, by considering the variability in the estimate of interest, the probability of rejecting the null hypothesis when it should not be rejected. In qualitative research, sample size is based on the 'saturation' of information. For example, while conducting in-depth interviews or FGDs, one stops conducting more interviews or FGDs at a point when new information is no more emerging, that is, 'saturation' has been achieved. For mixed method research, sample size is decided as the minimum sample size required both for quantitative and qualitative research.⁽²²⁾ A review paper has recently provided guidelines on sampling for mixed method research.⁽²³⁾

Based on the four mixed method designs, a provisional typology of mixed method sampling has been named as basic, sequential, concurrent, multilevel, and multiple Sampling. In the basic sampling, researcher divides the groups into strata (e. g., above average, average, below average, etc.) and then selects few cases for in-depth understanding within each strata based on purposive sampling. In the sequential sampling method, i. e., quantitative can lead to the sampling of qualitative or qualitative can lead to the sampling for quantitative. The research question leads to the design of sequential mixed method and then one method leads to the other. The literature on mixed method studies in health have good number of examples where this sampling technique has been used.⁽²⁴⁾ Although there are less examples of

concurrent sampling technique wherein both the samples (qualitative and quantitative) are decided independent of each other to meet the requirement of the research. This sampling method has also provided good results. Similarly, in multilevel sampling, one may use district purposively, but for selection of health institutions like subcenters, probability sampling can be used.⁽²⁵⁾

Approach to Analysis and Synthesis

In the physical sciences, researchers propose a null hypothesis based on a theoretical framework or model, then proceed on to gather quantitative data, and using statistical methods based on probability theory the hypotheses is rejected or accepted. In this process deductive logic is followed, researcher begins with some statements, called 'premises', that are assumed to be true (at least on face value or for exploration), then determines what else would have to be true if the premises are true. For example, in mathematics one can begin with some axioms and then determine what can be proved to be 'true' given those axioms. Deduction can provide absolute proof, given that premises are correct (these may not be correct, especially in social sciences). On the other hand; qualitative research approach, which is based on grounded theory, operates almost in a reverse fashion; rather than starting with a hypothesis, it begins by data collection in the form of text (narrative) using in-depth interviews, FGD, observations, etc. The data analysis steps include extraction of key points from the text or the narrative which are marked as codes. The codes are then summarized into similar *concepts* in order to make the extensive text data more comprehensible. From the concepts, categories are formed. This is how a study was analyzed, where qualitative data collection was conducted to study factors affecting the implementation of a randomized controlled trial parallel to the trial's quantitative assessment of the effectiveness of a transitional discharge model for people with a serious mental illness.⁽²⁶⁾ Nowadays, several computer programs are available for the analysis of qualitative data, that is, for coding, categorization, etc. Inductive logic is then used to arrive at a theory or general principles from the categories revealed by the data.

The inadequacies of deduction and induction logic are well-known. While deduction can give absolute proof, it really does not make contact with the real social world, there is no way to test the validity of the premises. Induction though is driven by data, but it also cannot provide proof of a theory in a strict sense.⁽²⁷⁾ The dialectic approach of thesis, anti-thesis and synthesis has provided a way for gradual synthesis of these two logical approaches in the mixed method research approach. Triangulation is often used to check whether different methods lead to same results when two or more

methods are used to study the same phenomenon. It acts as an alternative to traditional concepts of reliability and validity. By combining multiple observers, theories, methods, and empirical materials; researchers can hope to overcome the weakness or intrinsic biases and the problems that come from single method, single observer, and single theory studies.

Public Health Relevance

Public health has moved through the four developmental phases, namely environmental, individualistic, therapeutic, and new public health.⁽²⁸⁾ Public health is now entrenched in service delivery and it seeks explanations for health behaviors of the people and policy makers. Therefore, there is a need for understanding public health holistically while keeping the users of public health in the center.⁽¹⁰⁾ Public health researchers need to adopt interdisciplinary approaches to develop better understanding of the complex issues that confront public health today. In this situation, 'mixed method approach' can be used to explore following emerging public health issues.

Though the fact that 'disease cannot always be due to pathogens' was recognized long ago. Not only the pathogens (medical cause) but also other social factors (cause of cause or root cause or social determinants) that expose people to pathogens need to be looked into before deciding on the policy actions aimed at prevention and control of diseases and/or at the health promotion. These issues need to be reexplored using research methods that can complement each other. How to address social determinants of health – by top down Health in All Policies approach or through bottom up Peoples' Health Movement – can be explored using mixed methods.

The health systems are not only debating the alternatives like Health in All Policies to address the social determinants of health but are also exploring how to make health services more equitable.⁽²⁹⁾ Increased input of resources to increase the outputs in terms of improved service delivery has been the goal of most societies.⁽¹³⁾ But the efforts to make health service equitable do not seem to be effective as these have not led to optimal utilization of public health service, especially by those who need these most.⁽²⁸⁾ In a mixed economy where both public and private services are available, people need to choose between the public and private health services according to their felt needs. Their choices may depend not only on the affordability, accessibility, availability, and quality of healthcare services but health service utilization may also depend upon the 'perceived expectations' of the served population. However, generally provider's perspective is used in defining the concepts of availability, accessibility, and affordability; which have been used rather loosely

in the facility surveys or household surveys to identify gaps in infrastructure, equipment, human resources, services coverage, etc. And efforts have also been made to filling these gaps from providers' perspectives. These quantitative surveys have often assessed peoples' needs based on the providers' understanding of people's needs. This approach often fails to assess the felt needs of the health service users. A mix method approach can bring the users' perspective to the fore.

In the recent past, public health has witnessed a paradigm shift from only delivering the interventions to understanding the health behavior of people, especially to prioritize options on how the risk behaviors can be addressed to reduce harm.⁽³⁰⁾ Mixed method research approach may provide some directions in this regard for formulation and evaluation of health communication strategy. Putting the knowledge into practice or translational or implementation research to enhance health equity, that is, reducing health status differences between and within population groups, is another area where mixed method research can lead to formulation of policies that enhance access to effective care by provision of user-friendly public health services to those who need it most.

Conclusions

Public health deals with several complex situations from formulation of policies to delivery of interventions. Hence, a comprehensive understanding of the functioning of the society is required. Mixed method approach helps in having a more comprehensive understanding of the structure and functioning of society at large. Mixed method research intentionally integrates quantitative and qualitative methods rigorously to draw on the strengths of each other to ensure that the results of a study are more close to reality. Hence, public health researchers need to have a good understanding of the mixed method approach including its philosophical underpinnings for exploring the complex situations that confront public health today.

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