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Grand challenges of public health: How can health information systems support facing them? ☆

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KEYWORDS

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CRVS;
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Grand challenges

Abstract

Objectives: Achieving Universal Health Coverage (UHC) and establishing robust Civil Registration and Vital Statistics (CRVS) systems are two urgent priorities and grand challenges of global health, especially in Low and Middle Income Countries (LMICs). It is argued that addressing both these priorities requires strong supportive Health Information Systems (HIS), which to date have been elusive to develop.

Methods: Two case studies are presented and discussed. The first concerns an Indian state's effort to implement a UHC HIS in primary health care while the second relates to the efforts of the Tajikistan national ministry to develop a HIS for CRVS.

Results: UHC and CRVS can benefit by learning from the domain of information systems research and practice, especially relating to the design of large-scale and complex systems. From this perspective, key areas of concern in strengthening UHC and CRVS include: the role of primary health care, the role of existing systems and practices, and the fragility of technical infrastructure in LMICs.

Conclusion: Implications for policymakers can be found on three levels: anchoring HIS in primary health care, renewing what already exists, and adopting hybrid rather than fully Internet-dependent systems.

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Introduction

In this paper, from a policy perspective, we discuss two contemporary and grand challenges facing global public health, and more specifically focus on approaches to strengthen their associated health information systems. The first challenge concerns realizing the agenda of Universal Health Coverage (UHC), which mandates providing financial risk protection to all in accessing quality cost-effective health care. Its significance is emphasized by the WHO Report from “MDGs to SDGs” which states that UHC cuts across all of the health-related goals and is the linchpin of development in health and reflects the SDGs strong focus on equity and reaching the poorest, most disadvantaged people everywhere [1]. A strong health information system is fundamental to realize the UHC agenda of providing data on entire populations, their morbidities and mortalities, and monitoring of their costs of care. The second challenge concerns the strengthening of Civil Registration and Vital Statistics (CRVS) systems which represent the best source of continuous data on births and deaths. Both the UHC and CRVS data is key to measuring progress to the SDG vision of ‘leaving no-one behind’, and nearly one-third of the 120 SDG indicators require population data as denominators for population-based targets. SDG3 which sets out to “Ensure healthy lives and promote well-being for all at all ages,” emphasizes a new and key focus on non-communicable diseases and the achievement of UHC. UHC is the substantial indicator that health systems are trying to reach in the context of SDGs, while the CRVS represents a measurement system of where we are in reaching the UHC goals. Both CRVS and UHC are especially relevant to Low and Middle Income Countries (LMICs) where tackling these challenges is particularly urgent to improve health outcomes.

The aim of this paper is to illuminate, discuss and draw policy implications related to the role of health information systems in facing the grand challenges of UHC and CRVS. We are doing so based on positioning UHC and CRVS HIS as large-scale and complex information systems each having their particular information architecture problematic. In the next section, we present existing knowledge on the information architecture problematic and how researchers have identified challenges and approaches to deal with it. In the following Section 3, we present two (mini) case studies illustrating this problematic in the context of UHC in an Indian state and CRVS in Tajikistan. Based on an analysis of these cases, we build policy implications in Section 4 before we conclude in Section 5.

The information architecture problematic

We conceptualize the information challenges associated with both UHC and CRVS as the *health information architecture problematic*, representing common characteristics associated with large-scale and complex information systems (see e.g. [2,3]). Such systems present unique challenges and also approaches to deal with them, which we discuss around issues of *integration*, *installed base*, *evolution* and *politics*.

A common characteristic of large-scale and complex systems arise through the need to deal with the existence

of a multiplicity of systems which are fragmented, both technically and institutionally. These different systems each have their own deeply embedded historical legacies which make them difficult and risky [4] to change in responding to the novel requirements that both UHC and CRVS demand. Because these *installed bases* comprised of investments in technology [2], investments in user training, and institutionalized practices [5], are deeply embedded and hard to change, development strategies need to take an *evolutionary* path (see for example [6]) as changes can only be achieved in small steps [7].

Integration of fragmented health related information systems in the health care sector has been discussed extensively in the literature concerning both developed [3,7-9] and developing countries [10-12]. The very idea of integration has been challenged due to the rationalistic assumptions it inscribes, not accounting for the multiple rationalities and truths that are typically involved. In addition, both UHC and CRVS bring particular integration challenges of coordination, for example, across sectors and ministries, which are further heightened when we consider the need to link these systems as required to measure progress towards SDG3. Integration is thus not only, and often not primarily, a technical and institutional challenge, but also political in terms of the implications of the resulting functional architecture after integration [11] and the power relationships and existing asymmetries between the different institutions involved and the value they each see in ownership of data and information systems [12]. Often integration is seen primarily as a technical exercise of linking systems without adequately considering value add to the work itself and not just adding more to the work [13].

UHC and CRVS systems, like many other health information systems in LMICs are faced with challenges of poor and inadequate infrastructure, insufficient and unevenly distributed resources, and lack of sufficient capacity to deal with the complexity they entail. It has been further argued that the future trajectory of information systems tend to be indeterminate making it difficult to plan for the now while keeping choices open to link with other existing and emerging systems in the future, referred to as the challenge of change flexibility [14]. The future of UHC and CRVS systems are largely indeterminate in LMICs, being influenced by the nature of diseases, technological changes, political agendas and various others.

While there is a significant body of knowledge around the design, use and evolution of large scale and complex information systems, we argue that there are also additional and particular challenges particular to UHC and CRVS systems, which require novel approaches. We illustrate these challenges through two cases drawn from LMIC contexts of India and Tajikistan respectively.

Case studies

The information architecture problematic of UHC

The centrality of information in UHC is captured in this quote by Margaret Chan, Director-General of the World Health Organization in 2007: “Without these fundamental health data, we are working in the dark. We may also be

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