

29 Towards Equity Effectiveness in Health Interventions

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Abstract

Health interventions are a significant challenge for health systems, in terms of both feasibility and costs. Public health specialists are interested in the efficacy of interventions, as well as in learning how, in a given health and social systems context, the given efficacy of an intervention will translate into community effectiveness. This means establishing the actual cure rate of a given disease under real-life conditions. Focusing on the average effects of interventions in health may miss important differences within populations, for example between different social groups. Consequently, measuring the effectiveness of interventions and policies in terms of social equity means assessing their equity effectiveness. From 2001 to 2008, a group of researchers addressed the issue of equity effectiveness in the contexts of HIV/AIDS and the provision of drinking water in Côte d'Ivoire, environmental sanitation in Vietnam, and health and demographic surveillance of mobile pastoralists in Chad. The key result was that health equity and equity in provision of basic services such as drinking water and environmental sanitation are essential elements of development and environmental sustainability. Current studies are helping to identify determinants of inequity in health and basic services provision. Based on this knowledge, locally adequate and acceptable interventions with high leverage can be tailored and optimised through an iterative process. This is expected to improve interventions and make them contribute effectively to achieving the Millennium Development Goals for health, while supporting environmental sustainability and social justice.

Keywords: Public health; interventions; equity effectiveness; HIV/AIDS; environmental sanitation; drinking water; mobile pastoralists; Côte d'Ivoire; Chad.

29.1 Introduction

Health interventions represent a significant challenge for any health system, in terms of both public health feasibility and costs to budgets for private and public health providers in rich and poor countries. Where resources are limited, priority in public budgetary allocation tends to be given to those interventions considered the most cost-effective, that is, reducing the greatest share of burden and thus often yielding the best outcome in health and saved lives for a given amount of money.

Cost-effectiveness is commonly measured by determining the cost per averted disability-adjusted life years (DALY) (Murray 1994). Most cost-effective interventions, such as, for example, childhood vaccination under the Expanded Programme on Immunisation (EPI), or Directly Observed Treatment, Short-course (DOTS) for tuberculosis control – both programmes of the World Health Organisation – range around USD 15–25 per averted DALY. Compared to hospitalisation or surgical treatments, these interventions are extremely cost-effective. They are designed for widest possible coverage, and should allow for reaching populations equitably. Cost-effectiveness assessments provide a basis for comparing different interventions across the whole range of health-sector interventions and serve as a planning tool, particularly in connection with the Sector-Wide Approach (SWAp). Yet, this focus on average effects of interventions on health may result in important differences within populations being overlooked (Tugwell et al 2006a). Measuring the severity and extent of inequities has become more common (Tugwell et al 2006b), but the effectiveness of interventions and policies should also be assessed in terms of equity, establishing their equity effectiveness (Gwatkin 2001). Consequently, besides knowing the efficacy – for example, the cure rate of a drug as established through randomised controlled trials – public health specialists are interested in learning how, in a given health and social systems context, the given efficacy of an intervention will translate into community effectiveness – for example, the cure rate of a drug provided through the different layers of the health system (Tanner 1990; Vlassoff and Tanner 1992). Finally, it is of primary interest to know the extent to which social, ethnic, and gender strata have equal access and are equally covered by an intervention; this extent is captured in the term “equity effectiveness” of an intervention, recently introduced by Tanner (2005a, p 101). It is therefore important to understand, in both qualitative and quantitative terms, as many elements as possible of the complex pathways of health interventions in a given health and social systems context, in order to identify where and why these elements lose traction (see Table 1, as well as section 29.3 below).

Table 1

Community effectiveness	Equity effectiveness		
Tanner 1990	Tanner 2005b	Tugwell 2006a	Obrist et al 2007
Key determinants of effectiveness: health system factors			
Efficacy	Efficacy	Efficacy	Efficacy
Coverage	Access	Access	Availability
Diagnostic accuracy	Targeting accuracy	Diagnostic accuracy	Accessibility
Provider compliance	Provider compliance	Provider compliance	Affordability
User compliance	Consumer adherence	Consumer adherence	Adequacy
			Acceptability
			Diagnostic accuracy
			Provider compliance
			Consumer adherence

Conceptual development from community effectiveness towards equity effectiveness.

Health system factors as key determinants of effectiveness have been defined in increasing detail, for example – in Obrist et al (2007) – by subdividing ‘access’ into ‘availability’, ‘accessibility’, ‘affordability’, ‘adequacy’, and ‘acceptability’. This conceptual refinement provides a basis for better understanding the complex pathways of health interventions in a given health and social systems context.

Coverage of health interventions, for example for parasite control, remains very heterogeneous (Raso et al 2005), and application of health equity principles comes up against a number of institutional, managerial, and financial obstacles, which are all part of health systems (Hutton and Tanner 2004). Involving communities and peripheral health care providers is a driver to increase EPI coverage (Semali et al 2005) and tuberculosis control (Lwilla et al 2003), and investments in district health systems have a direct impact on increasing coverage of interventions in general (Tanner 2005b). Significant increases in coverage have been achieved by numerous global initiatives such as the Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) in the last decade (Tanner and de Savigny 2008). Huge disparities of coverage remain, however, and point out the importance of investing in underprivileged regions (Stoeckle et al 2006) and of addressing social determinants of health (Valero-Bernal and Tanner 2008). Moreover, coverage addresses essentially the perspective of health care providers, while major barriers to accessing health care remain on the side of health care users (Obrist et al 2007). In-depth analyses of social drivers of health inequity, such as exclusion of communities owing to inadequate planning, are an important contribution to understanding equity effectiveness of health inter-

ventions and to cracking down on inequitable policies (Birch 2009). However, health equity also depends on deep-seated power issues, economic and ideological constructs, cultural traditions, and values, which are beyond the direct reach of health planners (Tugwell et al 2006b). Equity effectiveness is an issue in addressing social and gender differentials in the provision of health and social services. Inequity in both health and access to basic services, such as drinking water and environmental sanitation, is determined by weak institutions and policies, governance failures, insufficient empowerment and decentralisation, unequal distribution of power and resources, and corruption, which are all core problems of development (Messerli and Wiesmann 2004). A review of the literature points to a broad range of individual determinants of equity effectiveness, but so far we lack more comprehensive assessments that address the whole sequence of determinants as outlined in Table 1 and in section 29.3 below.

29.2 NCCR North-South focus on equity effectiveness

Within the Swiss National Centre of Competence in Research (NCCR) North-South programme, Work Package 3 comprehensively addressed the determinants of equity effectiveness. Several case studies were conducted, along with investigations on vulnerability and resilience.¹¹ In the present article, we summarise and analyse the findings from this work and give a theoretical and methodological outlook on equity effectiveness assessment, which is also partly based on the interrelated studies and syntheses on vulnerability and resilience (Obrist et al 2007). As outlined in the introduction, addressing equity effectiveness requires a simultaneous understanding of socio-economic and cultural as well as biological and environmental determinants of health and well-being to gain insights into how interventions risk losing traction when implemented in different settings and conditions. Consequently, case studies were set up in different rural and urban contexts. The aim was to identify the populations most vulnerable to environmental and major health threats and to understand their resilience patterns as a basis for devising and scaling up effective and adapted control strategies. The following examples cover a broad range of topics and geographical areas and indicate that the methodological framework is not setting-dependent.

29.2.1 Southeast Asia: health, environmental sanitation, and social systems

Recycling of human and animal excrements in agriculture is widespread but linked to health risks for farmers and consumers. Reaching the goal of optimal natural resource recycling while minimising associated health risks requires a comprehensive understanding of linkages between health and environmental sanitation. A conceptual framework was developed using an approach combining health, ecological, social, economic, and cultural assessments to identify the most efficient and equity-effective interventions for reducing the disease burden (Nguyen Viet et al 2009). The framework consists of an integrated and interconnected research method with three main components: 1) assessment of the health status, 2) assessment of the physical environment based on an analysis of material flows, and 3) analysis of the socio-economic and cultural environment. The main objective is to define the extended health, ecological, and social risks along critical control points (CCPs) in the network of material flows, established by means of a material flow analysis (MFA). One way of identifying CCPs is by means of a quantitative microbial risk assessment (QMRA), a method that describes, for example, exposure to wastewater or contaminated food in relation to biomedical, epidemiological, ecological, socio-economic, and cultural factors. Sociocultural aspects, such as actors' perceptions of risk or the identification of particular risk groups, are essential for the development of successful interventions. The proposed concept complements the conventional CCP approach by including an actor perspective, considering actors' vulnerability to risk and patterns of resilience. Interventions deriving from such comprehensive analysis take account of biomedical, ecological, engineering, and social science perspectives. Thus, the proposed framework allows issues of health and of environmental sanitation as well as recovery and reuse of natural resources to be jointly addressed. Interventions are assessed with regard to their potential to reduce or eliminate specific risk factors, to reduce vulnerability, enhance health status or resilience, and assure equity. The framework is designed for application in a context of urban and peri-urban settings in developing countries, focusing on waste, such as excreta, wastewater, and solid waste, their influence on food quality, and their related pathogens, nutrients, and chemical pollutants.

Following up on this work, several studies were launched with the aim of testing and validating the conceptual framework developed. Main routes of domestic waste flows and transmission of pathogens in peri-urban agri-



Fig. 1
House with fish-
pond at the site of
a case study in
northern Vietnam.
(Photo by Hung
Nguyen Viet)

culture in Pathumthani Province, Thailand, were identified for different scenarios (Surinkul and Koottatep 2009). Risk assessment focused on different groups of people, such as farmers working in the fields, highly exposed to wastewater. It showed that the proposed intervention scenarios could significantly reduce health risks and improve the environment. High health risks for consumers of vegetables irrigated with wastewater were investigated using QMRA, in the course of which two key protozoa causing diarrhoea – *Entamoeba histolytica* and *Giardia lamblia* – were recorded (Ferrer 2009). Other studies assessed the infection risk of faecal sludge and organic solid waste management in the same area and concluded that estimated mean values of yearly infection risks from accidental ingestion of canal water in various scenarios, such as handling organic food and market waste, were higher than acceptable risk levels as defined by the World Health Organisation (Yajima 2005). Epidemiological studies show that 47% of a community in northern Vietnam were infected with helminth and 6% with *Entamoeba*, and these infections were strongly correlated with use of excreta and wastewater for agriculture, as well as with poor sanitation (Figure 1). Understanding the flows of materials and the associated health risks and pathogens forms the basis for interventions geared towards the particular group at risk. In another study, MFA was used to analyse environmental sanitation and agricultural

systems, with an emphasis on the flow of nutrients such as nitrogen (N) and phosphorus (P). Primary results show that on-site sanitation and crop production discharge the largest flows of N and P into water bodies through drainage systems (CCPs). Thus, there is a need for mitigating the environmental impact while making good use of waste materials, for instance as fertilisers (Do Thu Nga 2009). One study is now examining the perception of health risks and people's ability to minimise risk caused by wastewater and excreta reuse. A first survey, focusing on threat appraisal, revealed that people recognise the discolouration and bad smell of wastewater, the bad smell of excreta, inappropriate practices of excreta management, and suspected diseases from contact with excreta and wastewater as threats. Ongoing studies assess the sociocultural aspects, which will be crucial for identifying acceptable and affordable intervention strategies, while maintaining recycling of natural resources. Following up the health status of the communities concerned during locally adapted interventions will make it possible to measure the effectiveness of these interventions, so that they can be optimised in an iterative process known as the equity effectiveness loop (Tugwell et al 2006a).

29.2.2 West and Central Africa: water supply, access to HIV/AIDS treatment, and health of nomadic pastoralists

In Côte d'Ivoire, studies focused on the provision of safe drinking water as an example of municipal services and – at a different scale of governance – on health services provision in the context of HIV/AIDS, which is organised by the central health authorities. While the two studies deal with different scales on the provider side, actor-dependent determinants of equity effectiveness are likely to be similar.

Multi-scale studies of equity effectiveness in water supply and sanitation are being carried out in poor urban areas of Abidjan and Bouaké (Figure 2). Taking a transdisciplinary approach, actual disparities of access to water and sanitation are viewed through five complementary lenses: socio-economic, socio-anthropological, cartography and GIS, laboratory analyses, and multi-criteria analyses to assist decision-making. Field work in Côte d'Ivoire has been severely affected by the military and political unrest since September 2002. First results show that the institutional framework of water management, hydrogeological conditions, and technical aspects influence equity effectiveness in ensuring access to water supply. A detailed analysis of the other determinants is ongoing and will result in an assessment of how the government, public and private



Fig. 2
Water sale in
Bouaké, Côte
d'Ivoire. (Photo by
Bétio Silué)

bodies, and communities can join efforts to provide sufficient safe water and improved sanitation to all inhabitants and particularly to those most in need.

Côte d'Ivoire is the country most affected by HIV/AIDS in West Africa, with a prevalence rate of 4.7% among the general adult population. The epidemic has tended to regress since the advent of antiretroviral therapy. However, access to health care in general and to antiretroviral drugs in particular is one of the greatest challenges for the international community and developing countries. Accessibility of health care to people living with HIV/AIDS in Côte d'Ivoire is considered a central issue for achieving equity in antiretroviral therapy coverage and has become the central research question in one of the NCCR North-South case studies. Access to care as part of the livelihoods framework provides the conceptual basis for connecting access to its social determinants (Obrist et al 2007; Figure 3). Quantitative and qualitative approaches were combined to assess equity effectiveness in health care provision and treatment of HIV/AIDS in Abidjan and Bouaké. Preliminary results of the study show that inequalities in access are linked to lack of care and the poor drug distribution network of existing centres. In addition, patients lack financial means to cope with concomitant infections and to maintain an appropriate nutritional status. The government's institutional commitment is weak. In such a context, support for people living with HIV/AIDS requires coordinating actions among actors in the public care sector and the community.

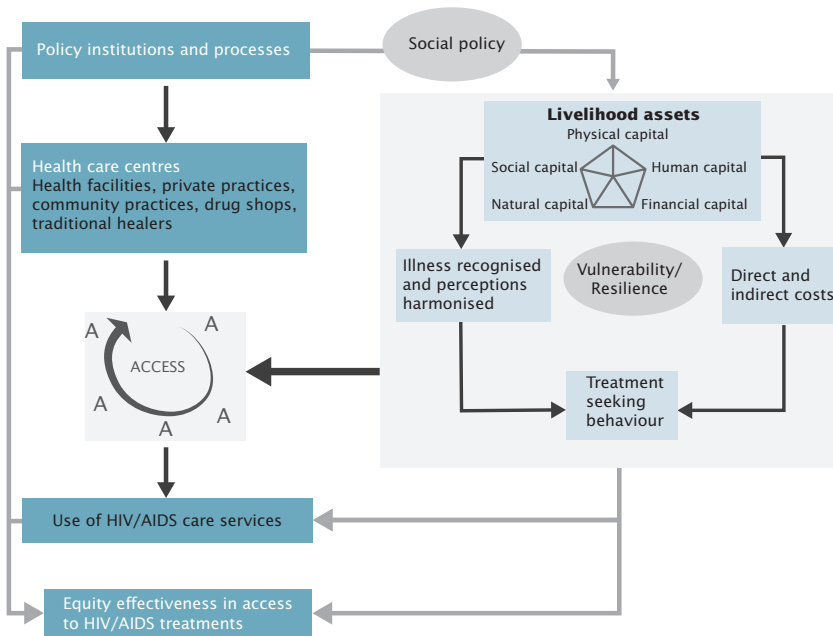


Fig. 3
Conceptual framework for equity effectiveness in access to HIV/AIDS treatment.

Source:
Adapted from
Obrist et al (2007).

Nomadic pastoralists in Chad represent a particular case of inequity of access to and provision of health services. Among different nomadic pastoralist groups, for example, we did not find a single child that had full vaccination coverage as recommended by the World Health Organisation’s Expanded Programme of Immunisation (EPI) – against a national average of only 35% of children that are properly vaccinated. In contrast, a high proportion of cattle were vaccinated against anthrax or contagious bovine pleuro-pneumonia (Béchir et al 2004). Subsequent joint vaccination by mixed teams of veterinary and public health personnel is an example of closer, effective cooperation between animal and human health care providers in an approach known as ‘one health’, and provided nomadic children and women, who had not been included in the national EPI policy, with access to vaccination (Schelling et al 2005; Schelling et al 2007; Figure 4). Participatory stakeholder processes involving nomadic communities, local and central authorities, and scientists yielded a new policy for nomadic communities (Schelling et al 2008). This represents significant progress towards understanding and promoting equity in preventive health services in Chad. A major research question in this study was how to assess vaccination coverage and impact on health status under conditions of mobile livestock production systems,



Fig. 4
Nomadic pastoral-
ist children receiv-
ing their first vac-
cinations. (Photo
by Jakob Zinsstag)

as a parameter of equity effectiveness. For this purpose, new methods to estimate human population size and to repeatedly identify the same person were developed and tested. Under very difficult security conditions, a proof of principle regarding mobile demographic surveillance could be established using electronic fingerprint technology with capture–mark–recapture methods (Weibel et al 2008). Mark–recapture techniques, however, did not allow for collecting sufficient repeated identifications of persons within a reasonable time frame; the approach will, therefore, be further refined by using social network information to rapidly identify previously registered members of the community. The ultimate aim of this research is to establish vaccination coverage and health status among nomadic pastoralists by means of demographic surveillance, which will make it possible 1) to compare equity in health care provision to mobile and sedentary populations and 2) to subsequently adapt primary health care provision to reduce inequities within the national population. The results are encouraging and provide a basis for working out differentials in equity for the benefit of excluded and neglected urban and rural populations. They also comprise tools to develop demographic surveillance of populations that are not yet covered. Future demographic surveillance of mobile populations and their animals will form the basis for social planning and more careful use of natural resources.

29.3 Synopsis and outlook

The different case studies presented illustrate why a simultaneous understanding of social, economic and cultural, as well as biological and environmental determinants of health and well-being is required when addressing equity effectiveness of health interventions and social services provision. Frequently there are no appropriate methods for such assessments, in particular when crossing disciplinary boundaries (see also Zinsstag et al 2011 in this volume). Therefore, investigating equity effectiveness has also led to the development of novel methods in integrated environmental sanitation, access research, and demographic surveillance of mobile populations by combining technical and social approaches. More work is under way to validate these new methods and to identify equity-sensitive population groups as well as their vulnerability, access to care, and specific risks. The equity effectiveness chain as originally proposed by Tanner (1990) and Vlassoff and Tanner (1992) and later expanded into the equity effectiveness loop by Tugwell and colleagues (2006a) provides a useful and open – in that it allows for specific extensions – framework for ongoing case studies assessing community and equity effectiveness in qualitative and quantitative terms.

Achieving equity effectiveness requires competence and action at the national, intermediate, and household levels. As shown in the example of childhood vaccination for nomadic pastoralists, interventions must be adapted to the particular way of life of population groups affected by inequitable health care provision. In this case, childhood vaccination was adapted to become part of joint human and animal vaccination campaigns in order to increase coverage among this population group. The underlying planning process requires that the authorities first perceive existing inequity as a problem and then consequently adapt the national policy; in this example, this led to intersectoral collaboration between the human and the animal health sectors at the political, managerial, and operational levels. As foreseen in the original concepts by Tanner (1990) and Tugwell and colleagues (2006a), the framework can be extended. In the context of childhood vaccination, this resulted in extra steps being added between ‘efficacy’ and ‘diagnostic accuracy’, by subdividing ‘access’ into ‘availability’, ‘accessibility’, ‘affordability’, ‘adequacy’, and ‘acceptability’ (see also Obrist et al 2007 and Figure 5). These components involve actors across all institutional strata, from the central government to individual households, also incorporating the concept of social resilience as adapted by Obrist and colleagues (2010; 2011, in this volume).

How interventions lose traction ...

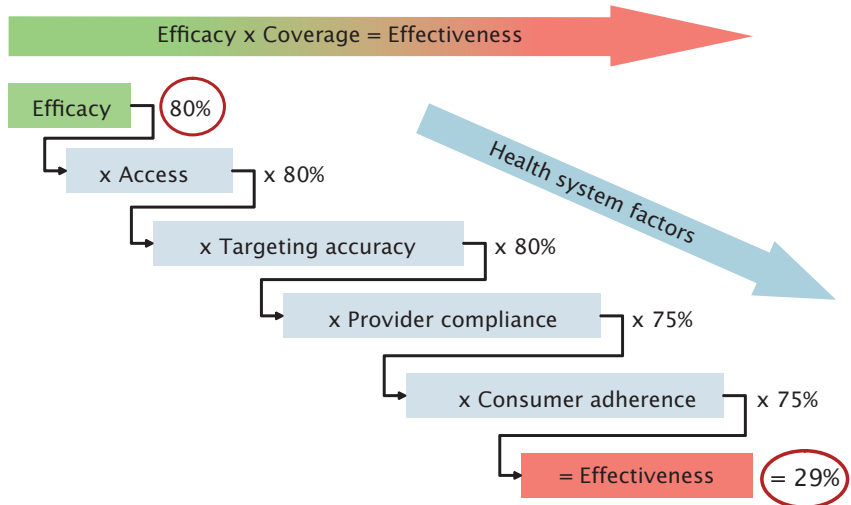


Fig. 5 From efficacy to effectiveness, or how interventions lose traction: a quantitative example based on the concepts listed in Table 1. Despite a relatively high performance of individual factors determining coverage of an intervention, their multiplicative effect results in low final effectiveness: efficacy drops from an initial 80% to 29% at the community level.

The important social issue of equity cannot be addressed without linking research and policy very closely. It also requires a consensus between social groups as well as between decision-makers and communities on how equity-effective interventions can be adapted to more vulnerable groups. As a form of social monitoring of the performance of a health system (Tugwell et al 2006b), a participatory stakeholder platform for communities, decision-makers, and scientists should be maintained to identify commonly accepted assessment agendas and harmonise perceptions between actor groups (Schelling et al 2008). In this respect, the NCCR North-South’s integrated approach has not yet fully exploited its synergistic potential with regard to equity effectiveness, especially in the interaction with governance and conflict transformation. Finally, the case studies all imply a coherent systems approach to health (Leischow et al 2008), and the combined framework of environmental sanitation and health largely matches the features of social-ecological systems (Ostrom 2007).

Equity effectiveness as a measure of social performance complements economic performance measures of cost-effectiveness on the way to achieving universal coverage of primary health care as claimed more than thirty years ago at the 1978 International Conference on Primary Health Care in Alma Ata. Huge equity differentials remain and are even growing between devel-

oped and developing countries, but also within individual countries (Esse et al 2008; Hetzel et al 2008). Research on equity effectiveness has an essential role to play. Working out equity differentials in health care provision and access to care remains a task of primary importance and is key to meaningful setting of priorities and allocation of resources at times of budgetary constraints in health and social planning. This, in turn, will lead to a systemic planning approach that considers where and how interventions will have the biggest impact in reducing poverty. An example of visualising equity concerns in health and social systems has been developed within the NCCR North-South and led to advocacy for equity-effective planning approaches in Southeast Asia and Africa (Epprecht and Heinemann 2004).

While our current synthesis focuses on equity effectiveness in health and environmental measures, it will be necessary to extend the concept to cover the entire social systems context, making it possible to achieve sustainable community development in different settings. Social effectiveness criteria are politically sensitive and can only be defined within a broad transdisciplinary partnership between communities and authorities governed by mutual trust and security. Global alliances and initiatives, as mentioned above, are part of achieving high levels of equity in services provision. At national and sub-national levels, however, equity can only be substantially increased once the relevant investments are made to strengthen health and social systems (Tanner and de Savigny 2008). Long-standing partnerships in research and development between the global North and South are part of such investments and require further strengthening. Addressing equity effectiveness ultimately not only challenges governments and health systems but also the research community. Health equity is clearly part of sustainable development and hence directly linked to environmental sustainability and social justice – key issues which will determine whether the Millennium Development Goals are achieved (Shankar and Kumar 2009).

Endnotes

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