EPIDEMIOLOGY AND HEALTH POLICY—A WORLD OF DIFFERENCE?

A CASE-STUDY OF A CHOLERA OUTBREAK IN KAPUTA DISTRICT, ZAMBIA

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Abstract—The relationship between epidemiology and health policy is an area of considerable debate. This article demonstrates the use of epidemiological methods to make health policy formulation more ‘policy significant’ and ‘down to earth’. A case-study of a cholera outbreak in Kaputa district, Zambia is used as an illustration. A closer liaison between epidemiology and social sciences is advocated. Epidemiological data should be supplied as feedback to the study population to facilitate community-based action for health. Copyright © 1996 Elsevier Science Ltd

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INTRODUCTION

The relationship between epidemiology and health policy is an area of considerable debate. Although it might seem that epidemiological findings are a straightforward, rational and ‘scientific’ basis for health policy formulation, in reality this relationship does not turn out to be so linear or one-directional [1]. Defining the (deficiencies in the) relationship between epidemiology and health policy can contribute to achieving a more effective, efficient and equity-oriented approach to public health. In this study the 1991 cholera outbreak in the Kaputa district of Zambia is reviewed as an example to demonstrate the role epidemiology can play in ‘validating’ arguments used in policy formulation. It concentrates on how different actors in the policy arena ‘viewed’ the high case fatality rate (CFR) and discusses obstacles in the process of policy formulation and implementation.

It argues that contextual factors tend to create a world of difference between the descriptive epidemiology and prescriptive health policy. To narrow this gap and in order to prevent health policy formulation becoming rhetoric, epidemiological analysis should carefully consider factors affecting success, thus becoming more ‘policy significant’.

Epidemiological data should not only be forwarded to health authorities but also be translated and supplied as feed-back to the studied population in order to facilitate community-based action for health.

BACKGROUND

It is beyond the scope of this article to elaborate on cholera in detail and only the aspects of importance to the topic are highlighted here.

Cholera hit the world seriously in 1991. The pandemic, caused by the *Vibrio cholerae* El Tor strain reached nearly 100 countries and extended for the first time to Latin-America [2]. As with most infectious diseases, the disease pattern is determined by the dynamics between the character of the micro-organism, the conditions under which it spreads, and the responses of the host. Recent scientific advances add to the previous water-borne germ theory and faecal–oral transmission of cholera demonstrated in 1855 by John Snow, the understanding of these dynamics between host and environment: the importance of infectious dose in virulence of the disease is now recognized, as is the potential of Vibrios to survive for long periods in suitable available micro-ecology, colonizing aquatic eco-systems and thus provoking seasonal reoccurrence [3]. Fluids, especially brackish water, but also food, are suitable carriers for disease transmission [4]. The appearance of cholera is related to poor hygiene conditions and is favoured by poverty, overcrowding, bad sanitation and sewage contamination [5]. Seventy per cent of all cholera cases are asymptomatic and 20% are indistinguishable from mild diarrhoea [6].

Intervention focusses on proper case management and preventative measures. With adequate case management, CFR should not exceed 1%, even in rural settings [7].
El Tor: the 30 year pandemic

Current outbreak of cholera is continuation of 7th pandemic which began in 1961

SITUATIONAL ANALYSIS

Kaputa district is one of the poorest districts of Zambia, situated in the northern Province, sharing an international boundary with Zaire. Its population of 52,246 people live mainly along the shores of Lake Tanganyika and Lake Mweru. The main occupations are fishing, subsistence farming, and salt-mining on a small scale. The district is very remote with only gravel roads and a surface of 13,004 sq km. There are seven health centres but no hospital. The District Medical Officer (DMO) for the neighbouring Mporokoso District supervises the health services for Kaputa.

The 1991 cholera epidemic

In the last 10 yr Kaputa has suffered outbreaks of cholera during the periods between November and February, which were mostly concentrated around the fishing camps and Nsumbu village on the shore of Lake Tanganyika. This time trend was associated with the rainy season and with the opening of the fishing camps. The fishing season gives rise to accelerated migration, increased mobility (traders) and cross-border activities with neighbouring Zaire and Tanzania, where cholera was said to be endemic. Up to 1991 the number of cases had mostly been limited, even in the 'large' 1982/1983 outbreak when

Fig. 1. Epidemiological profile of the cholera epidemic.
cholera spread to other areas of the district. The 1991 epidemic in Kaputa, however, exceeded by more than five-fold the number of cases in previous outbreaks and the CFR also rose to an unprecedented level of 11%. The epidemic spread over the entire district, mostly affecting the villages around lake Tanganyika and Lake Mweru. The index case came from one of the (temporary) fishing camps where extreme unsanitary conditions prevailed. A total of 573 cases and 63 deaths were recorded during the period November 1990–April 1991. The epidemiological profile of the epidemic is shown in Fig. 1.

The extent of the epidemic and the unacceptably high CFR were major reasons for concern.

Control and constraints

During the epidemic 11 cholera treatment centres were established. Due to poor communications considerable time was lost before outbreaks were reported to the DMO’s office. No telephone lines were available and public transport is limited. The health services were hampered as a result of the non-availability of fuel for regular programmes and supervision. Supply of essential resources (i.v. fluids) and additional staff by provincial and national authorities took several days and even during the epidemic, supplies were erratic.

Some patients experienced prolonged vomiting, a few needed more than 301 of i.v. fluids. One patient consumed 601 in 2 days, before oral intake could maintain rehydration. Sometimes only 1001 of i.v. fluids were dispatched.

The overall decline in living conditions and the deterioration of sanitation created a susceptible environment. Most people rely on shallow unprotected waterwells and pit-latrine coverage is low. For many years there has been a proposal to improve the water supply to the harbour village of Nsumbu, where it is unreliable.

One of the affected villages decided to embark on a programme to prevent a similar disaster occurring in the future. Kampinda is situated on Lake Mweru and was severely hit by cholera with many deaths occurring in the village (CFR >11%) despite the existence of a health centre. Pit-latrine coverage was below 5% and the water supply was poor. Several community meetings on the issue of sanitation and water were held and a health committee was set up. Two weeks later 80% of the 243 households were digging pit-latrines. A request from the community for cement to be used as re-inforcement to prevent their temporary pit-latrines from breaking down was met by the donation of funds. The community remained responsible for cement distribution and monitoring the project. As the Department of Water Affairs paid little attention to the village, the villagers decided to ‘do it themselves’, and constructed their own protected well with cement from the project. One villager was made responsible for chlorinating the well.

Evaluation and recommendations

Differences existed at varying levels in the perception of the problems and in the recommendations made. Reasons mentioned by the DMO concentrated on poor logistics (e.g. communication/cooperation/supply) and deteriorating living standards and environmental conditions in the district. His recommendations focussed on (a) environmental control programmes, in conjunction with communities where village organization and community participation have been demonstrated; (b) accelerated health campaigns, targeted at the high-risk population of fishing camps and supported by legislation; (c) a programme of preparation in case of cholera epidemics, in health centres and communities [8].

At the central level bad case management was identified as the problem leading to a high CFR and UNICEF initiated a diarrhoea management training programme for staff.

At local level claims concerning the high mortality rate ranged from lack of drugs and health services and poor water supply, to traditional beliefs ('Pungi') and witchcraft.

THE ROLE OF EPIDEMIOLOGY: ASSESSING THE VALIDITY OFArguments USED

The overall CFR for the Kaputa district was 11%, at times rising in certain centres to as high as 20%. Other African countries experienced problems with a high CFR. In Tanzania, mortality rates of over 10% have been documented [9]. However CFR in the Latin-American virgin population was less than 1% and CFR in Peru was 0.4% [10]. A repeatedly used argument, referring to the case of Peru, was the poor performance of health workers:

high CFR reflects poor case management.

How valid is this argument? The CFR is in fact a ratio, describing fatalities among the total number of
cases. Comparing CFR from Africa with Latin America has several pitfalls:

**Case Definition**

Different methods of defining cases have been adopted. In Peru 'a case' was defined as every incidence of diarrhoea occurring in the defined period. This 'suspect-case' definition might give rise to over- incidence of diarrhoea occurring in the defined period. In the Kaputa district of Zambia, only cases that were admitted or treated in the cholera treatment centres were counted. This certainly reflected gross under-registration, relating only to severe cases and representing just the tip of the iceberg.

Deaths occurring in the communities before treatment centres were established were not counted, contributing to the charges of poor management. However, if we plot actual fatalities and reported cases (Fig. 2), there is a considerable time-interval between the peak of both curves. This is compatible with information from the field that most deaths occurred in the first weeks, when centres often lacked i.v. fluids. Stabilizing severely ill cholera patients orally, in the absence of anti-emetics and nasogastric tubes, is extremely difficult, if not impossible. The early peak of CFR suggests other factors to be considered (e.g. logistics) rather than poor case management by staff (in which case we expect most victims to die in the period when most cases occur).

In fact cholera case definition is under discussion by the fact that 50% of patients had already started rehydration practices are common in Peru, as shown by the beginning of an epidemic [6].

**Contextual Factors**

Different geographical, socio-economic, biological and cultural factors make comparison of CFR between Peru and Zambia unrealistic. The dispersion of population in Kaputa (4.2 per sq km) alone will account for a lower attack rate (0.01%) compared with Peru (2.6%). Different approaches to maintaining good health will affect the outcome: e.g. oral rehydration practices are common in Peru, as shown by the fact that 50% of patients had already started ORS at home [10].

HIV infection is a major public health problem in Zambia, even in a remote and rural area like the Kaputa district. It is not yet clear whether virulence of cholera is different in HIV-infected areas. Issues such as an increased vulnerability to cholera in immunocompromised persons and/or different natural history/infectivity are points for study. In fact mucosal humoral responsiveness seems to be maintained in HIV-infected individuals despite concomitant system humoral hyporesponsiveness, at least in pilot investigations describing the reactions to cholera vaccination [11, 12].

In the fishing camps the poor living conditions, trade and frequent migration, seasonal labour, disrupted family life, social and sexual networking (more casual sex and sex for money) all create common risk factors and may confound any possible interaction between HIV and cholera. It is in this 'poverty-complex' that socio-economic and biophysical factors create opportunities for HIV, *Vibrio* and the *Tubercul* bacillus to meet and interact. Reflecting on the effectiveness of clinical case management we should take into consideration McKeown's argument [13] that the decline in mortality from cholera and diarrhoea (at the end of the 19th and beginning of the 20th century in the U.K.) was not attributable to medical treatment:

... It is unlikely that treatment had any appreciable effect on the outcome of the disease before the use of intravenous therapy in the 1930s§ by which time 95% of the improvement had occurred: For the main explanation of the fall of mortality we must look to the hygienic measures which reduced exposure.

**OBSTACLES AND INFLUENCES IN CHOLERA POLICY**

The 'strategy for control and prevention of cholera in Africa' [14] acknowledges that 'the cholera situation is extremely serious and worsening, and that much of sub-Saharan Africa is undergoing a health crisis of unprecedented magnitude'.

Socio-economic deterioration in Kaputa is reflected by the rise in poverty-related disease. Malnutrition rates are on the increase in Zambia [15] (Fig. 3) and in Kaputa scabies levels as high as 40% have become a notable reason for consultation [16].

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*Among non-exposed controls in the Peru study 30% of stool/blood specimen revealed asymptomatic cholera infection! [10]
†During the epidemic OPD attendances at some health centres doubled (extra staff), a considerable number of these cases being categorized under gastro-intestinal and diarrhoeal diseases.
†A small orientative study in Nsumbu of STD clients visiting a mobile clinic revealed half to be HIV positive [8].
§(Personal note: and before the introduction of sulfonamides (1935) and penicillin).
Evidence also suggests that a decline in the infant mortality rate has reversed in several African countries [17]. Zambia’s GNP declined rapidly during the 1980s, as did the price for copper, Zambia’s main export.*

Although problems such as falling commodity prices, the burden of mounting debt and reversed capital flow from north to south [18] go beyond the African continent, this situation certainly puts limitations on effective radical preventive measures. However, at the same time it establishes the importance of efficiency when using the meagre resources: “economic realism must now be the order of the day” [19]. What is it that hampers a more effective, efficient and equity-minded policy?

Health education: upstream or down stream?

Health education (HE) has been an annual exercise in Nsumbu but with disappointing results. It raises the question as to how realistic are approaches aimed at a voluntary change of behaviour, and whether or not “blind support for ineffective interventions” [20] should cease if they are not shown to be cost-effective [21]. HE instructions such as ‘boil water, wash hands’ do not take into account the fact that firewood is hard to come by, the price of charcoal has risen considerably, soap is not readily available and infection can occur anyhow. Without denying the role of HE, it soon degenerates to ‘victim-blaming’ if no realistic alternatives are available; it tends to explain social problems in medical terms [22] and induces ‘somatic fixation’ not only in patients [23], but also in their managers. Some authors even go as far as referring to ‘the tyranny of health promotion’ [24].

Vested and competing interests

Meanwhile it is particularly unfortunate that the provision of a safe water supply to Nsumbu, an easy and relatively cheap intervention (using a high quality water spring above village level) did not materialize. Most cholera funds were used up on paying allowances to officers who earned the equivalent of their annual salary by staying some weeks in the field. Flow of cholera money was rather irregular giving rise to accusations that money was diverted and the importance of cholera control decreased with increasing distance from the capital.

We could add to this list the fact that the closure of the fishing camp was postponed by the military authorities because it would not be in the interests of the president at the forthcoming elections; that local businessmen were important members on the Nsumbu cholera committee and that the population depended mainly on fishing activities.

An interesting event occurred in Luanshya, where the local government was accused in court by relatives of cholera victims of failing to collect refuse or to add chlorine to the water supply before the epidemic [25].

Expectations and value systems

We could discuss the severity of cholera rationally: it represents a marginal problem in terms of the numbers of people affected and of the numbers of deaths when compared with the preponderance of malaria or other diseases of which diarrhoea is symptomatic. However, the stigma attached to the disease creates policy priority at all levels, donors included. This leads to the paradox that, thanks to cholera, district health services are able to survive [26].† It raises the question as to how rational are the plans of action in critical situations. Reality resembles more a case of crisis-management than of “stepping up the cybernetic planning cycle” [27].

Positive outcomes

The control of diarrhoeal diseases (CDD) programme was boosted in the district. This refers not only to staff training in rehydration practices but also in control measures like disinfection, contact tracing, supervised burials, community sanitation programmes and correct surveillance. The ‘cholera preparedness programme’ was another positive outcome. However it also shows the world of difference between a sustained programme of management and the reality of coping with crises: Health centres were provided with i.v. fluids to be reserved for cholera. However staff in distant rural health centres with a non-functioning referral system encounter frequent emergencies. As they usually do not have i.v. fluids, the choice is between saving a patient or reserving the stock and being prepared for a cholera epidemic.

It was a learning experience to observe that crisis situations can have a spin-off effect on community involvement in health (CIH) and can enhance community development, as was demonstrated in the example of Kampinda village.

CONCLUSIONS AND REFLECTIONS

Epidemiological data can be used to validate arguments in policy and question effectiveness, efficiency and equity in programmes. The tendency to blame local health staff for the high CFR could be refuted. Major reasons for the high mortality rate in the Kaputa district were poor logistics (prerequisite for proper case management) and the “high risk-situation” of deteriorating living conditions [28].

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*Zambia was—and is—faced with its most devastating economic crisis on record, a statement that might be illustrated by the fact that the GNP per capita declined from $700 in the early 1980s to less than $265 per capita in 1987. Zambia’s external debt of $7.2 billion is 3.4 times the country’s 1987 GDP. This means that Zambia has one of the world’s highest levels of debt per capita ($950) in relation to its per capita GDP. Times of Zambia 16 August 1990.

†The district health services became dependent on cholera fuel because for the general health services no fuel was available throughout the year.
Comparing 'crude' CFR is not an epidemiologically sound procedure. Poor performance in terms of the number of avoidable deaths remains a fact and the effectiveness of health education is questionable. Contextual factors clearly define the limit, but also express the need for efficient use of scarce resources. Several 'external' obstacles influence decision making. Community-based health programmes can have a major impact in crisis situations.

In trying to extrapolate some of these issues to the role of epidemiology in health policy, it seems as if their interrelationship is complementary, a difficult marriage between different identities with different attitudes and powers, and with a lot of intruders from the outside world.

Although epidemiology is by now clearly defined, it seems that health policy is still struggling with its identity and the conceptualization of its construct. Health policy "for whom, by whom?" [29]. The viewpoint is of particular importance in the case of conflicting interests.

Health policy either implies or expresses a 'vision'. Although a comprehensive view is necessary, the tendency to drift towards 'utopia' or 'bureaucratism' is well known. The Alma Ata vision has become an example of a world of difference between rhetoric ('Health for all by 2000') and reality (an increase of poverty and differences in health within and between countries).

The complementary role of epidemiology relates to challenging a health policy if vision becomes an illusion. Questioning preconceived, fashionable ideas, however, presumes high-quality epidemiology and epidemiologists who are capable of using sound scientific techniques, but who also have sufficient knowledge of 'policy-significance' and 'down-to-earth' attitudes to bridge the gap between reality and policy makers.

Being aware of the interests involved, epidemiology has to consider factors affecting success. Epidemiology should develop ethics (a code of conduct) so that information obtained during the study is translated and fed back to the community under study. Dialogue with communities, especially in critical situations as shown in the Kaputa example, can enhance design-making by communities, raise community organization and promote development at a grass-roots level. The argument that "the best antidote to obstacles to the use of epidemiology for policy vested interest is an informed and aroused community" [30], remains valid.

The major challenge for health policy in developing countries lies in the ability to adopt flexible approaches, to adapt to diverse local situations and to weigh different competing needs. As sub-Saharan Africa is now in a continuously critical situation instead of promoting "standardization of methods to be applied" [31] and advocating Western-type standards of quality of care, which are mostly out of touch with daily reality, there seems a need to develop new concepts in crisis management: crisis management, in which different strategies and skills are needed. Instead of continuing the debate on comprehensive vs selective, oppressive vs liberating health care etc., there is a need to conceptualize a practical approach of 'minimum' Primary Health Care: how to realize with minimum resources maximum benefits in the particular setting. This goes beyond the universal cost–benefit analysis, but relates to the re-thinking of the conventional provider–recipient model of health care and the establishment of a kind of partnership with communities [32] that leads to sustained improvements in development and health [33].

It is clear that even with a proper marriage between epidemiology and health policy, 'real politics' will still be made in the social arena outside the scientific world. However, even the social world is subject to science, which means that health policy should not only exist hand-in-hand with epidemiology but also link with social sciences, which study factors influencing the policy process itself, the actors, powers, cultures and vested interests behind it. Perhaps this 'ménage à trois' can bridge the gap between rhetoric and reality and challenge the world of difference.

REFERENCES