HSD/GCP/November 2000
Original: English
Distr.: Restricted
Draft for discussion: Not for citation or attribution

Draft Working Paper

# Health, Global Public Goods and Externalities: Some General Issues

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***Second Draft - not for Citation or Attribution***

# Health, Global Public Goods and Externalities: Some General Issues[1]

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## Introduction

Increasing attention is being devoted in international and development policy discussions to the issue of global public goods (GPGs), led by, but by no means limited to, a major UNDP programme on the subject. At the same time, in an increasingly globalized world, health is an ever more international phenomenon, as each country's health affects and is affected by events and processes outside its own borders. This has resulted in health moving up the international agenda, and in increasing attention to the idea of global public goods (GPGs) in the health arena.

The purpose of this note is to clarify some of the conceptual and practical issues surrounding GPGs and health. It is divided into four parts:

- Part A discusses general and conceptual issues surrounding public goods and GPGs, and how they relate to health.
- Part B looks at cross-border effects of and influences on health status in the context of GPGs.
- Part C develops an approach to identifying possible candidate GPGs in the health arena.
- Part D considers the international political dimensions of GPG provision and mechanisms for financing them.

# A. Public Goods and Externalities

## A1. Private Goods, Public Goods and Externalities

The concept of public goods extends beyond the narrow colloquial definition of goods as merchandise or *physical objects which are consumed or used*. Virtually all goods, in this

[1] I am grateful to my colleagues Mark Wheeler, Matthew Hodge, Steven Olejas, Robert Beaglehole and Nick Drager for their comments on a previous draft of this paper. The contents of the present version nonetheless remain the author's sole responsibility.

narrow sense, are *private goods*; in order to consume them, one must first purchase them; and one person's consumption of them precludes their consumption by anyone else.

As used in the phrase "public goods", the word goods extends beyond this narrow concept, to a broader concept of a goods as *something which provides a benefit to people* – that is, it encompasses intangibles such as policy environments, institutional frameworks, social structures, patterns of behaviour, the physical environment, etc. as well as physical objects and commercial services.

Conventionally, pure public goods are defined as goods which have the opposite characteristics of private goods:

- **non-excludability:** the benefits of a public good, once it is provided, are available to all; and

- **non-rivalry in consumption:** consumption of a public good by one individual does not limit its consumption by others.

A classic example is the service provided by a lighthouse: it is available to all; and one person's use of it does not limit the ability of the rest of the population to use it. Virtually all public goods are services or other intangibles. Few if any goods in the narrow sense of physical objects meet these criteria.

However, **while most goods (narrowly defined) are private in nature, almost all have some *externalities* in their production and/or consumption** – positive or negative effects of an action on a third party who does not control or play an active part in that action. Cars, for example, have negative externalities both when they are used (exhaust emissions, risks to others from road traffic accidents, etc.) and when they are produced (e.g. pollution resulting from the production process).

There is an important conceptual distinction between public goods and externalities from a policy perspective. It makes no difference who benefits from an individual's consumption of a public good: all the benefits of consumption, public and private, are relevant to the decision as to whether to support its provision. In the case of private goods with externalities, however, it is only the benefits of each individual's consumption (or production) to *others* which matter. **The counterpart to the benefit provided by a public good is not the private good itself, but the externalities which it generates.**

Between private goods with externalities and public goods with private benefits are two further categories of goods:

- **Impure public goods** are *non-excludable but rivalrous in consumption*. Forests are an example: the environmental benefits of forests are not excludable; but if they are used for logging, these benefits are forgone.

- **Club goods**, conversely, are *excludable but non-rivalrous*. In effect, the benefits are spread among a subgroup of the population which can be controlled by the

providers of the good or others. Examples include cable and satellite television broadcasts, which have the characteristics of public goods for those who subscribe to them.

The above discussion is implicitly based on a simplifying assumption that each good is, in a sense, homogeneous. In practice, however, **there may be important differences in the public/private good profiles and externalities, according to the *purpose* for which the good is used, or the *circumstances* in which it used**. This can be illustrated by two particular examples:

- **Water** does not fit comfortably into any of the categories discussed above, essentially because it has two alternative uses with very different characteristics. The infrastructure to provide water has the characteristics of a public good (or at least a club good), as does communal provision of drinking-water, though not to provision to individual homes. The consumption of clean water also has important public good characteristics through its benefits to the health of the community as a whole. However, the main use of water globally is for irrigation in agriculture; and in this context, its benefits are clearly private in nature, increasing the incomes of those who use it. **In effect, the supply of drinking water is a public good in competitive consumption with a private good (water for irrigation and other uses).**

- A global ban on **DDT** would be seen by some environmentalists as a global public good, because of its impact on biodiversity and the adverse health effects of exposure to it, particularly for farm-workers and consumers when it is used as a pesticide for crops. However, it is a key input to malaria control programmes; and its non-availability would increase pesticide costs for this purpose considerably, limiting the extent of coverage affordable by both governments and households, and thus increasing the incidence of malaria. Here, **there are conflicting positive and negative externalities, which would need to be evaluated and compared** in assessing the case for and designing GPG policies.

## A2. The Relative Nature of Excludability and Rivalry in Consumption

The traditional definition of public goods implicitly treats both excludability and rivalry in consumption as absolute concepts – in effect, it assumes that each and every good is either excludable or non-excludable, and either rivalrous or non-rivalrous. In reality this is an over-simplification: **both excludability and, to a lesser extent, rivalry in consumption are matters of degree**.

**Excludability** is a relative concept in three dimensions, illustrated below with reference to television broadcasts (which are by nature a public good):

(a) Access to public goods may be **geographically specific**: conventional television broadcasts reach only an area defined by the location of transmitters, the strength of signals and topographical constraints.

(b) There may be **indirect access costs** (the cost of a television set, a satellite dish, etc.). If there are direct access costs, such as subscription fees, then the good is a club good rather than a public good.

(c) Access may be subject to **administrative control** (e.g. television licences).

It should be noted that these relative dimensions of excludability may be variable between consumers. Administrative control may be easier and/or cheaper for some individuals than others – for example, enforcement of television licensing requirements may be worthwhile in urban areas, but not in sparsely inhabited rural areas. Similarly the cost of private goods required to access public goods may differ between different locations (e.g. due to delivery costs). There may also be alternative means of gaining or providing such access which affect the cost – for example, renting rather than owning a television, or using internet cafés or computer terminals in public libraries rather than owning a computer for access to the internet.

Ultimately, some people could be excluded from the benefits of most conventionally-defined public goods: they could be prohibited from owning the means of accessing it or from living in an area where they would benefit from its provision, etc. Even in the case of personal security, selected people could in principle be denied the protection of the law. The question is to what extent this possibility arises from the nature of the good concerned. Thus those without licences may be excluded from access to television programmes; but this does not detract from the public good *nature* of broadcasting.

Where a public good is under-supplied, it may be substituted by subgroups of the population, effectively segmenting what is in principle a public good into a set of club goods. An example is the movement towards private policing: some communities have responded to the inadequacy of policing (fundamentally a public good) by establishing their own “gated” communities, with their own policing systems limited to their own members. This is a modified form of administrative control: the private police are administratively limited to protecting the members of their own community.

In addition, **the scope of excludability at any point in time is, to a great extent, technologically defined**: television broadcasts were public goods until the advent of the technology for cable transmission, encryption of satellite broadcasts and pay-per-view programming, which allow providers to make their programmes into club goods. As the use of electronic media increases and encryption technology is further developed, this can be expected to continue increasing the scope of club goods at the expense of public goods. By contrast, radio broadcasts generally continue to be provided as public goods, without technological or administrative restriction (beyond the regulation of frequencies for transmission).

As well as excludability**, rivalry in consumption is also a relative concept in some instances**:

(a) **Rivalry may be relative to capacity**, particularly in the case of infrastructure. If a sewage system has spare capacity, its use is non-rival; as the capacity constraint is approached, however, use becomes rivalrous.

(b) **Consumption of a particular good may impose costs primarily on non-users rather than users**. In the case of an over-used sewage system, for example, users are affected only if the ability of the system to carry waste away from their property is impaired. Problems arising beyond the property of an individual user affect the population as a whole rather than users as such.

(c) **Consumption of a particular good may not *prevent* others from using it, but reduce the *benefits* to them of doing so**. For example, one person's use of a road does not prevent use by others; but the use of roads becomes less beneficial as they become more congested. Similarly, the use of productive technology by one producer does not prevent its use by others, but may make it less profitable by increasing competition (particularly as compared with a monopoly situation).

## A3. Public Goods and the Problem of Collective Action

**Public goods are important from a policy perspective because of the collective action problem.** People as a whole are better off if public goods are provided than if they are not; but if provision of (or financial support for) a public good is based on voluntary decisions by individuals, they will not be provided, because no individual has an incentive to bear the costs. No matter how many or how few people are already providing (or supporting) the public good, the providers will have every incentive to *free-ride* by opting out, while non-providers have no incentive to opt in: if one more individual provides the good, he or she bears his or her full share of the cost, but receives a minimal benefit (because the benefits are shared between all the beneficiaries). Conversely, if one less individual does so, he or she will save his or her contribution, while suffering a minimal reduction in benefits. (See Box 1.)

**Box 1: The Collective Action Problem and Free Riding: an Illustration**

A group of 100 people are presented with two options. Either they can pay $100, in which case each member of the group (including the contributor) will receive $2; or they can withhold their contributions, but nonetheless receive the payments resulting from contributions made by others.

Collectively, the more people decide to contribute, the better off the group as a whole will be. For each person who contributes $100, the group as a whole receives $200. The best outcome is for everyone to contribute, so that every member of the group pays $100, but receives $200.

However, in deciding whether to contribute, each individual faces the prospect of paying $100, but receiving a benefit of only $2. This is clearly not in the interest of the individual concerned, and only the most altruistic will contribute. Even if every other member of the group is contributing, an individual is better off opting out: he or she will save $100, but lose benefits of only $2.

Thus acting individually, each person has an incentive to free-ride, by receiving the benefits of others' participation while not contributing him- or herself. However, if everyone acts individually and free rides, there are no benefits to be received. By contrast, if mechanisms were available to enable the group to decide collectively on the basis of their collective interests, and to enforce their collective decision on all the members of the group, all would contribute, and all would be better off.

The result is that the group is much worse off if decisions are made on an individual basis than if they are made by the group as a whole and enforced on all its members.

(The under-supply of public goods may also be resolved by philanthropy, without a solution to the collective action problem. However, reliance on philanthropy does not provide a dependable means of ensuring an adequate supply of all public goods, or of an appropriate prioritization of the public goods available. In the absence of an effective resolution of the collective action problem, it is therefore likely to leave at least some public goods under-supplied.)

However, **a good need not be a pure public good to suffer from a collective action problem**. This also applies to private goods which have substantial externalities. Because externalities are not taken into account by suppliers and consumers, such goods (and thus the associated externalities) will tend to be under-provided in terms of their effects on the well-being of society as a whole.

For example, an individual secures only part of the benefit from treatment of his or her tuberculosis (essentially a private good); and it is only this benefit which he or she will

take into account when considering whether to seek treatment. Where the private benefit is less than this cost (given the individual's resource constraints) he or she will not seek treatment, even though the population as a whole (including the individual sufferer) would be better off if the individual received treatment, because of the reduced risk of infecting others. However, no individual is likely to have a sufficiently strong personal interest in the provision of treatment (at least in terms of reduced risk of contracting the disease) to make a side payment to the individual to make treatment worthwhile.

From a policy perspective, however, it makes little sense to draw too categorical a distinction between this case and the pure public good case. In a sense, **an intervention which would counter a non-public good-related collective action problem, so as to correct the under- or over-supply of positive or negative externalities, widely spread among the population, can itself be considered as a public good**. For example, providing an infrastructure capable of delivering timely and effective treatment for tuberculosis, and the policies to provide an incentive for individuals to seek and complete treatment may have the characteristics of public goods, even though the treatment of an individual is essentially a private good with positive externalities.

The under-supply of public goods and positive externalities and the over-supply of negative externalities are cases of market failure, and as such are generally accepted as appropriate circumstances for state intervention. This generally takes the form of providing public goods, or creating the market conditions to secure their commercial provision; and imposing taxes equivalent in value to negative externalities and providing subsidies equivalent to positive externalities. This principle is applied to a greater or lesser extent in some cases (e.g. taxes on tobacco, alcohol and petrol; subsidies to public health services and education), but not in others (e.g. industrial pollution). In effect, **the state provides the mechanism for resolving the collective action problem at the national level**.

An important corollary of the collective action problem is that **the provision of public goods (including the correction of under-supply of positive or the over-supply of negative externalities), whether at the national or the global level, requires effective mechanisms for collective decision-making and the enforcement of collectively made decisions at the appropriate level.** The decision-making procedure may be institutionalised (cf. national governments) or more loosely structured (cf. international summits); but effectiveness is likely to depend on a combination of comprehensiveness of membership, legitimacy among members and effective monitoring and enforcement mechanisms. Many of the problems of international action to date have arisen from the weakness of decision-making and implementation mechanisms in one or more of these dimensions at the global level.

## A4. The Policy Relevance of Excludability and Rivalry in Consumption

While both non-excludability and non-rivalry in consumption are required by the strict definition of a public good, their relevance from a policy perspective is very different.

Non-rivalry means that one person's consumption of a good does not reduce anyone else's consumption of it, so that, in the absence of negative externalities, it does not reduce anyone else's welfare. This suggests **that broadening the provision and consumption of goods which are non-rivalrous in consumption** (provided they are also beneficial to consumers and do not have negative externalities) **will increase welfare and is therefore an appropriate objective of policy, whether or not they are excludable**.

In the case of goods which are **non-rivalrous** in consumption, the extent to which a good is excludable, and the means by which it can be made excludable, are relevant primarily in terms of their implications for how the objective of broadening consumption can be achieved, and how provision can be financed. Where a non-rivalrous good is excludable:

- the **promotion of "clubs" which coordinate provision among their members** is a potentially viable alternative to public provision; and

- in the case of public provision, it is possible to finance the good at least partly by **requiring consumers to meet part of the costs of provision**.

However, **it is important to consider the equity dimensions of these options**. Reliance on clubs may mean that benefits are limited to those able to finance provision for themselves – particularly if the availability of the "club" option to the better-off weakens the political constituency for public provision to those who cannot afford club membership. In the latter case, it is important to ensure that the payments required from consumers are proportional to their ability to pay.

In the case of goods which are **rivalrous** in consumption, exclusion allows the possibility of **ensuring consumption by those whose consumption has the greatest social benefits, and excluding those whose consumption is most harmful** (cf. regulation of the use of forests).

As well as formal "clubs" for private provision of non-rivalrous goods (cf. cable television), there may also be informal club-like arrangements. An example is technological knowledge, e.g. in pharmaceuticals, as mediated by patent régimes. The technology itself, once it has been developed, is non-rivalrous among consumers; but the pharmaceutical products which embody it are clearly rivalrous. In effect, the need to purchase (rivalrous) pharmaceuticals to gain access to the (non-rivalrous) technology act as an exclusion mechanism, limiting access to what is, in itself, a public good, and this turning it into a club good. The profits made from the pharmaceuticals pay for the production and provision of the technology.

Patent laws have the effect of enforcing and promoting such arrangements, by allowing the company which develops the technology to retain a monopoly right to its exploitation. This promotes the production and provision of technological public goods, by making them more profitable; but it also makes their consumption more expensive, restricting club membership. (See Box 2.)

This highlights the tension between the promotion of club good approaches and equity objectives: it represents a policy to increase the *production* of non-rivalrous goods; but the effect is to limit their *benefits* to fewer people. Those who can afford patented medical technologies are made still better off; those who cannot are made still worse off; and the production of new technologies is skewed towards the wants of those who can afford to pay for them and away from the much more urgent needs of those who cannot. **Securing a more efficient and equitable solution to the tension between the production and the provision of technological public goods than that provided by patent legislation is a key area for GPG research.**

## Box 2: Patent Laws and the Supply of Technological Knowledge

Patent laws restrict the use of knowledge to the company or individual which financed its development (or, in the case of genetic material, its discovery), or to a subsequent purchaser. This turns a fundamentally public good (by its nature non-excludable and non-rivalrous in consumption) into a private good through the use of the law to enforce monopoly power.

This seemingly perverse restriction of access to a public good, for the benefit of a single agent, reflects an important trade-off in the case of technology – that between the *production* of a public good and its *provision*. In the absence of patent protection, the financial benefits of developing a new product are much less than the welfare benefits to consumers of its existence, because they are shared with other producers. Where technology development is conducted primarily by private companies, whose motivation is essentially commercial, the result is a serious reduction in the production of new technology – that is, under-supply of a public good. In effect, the problem of the under-supply of a public good is "resolved" by making it into a pure private good, sold at a monopoly price.

This allows the patent holder to secure the maximum benefits of technological developments, thus increasing investment in research and the *number* of new products and processes which are developed. However, it means that each individual product is over-priced and under-supplied relative to the welfare-optimizing levels, given the existence of the technology. The result is that only those who can afford to pay monopoly prices have access to the technology; that the net benefit to them is reduced by the high price they pay; and that technological development is artificially skewed towards products and processes directed towards the better off.

(The public good characteristics of technology are reduced if it is considered as an input to the products which embody it, so that the producers of the these goods are the consumers of this technology. This introduces a major element of rivalry in consumption: one company's use of the technology does not prevent another company from using it, but it does greatly reduce its profitability by introducing competition. However, without patent protection, technology remains at least an impure public good; and each individual technologically based product is still under-supplied.)

## A5. Public Goods: towards a Policy-Relevant Definition

The above discussion suggests that the orthodox definition of public goods as those which are non-excludable and non-rivalrous in consumption is problematic in three respects from a policy perspective:

(a) excludability and rivalry are relative rather than absolute concepts, so that there is a large grey area between public and private goods even on a purely conceptual level;

(b) excludability is relevant to the means by which a good may be provided and financed rather than whether there is a case for intervention to ensure that it is provided; and

(c) irrespective of where the line is drawn between public and private goods, the coverage of the former will differ from that of the key reason for the relevance of the concept, namely under-provision due to collective action problems.

This suggests a need for a revised definition of public goods for policy purposes, which moves away from context-specific definitions of rivalry and (more particularly) excludability, and is more clearly linked to the policy question of collective action.

With these considerations in mind, a **modified definition** might classify as a public good (or, for purists, a good which should be treated as a public good for policy purposes):

> ***a good which it is rational, from the perspective of a society or a group of members of a society, taken as a whole, to produce for universal consumption, and for which it is irrational to exclude an individual from its consumption, irrespective of whether he or she contributes to its financing***.

This will apply where **the marginal cost of providing the good to an additional individual is no greater than the additional externalities of his or her consumption of it**, either **because the marginal cost is zero** (primarily where the good is non-rival in consumption, cf. television broadcasts), **or because there are substantial positive externalities** (cf. vaccination against infectious diseases). It will also apply in a commercial context **where the costs of excluding individuals are greater than the benefits to the supplier of doing so** (e.g. on-line access to the contents of newspapers, where the loss of potential advertising revenues from limiting access exceed the loss of newspaper sales).

This definition also gives rise to a modified form of non-rivalry in consumption: even if consumption is in principle rivalrous, it is rational for society as whole to increase production up to the point where the good ceases to qualify as a public good under the modified definition.

Two important points should be noted with respect to this definition. Firstly, it **includes some goods which are clearly not public goods in terms of the conventional definition, but which it is appropriate to treat as if they were public goods from a policy perspective**. The vaccination example is a case in point: vaccination is clearly both excludable and rivalrous in consumption, and its primary benefit (though not its only benefit) is to the individual recipient. Nonetheless, if the effects on the risk of onward transmission of infectious disease are sufficient, it is not rational either to exclude an individual from consumption or to limit production to a level at which consumption is rivalrous.

Secondly, **public goods, defined in this way, are not universal, even among those who would benefit from their provision**. In itself, non-universality is not fundamentally problematic. For example, a malaria control programme will be a public good for people who live in malarial areas; but it makes little sense to define it as such for those who live elsewhere. However, this modified definition of public goods raises a more difficult issue – that of non-universality arising from differences in *costs* rather than differences in *needs*: the lower costs of delivery to urban than to remote rural populations (and their greater propensity for the spread of infectious diseases) may mean that vaccination programmes qualify as a public good for the former but not the latter, even if the potential benefits to rural populations are greater.

This problem can be partly resolved, at least conceptually, by considering the overall coverage of vaccination as the public good, and individual vaccinations merely as *inputs* in its production. However, this still means that rural populations would be excluded.

## A5. Is Health a Public Good?

At first sight, good health may appear to be a pure public good, in that one person's enjoyment of it does not lessen anyone else's (non-rivalry) and one person's good health in some respects actually improves the health of the community as a whole, e.g. by reducing the risk of transmission of infectious disease, and through effects on the health of the next generation (non-excludability).

However, there are two critical caveats to this view. Firstly, it is implicitly based on the concept of health as *a single collective good*, in which people share, rather than as *a set of individual goods* which sum to population health. Viewed on an individual basis, one person's health status is a private good in the sense that he or she is the primary beneficiary of it. Individual health, in this sense, is no more a public good than a car which is on occasions used to transport other people without charge: it provides some benefits to others, but the main benefits accrue to the individual concerned. Nonetheless, some aspects of health – notably the incidence of communicable diseases – have important collective aspects.

Secondly, and more importantly, while one person's good health does not in itself reduce the possibility of others' good health**, many of the goods and services which are necessary to sustain health**, such as food, shelter and use of curative health services, **are**

**subject to competition in consumption**. In this sense, the *production* of health is at least partly competitive.

This suggests that **good health is better viewed, not as a public good, but as a private good which provides positive externalities: it is competitively produced, and the primary benefits are to the individual; but there are also substantial benefits to others**. Clearly, this is not to say that the improvement of health is not a worthy objective of private agents (e.g. NGOs), governments and official agencies, either at the national or the international level. Even where there are no positive externalities, social justice and equity are a sufficient justification for this. Neither does it conflict in any way with the concept of a right to health. (See Box 3.) It may, however, influence the way in which these issues are discussed.

## Box 3: Public Goods, Merit Goods, Rights and Equity

The status of some health-related goods as public goods is an important justification for their public provision or public action to ensure their provision by the private sector. However, this is not the only justification for public provision of health-related goods and services. In particular, it is internationally recognized that there is a **right to the highest attainable standard of physical and mental health** – not only on a philosophical level, but as a legal claim of international people towards their governments. This extends to the underlying determinants of health, including a wide range of socioeconomic factors that promote health, as well as health services. Goods and services must be available, accessible, acceptable and of good quality; and governments have a responsibility to ensure that they are provided, by the public or the private sector, in accordance with the principles of respect for individual rights, dignity and autonomy.

There is no conflict between the rights approach and the public goods approach. However, there are major differences in their scope. While it would not be untenable to argue that people have a right to public goods, this would extend rights to some unconventional areas (e.g. radio broadcasts and lighthouses). Equally, the right to health (or the view of health as a merit good) clearly implies ensuring access to goods and services necessary to health irrespective of whether they constitute public goods, or even whether they have positive externalities.

An intermediate position between the rights approach and the public goods approach is the view of health (or of goods and services required for health) as **merit goods** – that is, as goods to which people *should* have access, irrespective of their circumstances or their ability or willingness to pay, because they have positive externalities in consumption. It should be noted, however that this has a more limited scope than the rights view, in that not all aspects of health or health interventions have externalities, or can therefore be considered to be merit goods.

**The public goods approach and the rights approach are different in nature: the rights approach is fundamentally *normative,* asserting what should be the case, while the pure public goods approach is *positive,* based on the nature of goods. While they overlap in some areas, they are not coextensive. However, they are complementary rather than conflicting: neither is capable on its own of providing a complete set of appropriate interventions.**

**The same applies in principle to GPGs and equity.** The equity approach suggests that efforts to improve health should focus on the most disadvantaged groups. Some GPGs (e.g. prevention of most infectious diseases) will indeed benefit these groups disproportionately; but many GPGs would not be provided on the basis of equity considerations, as some are likely to benefit primarily more advantaged groups and/or countries (e.g. disease eradication – see Box 9).

This does not, in itself, imply that GPGs should not be provided, although it is important to ensure that they do not worsen the situation of disadvantaged groups. However, the problem is seriously compounded by the financial and political dimensions of GPG provision. Given the limited capacity at present of international decision-making processes, the skewed nature of the decision making process, and the limited resources available for activities at the international level**, there is a real risk that the provision of GPGs will in practice be skewed away from the provision of GPGs which could benefit disadvantaged groups. This could bring the GPG approach into direct conflict with the equity approach.** This is discussed in greater detail in Section D.

The nature and strength of the externalities associated with health improvements depend critically on the nature of the health problem concerned, and *whose* health is affected. Infectious diseases and the health of women of reproductive age and breadwinners have very large externalities, as do some aspects of child health, through their effects on the long-term health status of future mothers and breadwinners. The externalities of noncommunicable diseases in non-breadwinners other than women of reproductive age are generally at most very limited.

**Some of those dimensions of health for which the externalities are strongest may nonetheless qualify as public goods on the basis of the modified definition** proposed earlier – that is, the additional cost of achieving an improvement of health in these dimensions may be less than the benefit to others of doing so. However, the role of costs in this calculus means that this depends on the interventions which are used to achieve the improvement; and, **from a policy perspective, it makes greater sense to consider these *interventions* as candidate public goods**, and the health improvements which they generate as the *mechanism* through which they produce externalities. In considering *health status* as a public good in itself, it is only the benefits to *others* of the improvement in health status which are relevant to the calculation; in considering the *intervention* as a public good, the improvement in the health status of beneficiaries themselves is also relevant. As a result, the relevant benefits of the intervention will always be greater than those of the change in health status it produces, while the costs are the same. The scope of public goods will therefore be greater if considered at the intervention level.

As well as the externalities arising from individual health status, there is another important dimension of health from the perspective of public goods and externalities. Health is also an important *receptor* of externalities – that is, **a large proportion of externalities are felt primarily through their effects on health**. Externalities which strongly influence health include, not only those arising from others' health status (notably the transmission of infectious disease), but also, for example, most forms of pollution; advertising and marketing which promote healthy or unhealthy lifestyles; accidents or (unprovoked) violence causing injuries, etc.

While externalities of various kinds are important determinants of health, it is important to note that **not all influences on health are externalities** – or at least, the nature of the externalities need to be carefully defined. If someone purchases and smokes a packet of cigarettes, its health effects on the person concerned do not, in themselves constitute a negative externality, because *they only affect the individual concerned*. However, the decision to smoke or not to smoke may itself be a product of positive or negative externalities (the effects of health education or of tobacco advertising); and smoking may produce negative externalities for others (e.g. passive smoking, or from health and safety risks to workers involved in the production of the cigarettes).

Some of the externalities affecting health arise from public goods. **Three key types of public goods influencing health** can be distinguished in this context:

- **Infrastructure systems** (e.g. for the provision of health services, clean water and sanitation). As discussed in Section A2, while the connection of an individual

household to a sanitation system or a telephone network is a private good, the system itself is essentially a public good.

- **Knowledge and technologies** (broadly defined, to include understanding of health risks; preventive, diagnostic, curative and palliative interventions; delivery systems, etc.). While technology often needs to be embodied in private goods (e.g. vaccines or pharmaceuticals) to provide health benefits, the knowledge of the technology is, by nature, a public good. Equally, access to health information may require private goods (literacy, radios, televisions, computers, newspapers, etc.). This requirement of access to private goods in order to access public goods is analogous to the case of infrastructure.

- **Policy and regulatory régimes**. The collective nature of policies, whether in health or other sectors, makes them public goods (or bads). Regulatory régimes (e.g. for food and product safety, pharmaceuticals, health services, etc.) are essentially a particular subset of policies. It should be noted that policy can also be used to restrict access to public goods, either by enforcing its restriction to a limited subgroup of the population to make it a club good (e.g. television licensing), or by allowing its appropriation or retention by a particular agent (e.g. patent régimes).

In short, **while *health status* is not, by nature a public good, some aspects of *public health* – measures for the promotion and protection of health – are**. Potential examples include health service infrastructure; drinking water and sanitation systems; health surveillance and disease control; health education; regulation of private health service providers, etc.

## A6. Externalities of Improved Health Status

The direct externalities of health status are clearly considerable. Within the health arena, these arise in two broad areas:

- **Inter-generational effects**. The health of mothers has a major effect on the health of their children. The clearest case of this is the direct transmission of a disease (e.g. HIV/AIDS) or other health problems (e.g. drug addiction) at birth, or in the former case through breast-feeding. Other inter-generational transmission mechanisms are also important, however, particularly the effects of the mother's health and health-related behaviour during pregnancy (e.g. morbidity, consumption of tobacco or alcohol, or inadequate or inappropriate diet). Poor health among girls may also increase the risk of infant morbidity, mortality or developmental problems in the next generation, as well as obstetric complications and maternal mortality, through maternal stunting. This makes women's health a key area of externalities.

- **The incidence of infectious disease**. Preventing one person from getting an infectious disease (or treating it successfully) clearly benefits the individual

concerned; but it also provides a positive externality to others by reducing their risk of infection.

Reduced incidence of communicable and noncommunicable diseases may also **reduce the pressure on health services**, particularly where they are subject to serious resource constraints, increasing access to and/or quality of care, and thus contributing to further health improvements.

As well as these health-related externalities**, improved health status has potentially important economic externalities**. The economic effects of ill-health on the households it affects are considerable – particularly in the case of chronic illness and disability, but also for acute episodes of illness. Such effects include the cost of treatment; loss of income due to inability to work or impaired productivity; running down savings, incurring debts or selling productive assets to pay for treatment or sustain consumption, etc. These impacts in turn have potentially important effects on future consumption, education, etc. which may adversely affect health in the future, further reducing income.

While these effects are essentially private, the **cumulative effect on the local economy** of the resulting loss of production and income may be very substantial. The *financial cost of health services* is merely diverted from alternative expenditures, although this may result in an increase in spending on imports, e.g. of drugs, rather than local production; and/or it may represent a shift of income from lower to higher-income households within the local economy. However, the *loss of income* due to ill-health represents an actual reduction in the demand for goods and services, including though not limited to locally produced goods and services, and thus a reduction in household income.

There are two dimensions to the economic effects of ill health. Firstly, **lower overall income levels as a result of ill-health reduce the demand for goods and services**. This reduces the incomes of producers; but it also tends to reduce prices (providing a smaller benefit to consumers). Secondly, **lower productivity limits the supply of goods and services**, which tends to increase their prices.

If everyone's health status changes to the same extent, the effect is simply to reduce incomes and consumption broadly in line with the loss of production due to ill health. However, **the significance of the separate effects on demand and supply is potentially much greater if the health of only *part* of the population is improved, and the average production and consumption patterns of the beneficiaries of health improvements differ significantly from those of the population as a whole**.

In these circumstances, broadly speaking:

- if production is increased disproportionately for goods and services traded outside the area in which health is improved, overall prices of non-traded goods and services will be increased (because incomes and demand are increased by more than supply);

- if consumption is increased disproportionately for externally traded goods and services, overall prices of non-traded goods and services will be reduced (because supply is increased more than demand);

- prices will fall for those non-tradeable goods and services of which the beneficiaries of an improvement in health are net producers; and

- prices will rise for those non-tradeable goods and services of which beneficiaries are net consumers.

This has two effects (as illustrated in Box 4):

- It will at least partly offset, and could in principle even neutralize or reverse the economic effects of health improvement for the beneficiaries.

- It will reduce the real incomes of non-beneficiaries of health improvements who have the same pattern of net production and consumption of non-tradeable goods and services as the beneficiaries, and (generally) increase the real incomes of those who have the opposite pattern.

**Overall, there should be a net increase in consumption; and this is likely to include some people who do not benefit from the initial improvement in health; but some households are likely to face a net loss of income.**

This suggests that **the effectiveness of improvements in health as a means of reducing income poverty (and hence the externalities of health which arise through this effect) may be more limited than they initially appear on the basis of potential effects on productivity; and that the extent, and even the direction, of the effect on poverty will depend critically on *whose* health is improved.**

## Box 4: Real Income Effects of an Unequally Distributed Improvement in Health: an Illustration

Suppose that a population is composed of three groups of people:

- large farmers, who are substantial net sellers of a non-traded food crop;
- small farmers who are smaller net sellers of the same crop; and
- non-farmers producing non-food goods and services.

Both groups of farmers sell their surpluses to non-farmers, and buy non-food goods and services; non-farmers sell their goods and services to buy food. The large farmers sell more of their output than the small farmers. For simplicity, all goods and services are assumed to be produced and consumed exclusively within the community (i.e. there is no external trade); and farmers are assumed to consume only the food they produce themselves.

If the productivity of the large farmers (only) is increased, e.g. by an improvement in their health, the supply of food to the market is increased; but demand remains unchanged (because farmers do not buy food). This will reduce prices. Large farmers' incomes may therefore be increased or reduced, depending on the relationship between supply and price; but small farmers' incomes will necessarily be reduced, because prices for their output are reduced, while their production is unaffected.

The net effect on demand for non-food goods and services is ambiguous: it will be positive if and only if the overall increase in food production is greater than the reduction in price (that is, if the demand for food is price elastic). If demand increases, this will increase non-food prices, limiting the increase in real incomes for large farmers and further reducing the incomes of small farmers, but increasing the incomes of non-farmers. If demand for non-food goods and services is reduced overall, this will limit the reduction in farm incomes (or magnify the increase in the case of large farmers). It will reduce the incomes of non-farmers; but this will be at least partly offset by the effect of lower food prices.

Overall, large farmers are likely to benefit from the improvement in their own health; and non-farmers are also likely to benefit; but the small farmers, as competitors to the large farmers in both production and consumption, are almost certain to lose. Depending on the distribution of income, the result may be to increase or reduce poverty. In the latter case, it is possible that the second-round (i.e. price and income) effects on health of the initial improvement may be negative.

As well as effects on productivity, a slightly different set of problems arises from **mortality of the working-age population** – as exemplified by the effects of HIV/AIDS in sub-Saharan Africa. This increases the dependency ratio (the total population divided by the population of working age), reducing consumption and taking children out of school to support their families; and (depending on the pattern of the disease) it may seriously reduce the supply of skilled and educated workers – not least in health and teaching professions. This has serious effects on the local economy, as well as impacting directly and indirectly on health. Specifically, it reduces the availability and increases the cost of skilled labour (including for education and health services); and it increases the cost of goods and services which are intensive in skilled labour and human capital.

## A7. Health-Related and Non-Health Public Goods

The role of health as a receptor of externalities means that **health is likely to be a significant dimension of the benefits of many public goods in other sectors or with other primary objectives**. Pollution control, for example, may be primarily motivated by environmental objectives (e.g. conservation of biodiversity, climate change, etc.); but it is also likely to have significant health benefits, in terms of the reduction of exposure to hazardous and toxic substances. Education may be directed in part towards improving overall productivity and economic performance; but health-related behavioural changes are also a significant positive externality, as are the health benefits of the increased incomes associated with education, and the increased supply of health professionals.

Conversely, **health improvements may have positive effects which extend beyond health status** – in particular, they increase productivity and economic performance. This not only extends the externalities associated with health improvement, but may also facilitate the provision of other public goods, by increasing the productivity of the personnel involved and reducing the costs of staff turnover associated with chronic morbidity and mortality (discontinuity, recruitment, training, health insurance, pensions, etc.). Other linkages may also be relevant: for example, improved health status improves educational performance by reducing non-attendance due to ill-health and improving performance while in school, adding to the positive externalities of education.

This suggests that **there is a significant degree of synergy between health-related and non-health public goods, so that the costs, benefits and appropriate design of a public good may depend significantly on which other public goods are provided**. For example, the level of education will influence the effectiveness of health information campaigns, the nature and extent of the behavioural problems they address, the appropriate means of delivery (e.g. written versus non-written), the availability (and potentially the cost) of educated and skilled personnel, etc.

## A8. "Enabling" Public Goods and Access Goods

**Many public goods do not provide benefits directly, but enable people to secure benefits if they have (or can obtain) the private goods required to do so.** Such private

goods are here termed "access goods". These may be goods in the sense of physical objects (e.g. a television for access to broadcasts; a computer for access to the internet); or they may be goods in the broader sense of something providing a private benefit (e.g. a connection to a telephone network, access to health services to benefit from health sector infrastructure).

**The requirement of access goods restricts the scope of the benefits of public goods. This not only reduces the overall benefits (making the balance between costs and benefits less favourable), but may also lead to perverse targeting**: those who have access goods are likely to be the better off, so that the benefits of providing enabling public goods will tend to be skewed away from the poor, who are likely to be in greatest need. Where the poor are likely to benefit more from the provision of the public good – as in the case of many health interventions – this will reduce the overall benefits disproportionately to the number of people excluded.

The policy implications depend on whether the benefits of the public good are purely private, or whether its consumption has positive externalities. **Where the benefits are purely private** – as in the case of broadcast television, for example – **this represents a *prima facie* case against the provision of a subsidy** (assuming that the targeting of subsidies towards the poor is an objective of policy), or at least against prioritizing subsidization. This suggests that converting the good into a club good by administrative means (e.g. television licensing) should be considered, and/or that such conversion by technological means (e.g. by encryption of broadcast signals) should not be discouraged.

**However, these conclusions may be overridden by other policy considerations, such as human rights.** Where it is considered that there is a *right* to the (private) benefit which can be derived from the public good (e.g. palliative care for noncommunicable disease), subsidization may nonetheless be justified.

**Where consumption of the public good has substantial positive externalities, it is desirable to increase coverage, either by supplying access goods or by increasing demand for them.** Demand may be increased through the provision of information and education where the private benefits of the public good are not immediate or not fully appreciated (e.g. in the case of vaccinations). However**, while increasing demand is a "market friendly" approach, and will contribute to increasing coverage, it is likely to leave the problem of perverse targeting**. This applies particularly where education and information themselves require access goods (e.g. literacy, access to media, school attendance, etc.).

The direct supply of access goods is likely to be more expensive than increasing demand, even where effective targeting is possible; but it may be more effective than a demand-based approach in increasing coverage and countering perverse targeting. Decisions on the supply of access goods need to take account of alternative delivery mechanisms (e.g. the provision of access to computers through public libraries to facilitate access to the internet) in terms of their cost and effectiveness in allowing access to public goods. It should also be noted that, even if access goods are supplied, there may still be a need to

increase demand if there are indirect or non-financial costs (e.g. if vaccination requires travelling to a health centre).
In some cases, **the cost-effective supply of access goods may itself be a public good according to the modified definition** – that is, the cost of providing the access goods to those who do not have them may be no greater than the externalities arising from the additional consumption of the public good. In the case of vaccination against infectious diseases, for example, the externalities of increased coverage may well be sufficient to justify the subsidization of the costs of individual vaccination, as well as the infrastructure for the overall vaccination programme. Other examples may include treatment for infectious diseases such as tuberculosis and sexually-transmitted infections.

**A particularly strong case can be made for subsidization of access goods where universal or near-universal coverage is necessary to the benefits of the public good.** If some people do not have access to health services, for example, this may represent a major obstacle to disease elimination.

**Access goods are an important area of synergy, as essentially the same access goods may be required for a range of public goods. Health provides perhaps the clearest case**: the overall health infrastructure constitutes a clear public good; but the potential benefits are dependent on access to health services. Those who have access to health services are thereby enabled to consume a range of public goods with substantial positive externalities – preventive and curative services covering a number of infectious diseases – some of which may require universal or near-universal coverage. This represents a strong case for provision of free health services as public good at the national level.

## A9. The Geographical Scope of Externalities and Global Public Goods

Externalities, whether of public or private goods, arise at all levels from the household to the global. Often, though by no means always, their distribution is geographically defined. The health effects of pollution, for example, (and thus the health benefits of controlling a particular source of pollution) are generally determined by geographical proximity, wind direction, sea currents, river courses, etc. The externalities of infrastructure are defined by its geographical coverage; those of policies and regulations by the jurisdiction within which they are implemented or enforced.

This raises the question of **which externalities are relevant in what contexts** – specifically as between within-country externalities (i.e. those which arise in a particular country from the provision of a public good within that country) and cross-border externalities. This issue arises on four levels:

- in defining whether a good is a GPG;

- in determining whether it should be provided globally (i.e. whether there is a collective action problem);

- in designing the mechanisms for its provision and financing; and

- in considering the political calculus of how to ensure that it is provided.

This Section focuses on the first two questions, while the last two are discussed later in the context of financial and political aspects of GPGs.

UNDP (1999, pp. 509-10) defines a GPG as:

> "a public good with benefits that are strongly universal in terms of countries (covering more than one group of countries), people (accruing to several, preferably all, population groups) and generations (extending to both current and future generations, or at least meeting the needs of current generations without foreclosing development options for future generations)."

However, this definition, as stated, seems unsatisfactory from a policy perspective because it does not make explicit the distinction between *cross-border* and *within-country* externalities. In principle, this definition would include a public good whose benefits are limited to the country in which it is provided, so long as any country which provides it benefits. This allows, for example, broadcast television to qualify, although there is no obvious case for *international* provision or financial support.

**From a policy perspective, the primary consideration in defining GPGs is the existence of a collective action problem at the global (or at least the international) level – that is, between countries.** Just as the collective action problem at the national level arises from externalities between individuals, so the international collective action problem arises from externalities between countries – that is, from cross-border externalities. If all the potential benefits of a public good arise within the country where it is provided, then non-provision signifies a collective action problem at the national rather than the international level.

Applying the modified definition of public goods proposed in Section A5, this would suggest the following **definition of a GPG**:

> **"a good for which it is rational for the rest of the community of nations, taken as a whole, to provide to some or all countries, because the costs exceed the benefits, but irrational to exclude a country from its consumption, because the additional cost of extending its coverage is no greater than the associated increase in cross-border externalities."**

The relationship of this definition with the UNDP definition is discussed in Box 5.

## Box 5: The UNDP and Modified Definitions of GPGs

There are three key differences between the UNDP definition of GPGs as stated and the modified definition proposed in this paper, as shown below.

| | UNDP Definition | Modified Definition |
|---|---|---|
| **non-excludability and non-rivalry** | required (level not specified) | not required at international or individual level |
| **cross-border benefits** | not explicitly required | cross-border benefits must be no less than international costs |
| **universality** | GPGs must benefit "more than one group of countries" and "several population groups", and not harm future generations | no requirements (though effects on future generations should be taken into account); selective provision possible |

The result is that the two definitions are not coextensive: some goods will qualify under the GPG definition and not the modified definition, and vice versa. Thus vaccination programmes would be excluded from the UNDP definition because of the non-excludability and non-rivalry requirement, as would onchocerciasis control would be excluded because of its limited geographical scope.

The implications of requirements for "strong universality" in terms of population groups are difficult to establish, because such groups are not defined. In principle, this could mean, for example, that women's health programmes (other than those improving maternal health or reducing the incidence of communicable disease) are excluded as benefiting only women, or urban environmental programmes as benefiting only urban populations. This also suggests that programmes benefiting only the poor would, in principle, fail to qualify. The requirement that neither present nor future generations should be harmed arguably excludes disease eradication programmes, to the extent that these require a reallocation of resources from uses which are of greater importance to the health of the present generation. (See Box 9.)

Conversely, the modified definition is more restrictive in terms of its requirements on cross-border benefits. At its most expansive (i.e. making no requirements of cross-border benefits), the UNDP definition would include, for example, preventive programmes for noncommunicable diseases in people above reproductive or economically active age, which would be excluded from the modified definition because they have no cross-border effects. At most, the UNDP might be interpreted as requiring significant cross-border benefits, without placing conditions on their scale. The modified definition, requiring cross-border benefits at least equal to international cost, is still considerably more restrictive.

As at the national level, it should be noted **that GPGs, thus defined, will not necessarily be GPGs for all countries**, as benefits may exceed costs for some countries, but not for others. However, **the pattern of coverage of GPGs is likely to be less consistently inequitable at the intercountry level** (although the pattern of GPGs actually provided is likely to be more inequitable because of financial and political considerations, as discussed in Section D). At the national level, those least likely to qualify for public goods are the populations which are hardest to reach – typically those in remote areas, who are generally most disadvantaged and in greatest need of many public goods. Internationally, provision of at least some public goods will be less costly in the most disadvantaged countries, because salary levels and other local costs are lower. However, this may be at least partly offset by higher transport costs (for inputs produced in developed countries), greater logistical problems, limited infrastructure (transport and institutional), etc.; and the most disadvantaged within developing countries are still likely to lose out.

To be a global (as opposed to an international) public good, the cross-border externalities must also extend beyond "one group of countries". This may appear to be problematic, because many externalities, like pollution, are relatively narrowly defined in geographical terms.

However, it is important to distinguish between the geographical scope of negative externalities, and that of the positive externalities of measures to deal with them. **Even where negative externalities are localized, if the sources of the problem are widespread, dealing with them may nonetheless constitute a global public good.** Thus measures to control pollution on a global level may constitute a GPG, even though the externalities of each individual source of pollution is geographically limited, because pollution control represents a single public good providing a multiplicity of regional externalities.

In terms of the decision **whether to provide a GPG at the international level**, account needs to be taken of the extent to which it is already provided nationally or regionally. In this context, countries can be divided broadly into three categories:

(a) those where the prospective *GPG is provided* at the national level;

(b) those where *the within-country externalities are insufficient to justify provision* at the national level; and

(c) those where the within-country externalities are sufficient to justify national provision, but it is *not provided for political reasons* (e.g. the political strength of those who would lose compared with those who would gain, or the long-term nature of gains versus the short-term nature of the incentives facing governments).

An additional complication is that countries may change between categories over time, as national provision of public goods is increased or decreased, and costs and benefits change over time, affecting the rationality or irrationality of provision. This affects the temporal profile of costs and benefits, as discussed in the next Section.

Since a policy measure intended to ensure global provision of a GPG provides no additional within-country benefits in countries where it is already provided nationally, the within-country externalities in such countries should clearly not be taken into account. At the other extreme, where within-country externalities are insufficient to justify national provision, it seems clear that these should be considered: they are benefits arising from the global provision of the GPG, which would not be enjoyed if it were not provided globally.

Where non-provision arises from political rather than economic considerations, the question is more arguable, in that the problem arises from a collective problem at the national rather than the international level. A pragmatic view would suggest that the in-country externalities, as in the "rational non-provision" case, are potential benefits which would *de facto* be forgone in the absence of global provision. A more purist view would suggest that a more appropriate global action would be to seek to increase the representativeness of government in the country concerned, so as to resolve the national collective action problem.

Clearly, there is no inconsistency between global provision of a GPG and efforts to resolve national collective action problems, so the two approaches could be pursued in parallel. However, even if the within-country externalities are taken into account, this scenario suggests a likelihood of political obstacles to provision at the global level: countries in this category can be expected both to oppose global provision, and to have at best limited commitment to implementation (unless the domestic political obstacle arises from the financial costs of national provision, and these costs are met externally under global provision).

This may appear to provide a very weak criterion for global provision. In principle, if within-country benefits of provision in "irrationally non-providing" countries are included in the calculus, this may imply a case for global provision of a public good which has very limited cross-border externalities, but where the benefits forgone by of its provision are relatively limited. In practice, however, this is unlikely, because of the variety of country situations. If a substantial part of the world is already providing a public good at the national (or regional) level, and within-country (or within-region) benefits are not taken into account in these cases, this will limit the geographical scope of externalities, and may well result in the public good being disqualified as a GPG, unless those countries already providing the GPG are major beneficiaries of its provision elsewhere.

**Even where a GPG is not currently provided within individual countries, there may be instances where it could more readily be provided at the regional level.** This applies particularly to GPGs which deal with multiple localized negative externalities, such as pollution control. In such cases, regional arrangements would provide most of the cross-border externalities available to countries within the region concerned, leaving only those areas on the periphery subject to negative externalities from other countries; collective action problems are likely to be more tractable among smaller groups of countries; and for many (particularly developed) countries, regional decision-making

processes are more developed than those at the global level (e.g. the European Union and NAFTA, but also Mercosur, ASEAN, SADC and some other South-South groupings). In principle, where the good is not currently provided at the regional level, the externalities within the region should still be taken into account in estimating the benefits. However, if non-provision indicates an insuperable collective action problem at the regional level, this may be an indication of still greater problems at the global level. There may nonetheless be some merits to a global approach, if non-provision at the regional level arises for other reasons. This applies particularly where the supply of a GPG adversely affects the competitiveness of production, e.g. by increasing production costs (as in the case of pollution control) or by increasing levels of taxation, diverting resources away from investment in infrastructure, etc. Thus **assessing the reasons for non-provision at the regional level is critical to decisions on global provision.**

**This suggests that whether a public good qualifies as a GPG will depend in part on how widely it is (or could be) provided at the national or regional level, and on the reasons for its non-provision.** This is particularly important from a political and financial perspective: levels of provision of most public goods are likely to be highest in the developed countries, due to their greater resources (in the case of the EU) more developed regional decision-making processes; and these are also the countries with the greatest power in international decision-making and the resources to finance global provision of GPGs. (See Section D2.)

## A10. Income Disparities and National Provision of GPGs

It is important to note that **the economically rational level of provision of a GPG will be very different in different countries, and that the resulting pattern of provision will be very different from that implied by global provision**. This is partly a result of differing levels of potential benefits: for example, the benefits of a malaria control programme in a North European country are clearly much less than in a tropical country.

Of much greater significance, however, is the difference in "rational" levels of provision between rich and poor countries. The relationship between costs and benefits will typically be much more favourable in low-income countries than in developed countries (as unit costs, e.g. for salaries and non-tradeable goods, will generally be lower in the former case, while the benefits will often be greater); but **the much greater resource constraints in poorer countries mean that the rational level of provision will be much lower**.

This represents a strong case for cross-border support for public goods, not only in terms of equity but also for reasons of efficiency (the cost of securing a given improvement in health outcomes). By way of illustration, the savings from a 1% reduction in total per capita health expenditure in the developed countries would be roughly the same as the cost of increasing per capita health expenditure by around 90% for four times as many people in low-income countries. There is little question that the resulting improvement in health status in Africa (and the associated externalities) would far outweigh the deterioration in the USA. In this sense, a redistribution of the provision of health services

from the USA to sub-Saharan Africa would represent a substantial increase in the efficiency of resource allocation.

But **however strong the case in terms of equity or efficiency, the disparity in the economically rational levels of provision of public goods in different countries due to resource constraints does not *in itself* constitute a case for global provision of these public goods**, because the problem is one of distribution rather than of international collective action. The appropriate response is not through the global provision of these goods, but through other areas of policy such as debt reduction, aid and resolving the problems in the international economic system which perpetuate extreme inequalities of income between countries. The question of whether these constitute GPGs or merely a means of providing a range of GPGs in different sectors is beyond the scope of this paper.

Nonetheless, **the disparity between rich and poor countries represents a very strong case for financing the provision of GPGs as far as possible from resources provided by the developed countries**, where the opportunity cost of the funds in welfare terms is much lower than in developing countries (provided the funds are not diverted from development assistance). It also means that the opportunity cost of funds will be lower (and probably much lower) in the case of global provision than at the national level, so that **provision of a public good within a country may well be rational at a global level where it is irrational at the national level, even in the absence of cross-border externalities**. While this does not represent a case for global provision on GPG grounds, it does constitute a strong case for cross-border support (i.e. country-to-country development assistance).

## A11. Health Effects of Non-Health GPGs

As noted earlier, health is an important receptor of externalities. As a result, many potential GPGs have potentially major effects on health:

1. **Peace and security** improve health through the avoidance of:

   (a) injuries and deaths caused by conflict;

   (b) mental health problems arising from conflict-related trauma;

   (c) transmission of disease across distances and borders associated with population displacement;

   (d) the additional burden of disease associated with poor living conditions for refugees and displaced people;

   (e) the general loss of income resulting from the adverse economic effects of conflict;

(f) the loss of incomes to individual households arising from disabilities arising from conflict, loss of breadwinners, etc.;

(g) adverse effects on health arising from separation of families, orphaned children, etc.;

(h) disruptions in food supply caused by conflict, and of associated malnutrition;

(i) the reduction in resources for health and health-related services resulting from the adverse economic effects of conflict and the diversion of resources to military uses;

(j) avoidance of physical damage to health facilities and health-related infrastructure due to conflict;

(k) the logistical disruption of health services, education, and other health-related services associated with conflict;

(l) the prevention of health-service utilization, school attendance, etc. due to insecurity;

(m) avoidance of the loss of health professionals and professionals in other health-related services as a result of death, disability and outward migration due to conflict.

2. **International financial stability** benefits health through:

(a) the avoidance of the health effects of financial crises, as a result of their effects on incomes, prices of imported inputs, resource for health and health-related services, etc. in crisis-affected countries;

(b) improved long-term growth, increasing incomes and resources for health-related expenditures;

(c) the easing of fiscal constraints on health-related expenditures as a result of the lessening of vulnerability to sentiment in financial markets; and

(d) the redirection of aid resources currently used for financial “rescues” towards health-related uses.

3. Depending on its scope and content, a redesigned **international trading system** might benefit health through:

(a) improved economic performance and increased economic stability in low-income countries, increasing incomes and resources for health-related services and reducing the risk of conflict;

(b) improved health standards for internationally traded goods and services;

(c) responsible marketing of unhealthy products and of pharmaceuticals and other health-related goods;

(d) improved working conditions;

(e) improved environmental conditions, through the incorporation of environmental standards and/or reducing incentives for environmentally damaging production methods;

(f) a more effective resolution of the patents issue with respect to pharmaceuticals and other medical technologies (see Box 1);

(g) more efficient international markets in health-related products, leading to lower costs; and

(h) minimization of the adverse effects and maximization of the potential benefits to health of international trade in health services; and

4. Effective **international environmental stewardship** might contribute to health through, for example:

(a) reduced exposure to hazardous substances;

(b) preservation of biodiversity, allowing a greater potential for developing medicinally useful products from the natural environment;

(c) avoiding adverse health effects associated with depletion of the ozone layer and global warming; and

(d) improving access to water in countries where it is scarce, through more systematic and equitable mechanisms for shared water resources.

## A12. Access Goods at the International Level

Just as some national public goods require private goods if they are to be accessed by individuals, so **some GPGs require access goods at the national level, some of which may themselves qualify as GPGs**. The overall health system is a key case in point. Many potential GPGs in the health sector require an effective and accessible health system at the country level if they are to provide benefits; and in some cases – notably disease eradication – the prospect of attaining the GPG may be compromised if some countries are excluded through the absence of this access good.

This suggests that **support for the health system as a whole in countries where it is currently ineffective or inaccessible may in principle constitute a GPG, according to**

**the modified definition**, if the cross-border externalities (including, but not limited to, those arising from increased access to GPGs) are at least as great as the cost. However, this will be critically dependent on how many health interventions are categorized as GPGs and the nature of these interventions.

More generally, **the benefits and cross-border externalities of a candidate GPG – and therefore whether it qualifies as a GPG under the modified definition – may depend on whether international access goods and/or individual access goods are also provided**. Coupled with the dependence of multiple candidate GPGs on the same access goods, this greatly complicates the analysis: in principle, it is necessary to evaluate the costs and benefits of all combinations of candidate GPGs and international and individual access groups (using alternative criteria for the selection of beneficiaries) to eliminate the possibility of GPG, or to select which combination provides the optimal benefits. In practice, this process would clearly need to be simplified.

## A13. Is Health a *Global* Public Good?

As discussed above, good health is better seen, not as a public good, but as a private good with substantial positive externalities. Moreover, many of the most direct externalities of good health are essentially local in nature. This applies particularly to inter-generational transmission (unless members of the next generation migrate), but also to a considerable extent to infection (to the extent that cross-border transmission is the exception rather than the rule, and is likely to occur primarily between adjacent countries), and to the economic effects of poor health (which are likely to be concentrated largely in the local markets). This suggests that **improved health status cannot be seen as a GPG in itself**, although it may contribute significantly to the provision of other GPGs.

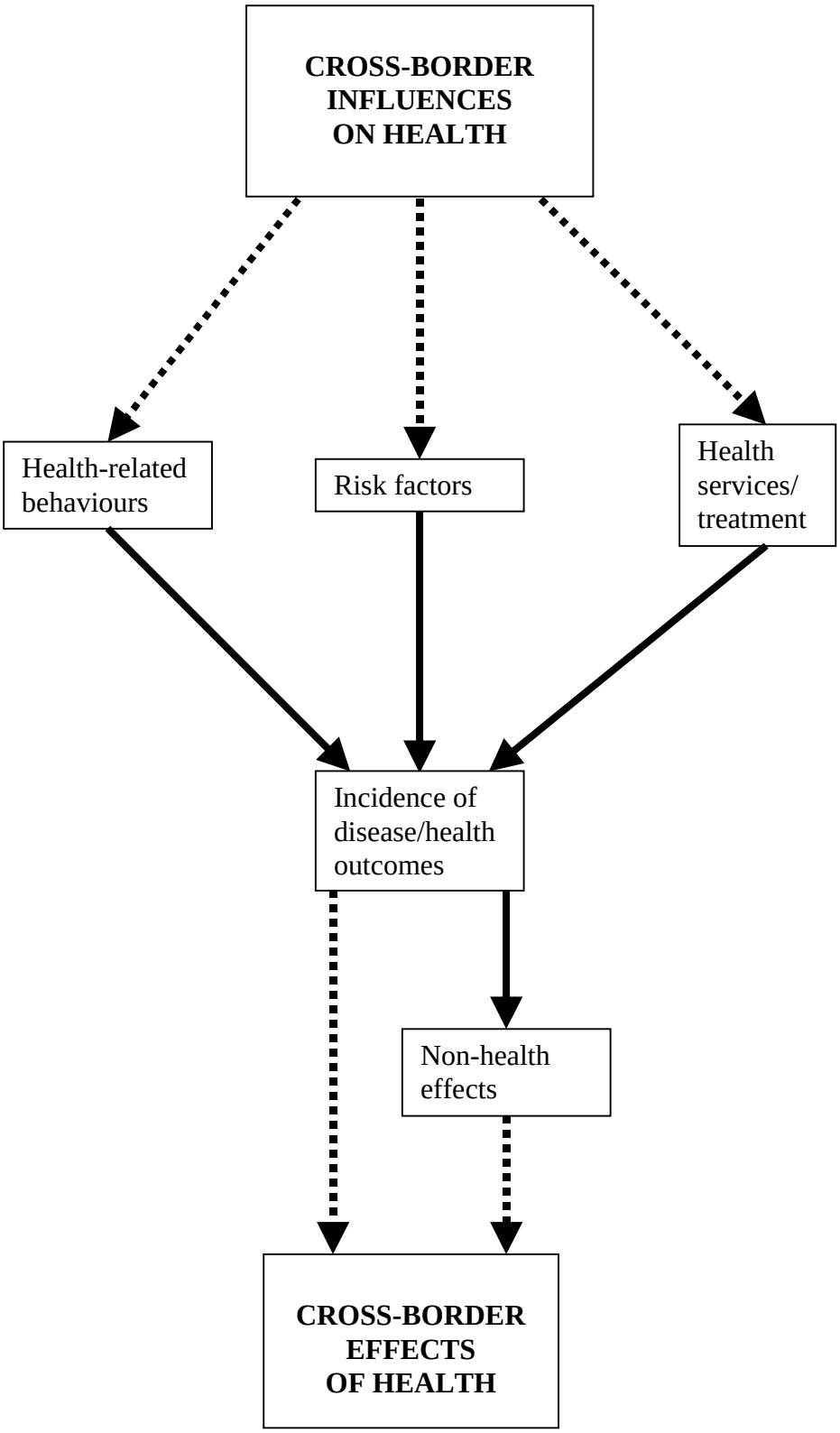
However, the role of health as a key receptor of externalities suggests that there may be some *health-producing* GPGs. Moreover, just as measures to correct the under-supply of positive within-country externalities may be considered as public goods at the national level, those which correct the under-supply of positive cross-border externalities (or limit the over-supply of negative cross-border externalities) may constitute global public goods.

Most negative externalities affecting health are also geographically specific, being primarily local in nature (e.g. inadequate provision of sanitation), or covering a wider area which is defined geographically (e.g. air and water pollution), politically (e.g. well-functioning health systems) or commercially (e.g. tobacco advertising and marketing). In all but the first case, however, measures to resolve these problems may nonetheless qualify as GPGs on the basis that they are general problems with significant cross-border dimensions, even though specific instances are of a more localized nature.

This suggests that **public health measures at the international level may constitute GPGs, even if health itself does not**. However, this depends critically on the extent, strength and geographical distribution of cross-border externalities. The greatest

limitation may be that existing national and regional provision may negate the "near universality" requirement.

**Figure 1: Conceptual Framework**



# B. Global Public Goods and Health

## B1. Cross-Border Influences on and Effects of Health: a Conceptual Framework

Figure 1 sets out a simplified conceptual framework for considering cross-border influences on the determinants of health and cross-border effects of health outcomes. Health outcomes and the incidence of disease are essentially determined by three sets of factors (all broadly defined): health-related behaviours; risk factors not related to individual behaviour; and treatment and use of health services. Each of these may be influenced by a range of cross-border influences. The specific components of each element are elaborated in turn in later sections of this paper.

The unidirectional process outlined in Figure 1 is, of course, an over-simplification. In particular, the incidence of infectious disease itself contributes to risk factors (in that it increases the risk of exposure to infection); and the effects of adverse health outcomes impact on the capacities and incentives for health-related behaviour in the future, both at an individual level (through loss of income, borrowing, use of savings, etc.) and through effects on the local economy (through effects on incomes and relative prices). Reduced productivity and incomes due (directly or indirectly) to poor health may also reduce the resources available to finance health services or financial access to them.

## B2. Cross-Border Effects of Health Status

As noted earlier, improved health status has two types of health-related externalities: reducing the incidence of communicable diseases reduces the risk of infection; and improving the health status of girls and women of reproductive age improves the health of the next generation. However, the great majority of these effects are fundamentally local in nature. Inter-generational transmission occurs specifically between mothers and their children. Even if the children migrate in later life, the cross-border health externality is limited to the risk of onward transmission of infectious diseases from which they would not have suffered but for the inter-generational effect. It seems likely that this effect would be limited.

Cross-border transmission of infectious disease is clearly a case of a cross-border (and potentially a global) externality. In most cases, however, it is likely to account for a very small proportion of overall infection. Infection arises from close proximity; so for cross-border transmission to occur, the carrier must move between countries between the time when he or she is infected and the time when he or she ceases to be infectious. In practice, however, despite increasing international travel, the vast majority of the world's population remain in the same country for long periods at a time; and they are generally less likely to travel internationally while suffering from an acute infectious disease (except in a few cases to seek treatment and, for example, in relatively uncontrolled border areas).

This suggests that cross-border transmission of infection with a disease is most likely to occur where:

- the symptoms of the disease are not sufficiently serious to prevent or discourage travel for a significant part of the infectious period;
- there is a long incubation or latent period; and/or
- infection is asymptomatic in some individuals.

Examples include HIV/AIDS, other sexually-transmitted infections, tuberculosis and malaria.

Even where these conditions are fulfilled, cross-border infection is likely to occur on such a small scale that it will have a minimal effect on the overall level of incidence in the recipient country in most cases, *except* where:

(a) the disease has been eradicated in the country to which infection is transmitted (e.g. polio, or smallpox during the process of eradication);

(b) the disease has not yet reached the country but has the potential to become endemic (e.g. HIV/AIDS in the early stages of its development);

(c) the disease is at a very low level in the country to which it is transmitted, and the risk of transmission is substantial due to a large volume of movement of people (including residents returning from travel) from countries with a high incidence (e.g. tuberculosis in developed countries); or

(d) the strain of disease transmitted is resistant to the treatment régimes generally used in the country (e.g. multidrug resistant tuberculosis and malaria).

There are some possible GPGs potentially available, in the form of measures to prevent the cross-border transmission of diseases which meet both these sets of criteria (e.g. transmission of HIV/AIDS and tuberculosis to low-incidence countries, and cross-border transmission of multidrug resistant tuberculosis and malaria). (See Box 6.) However, the scope for effective policy responses may be limited – or at least may create as many problems as it resolves. The first stage – improved disease surveillance and sharing of epidemiological information – is straightforward. Effective response to the disease within the country, in terms of disease control, is also unproblematic, although the cost is likely to be greater than the cross-border externality.

## Box 6: Cross-Border Transmission of Disease: Key Cases

**Tuberculosis.** More than 50% of the incidence of tuberculosis in the USA is in the foreign-born population, suggesting a strong link with migration and travel. (US residents born in countries where tuberculosis is endemic are more likely to travel to such areas, to have contact with the local population while there, and to stay in conditions where infection is more likely, than the remainder of the population.) However, the relative living conditions of a subgroup of first generation immigrants within the USA may also be a factor.

**MDR Tuberculosis.** The risk of international transmission of multidrug resistant tuberculosis is a matter or particular concern: at present it is confined to a relatively small group of countries; but if infection were transmitted to other countries – particularly those where surveillance is less effective, treatment less readily available, and/or living conditions are more conducive to infection – the problem could rapidly reach unmanageable proportions.

**HIV/AIDS.** The variation of incidence rates of HIV infection between regions which are geographically, economically and epidemiologically similar (e.g. relatively low rates in Western Africa compared with Southern Africa) suggests the potential for a rapid increase in some less infected areas. The importance of cross-border movements of people – e.g. troops, truckers, sex workers and sex tourists – means that cross-border transmission could accelerate this process substantially.

**MDR Malaria.** Multidrug- resistant malaria is spreading rapidly; but this is probably due to the increasing resistance within countries rather than the cross-border transmission of resistant strains. There is the potential for cross-border transmission to areas where malaria is endemic; but this is likely to be limited (except at the regional level) by the relatively limited travel between malarial areas in different regions of the world.

**Polio.** Polio has been eradicated in all but 30 countries; and the risk of cross-border transmission from these countries could significantly delay the process of global eradication, particularly in countries with seriously under-resourced health systems. Polio was reimported to China, Iran and Myanmar in 1999, but appears to have been effectively controlled in all three cases.

However, the real problem is the effective prevention of cross-border transmission between the time when the threat is identified and when it is effectively controlled. This is practicable in principle where effective preventive measures are available (e.g. vaccination for yellow fever). In other cases, however, it would seem to require *either* health screening of all travellers from the country (including visitors wishing to return to their countries of origin), and preventing cross-border movement by or imposing quarantine requirements on those infected; *or* imposing a blanket ban on cross-border travel by those who have been in the infected area during the incubation period of the

disease. The former is feasible only where effective diagnostic instruments are available, and even there is likely to be impracticable and very costly; the latter raises potentially serious human rights issues.

In principle, measures to control sex tourism would seem a more promising area for health-related GPGs. Again, however, it is by no means clear that effective global action is feasible in practice. (See Box 7.)

## Box 7: Is the Control of Sex Tourism a Global Public Good?

At first sight, there would seem to be a case for international measures to control sex tourism as a GPG. Sex tourism creates a substantial risk of cross-border transmission of HIV/AIDS and other sexually-transmitted infections (STIs); both of these satisfy the conditions for cross-border transmission listed above; HIV/AIDS also meets the second set of criteria; and while other STIs do not meet these criteria, they accelerate the transmission (in-country and cross-border) of HIV/AIDS.

However, while effective control of sex tourism would seem to generate significant global externalities, it is not clear what measures could be adopted to achieve this. Controlling movements of people is not obviously practicable – particularly given the problem of identifying sex tourists. Controlling the activities of tourists in-country seems equally infeasible. Controlling the promotion of sex tourism would have little effect, as little formal promotion takes place.

Controlling the activities of the sex industry as a whole would be more feasible in principle, but would be heavily dependent on the political will of governments. This might extend to health screening of sex workers and promoting the use of condoms – but there has already been considerable movement in this direction. Active discouragement of sex tourism itself by host governments is likely to be limited, as tourist revenues are of critical importance to the countries most heavily engaged in sex tourism, in terms of employment, (financial) poverty alleviation, urban-rural remittances, taxation and foreign exchange. In principle, it might be possible to provide compensation for the losers; but targeting would be very problematic; and the compensation required would need to be very considerable. It is far from clear that the additional benefits (beyond those from health screening and condom promotion) would merit the expense.

A more practicable approach to reducing cross-border transmission would be to reduce the incidence of infectious disease *within* countries, through the strengthening of health systems. This would have much greater overall benefits (both private benefits and externalities); and it might well be more cost-effective in aggregate. However, the cost relative to the reduction in *cross-border* transmission would almost certainly be considerably greater, raising political and financing problems.

**Perhaps the most promising area for GPGs to reduce cross-border transmission is reducing the risk of resistant strains emerging, through appropriate monitoring and treatment régimes, where a risk has been established and there is a substantial risk of cross-border transmission (e.g. DOTS for tuberculosis).** In other cases, the externalities (within-country and cross-border) of reducing the incidence of infectious disease could usefully inform aid programmes in the health sector; but this is very different from provision as a GPG.

## B3. Cross-Border Transmission of the Effects of Ill-Health

As discussed earlier, health has significant externalities through its effects on the local economy as well as through its effects on health. While these non-health externalities are again primarily local in nature, they have potentially significant cross-border effects, which are increased by economic globalization. By reducing income in the country concerned, they reduce export opportunities for its trading partners; and the profitability of foreign investment is reduced both by the reduction in demand and the shortage of skilled labour (due to adult mortality and reduced educational attainment). (The availability of skilled labour is a key determinant of foreign direct investment, suggesting that it is also a significant determinant of profitability; and HIV/AIDS now disproportionately affects skilled and educated workers in high-incidence countries. The resulting loss of in-company experience, discontinuity of employment, training costs, etc. and potentially an increase in the cost of these workers could significantly reduce TNC profits in these countries.)

By reducing the supply of primary commodities – particularly agricultural produce in the case of HIV/AIDS in Africa – they may also increase their prices. However, while this has an adverse effect on consumers, it will benefit producers in other countries. Assuming that producers are poorer than consumers, this will have a positive rather than a negative effect.

Some caution is required in assessing the costs of ill-health to foreign investors. In general, the terms of investments should broadly reflect the economic and health situation (and the subsequent developments expected) at the time the investment was made: it can be assumed that the investment would not have been made if it was not expected to provide the rate of return necessary to justify the risk involved, allowing for these factors. The cost to investors is therefore that relating to *unanticipated changes since each investment was made*, and not the totality of health problems, or even of losses of skilled personnel, during this period. There is, however, a loss to the country itself, in terms of the investment forgone as a result of the low *level* health status, which may have knock-on effects on the rest of the economy, including foreign investors and potential exporters.

The geographical distribution of these effects is likely to be wider than in the case of cross-border transmission of infectious disease. While many countries have some tendency towards stronger economic relations with economies in their own regions, virtually all have major trading partners and/or foreign investors outside their own

regions. Importantly from a political perspective, the economic relations of most developing countries are primarily with the developed world – though often with a strong bias towards the nearest major economic power (Japan for East and South East Asia; the USA for Latin America) and/or former colonial powers.

## B4. Cross-Border Influences on Health-Related Behaviours

As noted earlier, "health-related behaviours" are here defined very broadly, encompassing everything individuals do which affects their own health. This includes, in particular:

- nutrition and diet;
- consumption of tobacco, alcohol and narcotics;
- household maintenance and management of the household environment;
- child care;
- education;
- sexual behaviour and fertility;
- productive activities and employment;
- use of clean water; and
- use of health services.

It should be noted that the last two elements overlap with the following sections, on risk factors and health services. This section considers the utilization by households of the water supply and health services which are available; the following section covers the availability, accessibility and quality of water supplies and health services.

The main cross-border influences affecting these dimensions of household behaviour are incomes and prices. Rising incomes increase ability to pay for adequate and varied nutrition, goods required for household cleaning, clean water, health services, etc.; but they also allow greater consumption of tobacco, alcohol and unhealthy foods. Pressure on incomes may also increase health risks by inducing a movement into unsafe or unhealthy occupations (e.g. prostitution, scavenging) or a reduction in the time devoted to household cleaning and child care, to sustain consumption. Prices also affect consumption of different goods and services with positive or negative effects on health, including health services, clean water and education where these are subject to cost recovery.

Thus the pattern of income and price changes is critical to health. For prices, the desirable pattern is in principle relatively straightforward: reductions in the prices of goods which are favourable to health (basic foods, clean water, health services, education, etc.); and increases in the prices of those unfavourable to health (tobacco, alcohol, unhealthy foods, etc.). In practice, however, the situation is often more complex. In particular, the importance of basic foods as a source of income to many poor households in many countries means that reducing their prices may have a perverse effect (by increasing poverty), unless producer prices can be sustained; and increases in the price of tobacco or alcohol may lead to a less than proportionate reduction in demand by poorer households, so that more is spent on these goods, and less is available for health-positive goods.

In the case of income changes, one might hypothesize that the effects of increased income on health will be most positive at very low levels of income, where they allow an increase in calorie intakes to sustainable levels, an increase in the variety of diet and hence micronutrient and protein intakes, adequate use of clean water, access to basic health services and education, etc.; and that they will be less positive – and potentially even negative – at higher levels of income, where these needs are already largely met, and expenditures on tobacco, alcohol and/or unhealthy foods are more likely to be increased.

As the world economy becomes increasingly globalized, and national economies more open, external influences on incomes and prices within each country become ever stronger. The most important mechanisms for these effects are:

- the prices of exports and imports in international markets, which are determined by demand in consuming countries (and thus their economic performance), supply in producing countries, technological developments in the production and use of materials, etc.;

- the cost of foreign capital (international loans and foreign investment);

- the exchange rate, which is determined in varying degrees by the volumes and prices of exports and imports, international capital flows to and from the country and the cost of external liabilities and speculative pressures;

- trade policies (tariffs and non-tariff barriers, and export taxes and subsidies), and policies towards international capital flows, which are affected by obligations under international agreements (e.g. the WTO, regional trade groupings and bilateral agreements);

- taxation, government expenditure and interest rates, which are also influenced by the balance of payments (and hence the factors affecting exchange rates); and

- structural economic policies (e.g. privatization, market deregulation, and policies towards the agricultural, industrial and financial sectors), which may be affected

by the need to maintain competitiveness in changing international market conditions.

All but the first two of these are also heavily influenced in many developing countries by the conditionality which is attached to aid, and more particularly loans from international agencies.

This suggests that **global public goods in the arena of the international economy – improvements in the international trade and financial régimes, and in the policy prescriptions of international agencies and bilateral donors – have potentially important health benefits**, as well as their wider impacts on the overall economy and other aspects of welfare (education, poverty reduction, etc.).

As well as prices and incomes, another important cross-border influence on health-related behaviours – especially in the areas of tobacco and alcohol consumption and diet – is advertising and marketing. (See Box 8.)

## Box 8: Marketing and Cross-Border Externalities

Marketing is clearly an international – and increasingly a global – phenomenon, as markets are opened to trade and foreign investment, transnational companies extend the geographical spread of their operations, using sophisticated marketing strategies to break into new markets, and the media themselves become increasingly globalized through satellite technology, the internet and increasingly internationalized ownership and control of the traditional media.

It also seems clear that marketing has significant effects on health-related behaviours: if marketing had no effect on the consumption of tobacco or alcohol, for example, the companies producing them would not invest in it. (This leaves the question of whether overall consumption is increased, or whether the effect is to switch consumption between alternative products and brands. In the case of diet, however, it seems likely that the primary effect of marketing of "junk food" is to switch consumption away from other foods, suggesting a more clearly negative effect on health.)

To the extent that marketing is viewed as a set of transactions between the seller, the marketing agency and the media through which the product is marketed, the effects on the behaviour of consumers (who do not participate in or control these transactions), clearly constitute an externality. Conversely, to the extent that consumers choose to "consume" advertisements, the effects on their behaviour are a result of their own actions, and therefore not an externality. Moreover, strict economic orthodoxy would suggest that consumers' behaviour will be influenced by marketing only to the extent that it provides them with better information on which they can base their consumption decisions.

For the purposes of this paper, the former interpretation is adopted. This also seems more consistent with the conventional view of the effects of health information and health

education as externalities.

This suggests that **international policies contributing to poverty reduction are a potentially important area for potential global public goods from a health perspective, with a secondary role for control of advertising and marketing of unhealthy products by transnational companies.** In the former case, this might imply, for example:

- greater and/or faster debt reduction, and/or mechanisms to ensure the use of savings contribute to long-term improvements in health;

- revisions to national policy programmes supported by the IMF and World Bank, and/or to WTO agreements and future negotiations, to ensure (and/or maximize) positive effects on health;

- reform of the global financial architecture to reduce the likelihood and social impact of financial crises in developing countries; and/or

- reform of international institutions and decision-making processes to ensure that the objectives of development and health are appropriately reflected in their decisions.

A second, more specific area of potential global public goods lies in international measures to permit greater national control over the consumption of unhealthy goods and services. Particular areas where this is relevant include tobacco, alcohol, narcotics and unhealthy diets.

Restrictions on trade in tobacco goods, alcoholic drinks and unhealthy foods are unlikely to be appropriate (and are incompatible with the fundamental principles of the WTO, which requires control measures to be the least anti-trade possible). Moreover, cross-border trade in these goods does not in itself constitute a cross-border externality, as only the health of the purchasers is involved. (An exception is the over-consumption of alcohol, which may cause violence to third parties. Even here, however, the violence is only linked to trade if the drinker would not otherwise have consumed an equivalent amount of domestically produced alcohol.)

Nonetheless, there are at least two areas in which international measures could be justified on GPG grounds:

- Advertising and marketing of unhealthy products does give rise to negative externalities; and it may be substantially affected by developments in other countries. Transnational tobacco companies, for example, have responded to declining demand in developed countries by increasing their marketing efforts in developing countries. Similarly, expansion efforts by “fast food” outlets and soft drinks companies has entailed active promotion efforts in many developing countries, encouraging unhealthy diets. International regulation of marketing activities, or efforts to ensure that international régimes do not restrict the ability

of governments to regulate marketing effectively in health-related areas, may be desirable on GPG grounds. This may also apply to marketing of pharmaceutical products (e.g. promotion of high-cost non-generic drugs, drugs of unproven effectiveness or safety, antibiotics, etc.).

- There may be a case for coordination of tax policies towards tobacco and alcohol. Taxation is widely seen as an effective means of discouraging tobacco consumption; and similar arguments would seem to apply to alcohol (although the problem of price inelastic demand among low-income consumers, as discussed above, may apply in both cases). However, the potential for tax evasion by smuggling, especially across porous borders, may limit the effectiveness of tax increases in one country in reducing consumption. In this sense, low taxes in one country arguably represent a negative health externality for its neighbours. It should be noted, however, that this would constitute an international rather than a truly global public good.

## B5. Cross-Border Transmission of and Influences on Non-Behavioural Risk Factors

The "risk factors" box in Figure 1 includes all the determinants of an individual's health which are not related either to that individual's behaviour or to health services. Specifically, these include:

- exposure to infection (discussed earlier);
- disease vectors such as insects;
- pollution;
- food safety;
- product safety;
- health and safety at work;
- accidents; and
- violence.

Cross-border effects on health through these mechanisms can essentially be divided into two types:

(a) cross-border **transmission** of these factors (e.g. pollution in one country arising from activities in another; cross-border movement of disease vectors, the safety of traded food and other products); and

(b) cross-border **influences** on the extent and nature of health risks generated within the country (e.g. the pollution, product safety and work-place safety of transnational companies operating in the country, external influences on national policies and on behaviour, etc.).

**While cross-border transmission of vectors and of pollution are likely to be considerable, the scope for direct action to restrict their movement is very limited in most cases.** In the case of insect vectors, it might be feasible to create "no-go" areas on international borders (through intensive vector-control efforts or greater restriction on emissions); but there is no reason to expect that international boundaries will be the optimal place for such measures.

**Where there may be greater scope is in cross-border transmission of vectors linked to international movement of people or of goods.** Examples include malaria-infected mosquitoes in aeroplanes and the inadvertent transportation of infected materials by cargo ships (e.g. the alleged responsibility of ballast discharged by a foreign cargo ship for the outbreak of cholera in Peru in 1991).

**However, the feasibility of measures to deal with these issues is likely to be very variable.** International commercial flights are operated by a relatively limited number of companies from a finite number of locations; they are already highly regulated (and regulations are well policed); the cost of routinely spraying planes with insecticide is relatively limited; and passenger concerns provide a commercial incentive for compliance. Intervention thus seems quite feasible. International shipping, by contrast, is much more disparate in its ownership and routes; it is much less well regulated (with the added complication of "flags of convenience"); the inspection procedures required for effective vector control are much more complex; and customers have little incentive to ensure that health regulations which do not affect the quality of their product are observed, particularly if this increases costs.

**Beyond this, control of vectors within countries, and of pollution at its source, are likely to be much more cost-effective** in terms of overall benefits. However, this means that the benefits will accrue disproportionately to the country concerned, while cross-border effects will be more limited (except in the case of a small and heavily industrialized country such as Luxembourg). Moreover, these effects are overwhelmingly regional in nature (i.e. they occur between neighbouring countries); and they arise primarily in developing countries (vector-borne diseases are more prevalent in tropical areas, while pollution is more readily dealt with at a regional level in developed countries). As a result, **measures in these areas are unlikely to qualify as GPGs**.

While exposure to infection was discussed earlier, a distinct issue arises in the present context, namely the **cross-border transmission of diseases which have the potential to cross the species barrier** (e.g. through live animal exports). Such diseases are more likely to go undetected than human-borne diseases, because surveillance of animal health is much more limited than that of human health. Recent examples have included avian 'flu in Hong Kong and Nipah virus in Malaysian swine. While these cases were

successfully dealt with at the national level, this would be much less likely in countries with weaker surveillance and regulatory systems.

Measures to control this problem may represent a potential GPG – probably through border controls rather than in-country. However, further consideration would need to be given to the extent of the potential benefits; practicality (e.g. the extent of the health checks on animals which would be required); cost and financing mechanisms (and the implications for trade); effects on poverty (e.g. potential impacts on nomadic herders in West Africa), etc. The potential problems could be eased by using selective rather than universal checks; and possibly to apply controls to trade between different regions rather than all international trade (since most trade takes place over relatively short distances), so as to confine outbreaks of disease within confined areas. It might prove more feasible either to ban international trade in live animals outright (which would have additional benefits for animal welfare).

**Cross-border transmission issues in the areas of food and product safety are currently dealt with by the WTO**, through the Sanitary and Phytosanitary (SPS) and Technical Barriers to Trade (TBT) Agreements. Here the main issues are now the appropriate implementation of these agreements; the avoidance of unnecessarily restrictive standards being set, to the detriment of small producers in developing countries (with potentially adverse effects on poverty, and thus on health); and meeting the very high cost of compliance with the terms of these agreements, particularly in developing countries.

All of the factors listed above are subject, in varying degrees, to cross-border influences as well as direct cross-border transmission. Cross-border influences on **incomes and prices** (as discussed in the previous section) are again an important mechanism, influencing exposure to infection and vectors through their effects on living conditions, and in the latter case through ability to afford insecticides, etc. for domestic use; pollution through effects on demand for industrial products, energy use, etc.; food and product safety through ability and willingness to pay for safer goods and the need for producers to compete either by improving safety standards or by reducing costs possibly at the expense of safety; health and safety at work through the commercial presence of foreign companies and the need for domestic producers to compete with them and with imports; accidents, e.g. through effects on road use; and violence through effects on poverty and inequality.

**Policies** are also an important cross-border influence, to the extent that deregulation, or the more effective enforcement of the regulations which exist, affects product and working standards.

The policy implications in these areas are similar to those outlined in the previous section.

## B6. Health Services

Factors influencing health status through health services include:

- health policies;
- health system infrastructure and delivery systems;
- the availability of health services;
- capacities and incentives for providers (e.g. salary levels, resource availability and incentive structures within health systems, etc.);
- factors of production (primarily health professionals and capital);
- medical technology; and
- other inputs (pharmaceuticals, other consumables, medical equipment, etc.).

Many of these factors are, of course, interrelated.

Possible areas for GPGs in this context include, in particular:

(a) international measures to control adverse cross-border influences on health systems;

(b) development and dissemination of delivery technologies, treatment régimes, etc.;

(c) international influences on national health sector policies; and

(d) cross-border financial support for aspects of health systems.

Adverse cross-border influences on health systems include, for example, the effects of changes in the global economy and international economic institutions on the resources available for health at the national level (e.g. debt problems, financial crises, adjustment programmes, competitive pressures on tax rates, etc.); the effects on input prices of international trade rules (e.g. the TRIPs agreement); international migration of health professionals; and the potential effects of international trade in health services. The first of these falls mainly outside the health sector (i.e. controlling it would be a non-health GPG with health-related externalities), and is therefore not considered here.

Mechanisms to ensure that the effects of international trade agreements on health systems are taken fully into account is a potential GPG, in that its costs are limited and the potential benefits substantial. The specific case of the TRIPs Agreement is more complex, as it raises the issue of conflicts between incentives for the development of technology and incentives for its dissemination, as discussed in Box 1. Nonetheless, **a satisfactory resolution of the "intellectual property" issue, which provided incentives both for the development of the technologies which would provide the greatest health improvements and for their dissemination to the areas where they**

**are most needed, would be a GPG of considerable value.** The development and dissemination of treatment régimes, delivery technologies, etc. is closely related to this.

International migration of health professionals is a serious problem for some major source countries, where large-scale outflows coexist with serious domestic shortages. However, restricting movements would raise significant human rights issues, as well as being strongly opposed by many developed countries, whose health systems are increasingly dependent on migrant health professionals.

International trade in health services, through foreign direct investment in health facilities and telemedicine, has the potential to cause significant disruption to national health systems, by diverting resources (especially high-quality health professionals) away from public health services serving the majority of the population to for-profit services for the élite (through direct investment) and/or for patients in richer countries (through telemedicine). Coupled with international migration, this could create shortages of health professionals, reduced quality of health professionals within public services and/or substantially increased costs for services which are already under-funded. While the extent of international trade in health services remains limited at present, these effects may justify international action to prevent these effects in the future – particularly if they undermine the provision of other health-related GPGs.

International influence on national health policies revolve primarily around the development of ideas on health policy (the health reform agenda); instruments of policy-making (e.g. the cost effectiveness methodology); cross-country research and exchanges of experience; and, most importantly, conditionality attached to international loans and aid. Recent experience, for example on cost recovery policies, suggests that such external influences are by no means always positive, and can be extremely damaging where false assumptions are made, evidence misinterpreted, or policies inappropriately transplanted to different settings. **Ensuring that policy advice is correct, and not merely well intentioned, would be another very valuable GPG.**

As noted in Section A12, while the most obvious GPGs within the health sector are interventions**, it is at least arguable that health systems themselves constitute a GPG**. Without an effective health infrastructure, there is no effective delivery system for health sector interventions; but many low-income countries face an absolute inadequacy of resources for health, and will therefore be unable to benefit from some GPGs even where they are provided. In some cases, the resulting gaps in coverage could seriously undermine the feasibility or the benefits of some GPGs (e.g. disease eradication; control of drug-resistance strains, etc.).

The likelihood of health-system support being justified on GPG grounds is greatly increased by the disparity in resources available for health discussed in Section A10. As noted above, a 90% increase in public expenditure on health for 3.35 billion people in low-income countries could be achieved for the cost of a 1% increase in total health spending for 860 million people in the developed countries. Since health systems in many low-income countries are typically seriously underresourced, and in consequence seriously under-performing, the potential health benefits would be considerable (although

some other conditions might also need to be improved if the benefits were to be achieved). It is not inconceivable that the cross-border externalities to developed countries of this improvement, in terms of their health (e.g. through reduced cross-border transmission of infectious disease, slower development of antimicrobial resistance, etc.) and economic factors (greater trade opportunities and profitability of investment) would be greater than that of the lowest priority use of public funds in the developed countries. The benefits could be magnified (or the costs reduced) by focusing additional resources on those countries where the needs and potential benefits are greatest, and on health services with the greatest potential cross-border impacts. For example, had additional resources on this scale been allocated to countries at high risk of HIV/AIDS early in the epidemic, and skewed towards activities designed to slow its spread, the number of cases in developed countries might have been substantially reduced. Given the high cost of treatment for HIV/AIDS in developed countries, the financial savings to their health systems alone could well have been greater than the costs.

This suggests that **there may be a case for financial support to the health infrastructure – general equipment, salaries, professional training, buildings, maintenance, information systems, management and administration, regulatory systems, etc. – in some countries as well as (and in some cases potentially as a precondition for) support for specific interventions on GPG grounds**.

# C. Identifying and Prioritizing GPGs

## C1. Identifying Candidate GPGs

The scope of the potential GPGs which have been mentioned in Sections A and B is wide, and their nature very varied. They include, for example:

- measures to limit the incidence and cross-border transmission of infectious diseases;
- international and national-level measures to control sex tourism and the production and international trading of narcotics;
- improvements in the international economic system to produce incomes and prices more conducive to favourable health outcomes and ease financial constraints on health systems;
- international regulation of the marketing of unhealthy products;
- the preservation of a permissive environment for national public health policies;
- coordination of taxes on tobacco and alcohol;

- measures to control cross-border movements of vectors linked to international movements of people and goods, including infectious diseases with the potential for inter-species transmission;

- pollution control;

- modifications to international trade agreements (and mechanisms to guide the negotiation of future agreements) to limit potentially adverse effects on health systems;

- measures to limit migration of medical professionals from countries where their skills are in short supply;

- improvements in the quality of international influences on health sector policies; and

- international support to acutely under-resourced health systems.

However, a framework is needed to identify possible GPGs more systematically.

A useful starting point is to distinguish between problems conducive to GPG-type solutions, and GPG-based means of resolving problems. This suggests viewing possible GPGs for health in two dimensions: the **types of problem** which they address; and the **types of solution** which they offer. GPG-type solutions include those in the areas of global governance (international institutions and rules which could provide benefits by improving health); knowledge (basic epidemiological research, the development of medical technologies, and dissemination of information); and interventions (international support to specific health programmes at the national level). This category might also be considered to include national access goods which widen access to a range of potential GPGs – principally, support to national health systems.

Problems conducive to such solutions can be broadly divided between those which address in-country health problems with cross-country externalities (primarily infectious disease control, but also noncommunicable disease control to the extent that it has economic effects); and those which address the cross-border transmission of factors influencing health risks (food safety, tobacco marketing, international trade in narcotics, etc.).

This suggests a framework for the identification of candidate GPGs such as that shown in Figure 1, with rows indicating problems, and columns indicating potential solution.

## Figure 1: A Checklist to Identify Possible Health GPGs, by Problems Addressed and Solutions Proposed

| | | *problems addressed* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **in-country health problems with cross-border externalities** | | | **cross-border transmission of and influences on risk factors, etc.** | | | | | | |
| *solutions proposed* | | **prevention** | **treatment** | **control of cross-border transmission of infection** | **foodborne risks** | **marketing of unhealthy products** | **narcotics** | **disease vectors** | **chemical pollutants** | **incomes and prices** | **health system costs** |
| **global governance and regional arrangements** | **institutions** | | | | | | | | | | |
| | **rules** | | | | | | | | | | |
| | **standards** | | | | | | | | | | |
| | **coordination** | | | | | | | | | | |
| | **information-sharing** | | | | | | | | | | |
| **knowledge** | **basic research** | | | | | | | | | | |
| | **product development** | | | | | | | | | | |
| | **information-sharing** | | | | | | | | | | |
| | **policy research** | | | | | | | | | | |
| | **best practice dissemination** | | | | | | | | | | |
| **interventions** | | | | | | | | | | | |
| **health systems** | | | | | | | | | | | |
| **other** | | | | | | | | | | | |

This provides a check-list for possible GPGs: to identify candidate GPGs within the area of food safety, for example, consideration should be given to whether there are potential public goods within that area corresponding to each of the rows in the Figure. Conversely, candidate GPGs in the area of product development requires consideration of each of the columns.

Having thus identified the areas in which GPGs may exist, in terms of the problems to be addressed and types of solution, **the nature of each candidate GPG may be defined with respect to its excludability and rivalry characteristics**. Figure 2 presents a taxonomy based on these characteristics. Between the extremes of pure excludability and pure non-excludability, goods may be technologically excludable (e.g. through encryption technology); administratively excludable (cf. television licensing); circumstance specific (i.e. concerning only countries exhibiting certain characteristics); geographically exclusive (each country's production is beneficial only to some other countries); or "enabling" (i.e. excludable through absence of access goods). It should be noted one good may be subject to more than one or more of these aspects of excludability.

Some of these categories can usefully be broken down further. Administratively excludable goods may be subdivided between those which are produced by the private sector and those produced by the public sector. Geographically-exclusive goods may be subdivided between those which are circumstance specific (beneficial only to countries with specific characteristics); regional (beneficial only to countries in a certain region); or global (beneficial to all countries).

Purely-excludable goods may be subdivided in two dimensions: by rivalry in consumption (between goods which are rivalrous and non-rivalrous, and in the former case between national public goods and private goods); and by the nature of the cross-border externalities (negative, zero or positive, and through "access good" characteristics, i.e. allowing countries to benefit from "enabling" GPGs).

Two points should be noted with respect to externalities in this context. Firstly, the dichotomy between goods with positive and negative cross-border externalities implied in Figure 2 is an artificial one, in that some goods may combine positive and negative cross-border externalities, possibly affecting different countries in different degrees. Secondly, cross-border externalities arising from international club goods (i.e. international public goods provided on a regional or group basis) are limited to those which affect countries outside the region or group concerned.

## Figure 2: Policy Issues Relating to Candidate GPGs, by Excludability Characteristics

## (a) Partially Excludable and Non-Excludable

| *excludability characteristics* | | examples | candidate GPG |
|---|---|---|---|
| **technologically excludable**<br>*consumption can be prevented by technological means, e.g. encryption* | | electronic information | restrictions on exclusion |
| **administratively excludable**<br>*consumption can be prevented by enforceable rules* | **privately produced** | patentable medical technologies | optimal exclusion measures |
| | **publicly produced** | international vaccination programmes | provision financed by subscription |
| **geographically exclusive**<br>*each country's production is beneficial only to certain other countries* | **circumstance specific**<br>*benefits defined by country characteristics* | control of trade in narcotics | facilitation of intercountry collaboration |
| | **regional**<br>*potential to benefit defined by region* | malaria control | facilitation of regional collective action |
| | **global**<br>*global production benefits all countries* | pollution control | global provision or facilitation of regional provision |
| **enabling**<br>*consumption depends on access goods* | | information on treatment régimes requiring functioning health system | provision of GPG; selective provision of/financial support for access goods |
| **purely non-excludable**<br>*production is uinfeasible or irrational at subglobal levels* | | disease eradication | new institutions/ rules;<br>changes in existing institutions/rules;<br>global programmes |

## (b) Intrinsically Exclusive

| | | non-rivalrous | | rivalrous | | | |
|---|---|---|---|---|---|---|---|
| | | international club goods | | national public goods | | private goods | |
| | | examples | candidate GPG | examples | candidate GPG | examples | candidate GPG |
| **intrinsically exclusive** *production and consumption occur at the national or regional level* | **negative cross-border externalities** | regional trade arrangements | mechanisms to ensure cross-border externalities[1] are incorporated in group decisions | food safety regulations | mechanisms to ensure cross-border externalities are incorporated in national decisions | international marketing of unhealthy products | facilitation/ promotion/ finance of national control measures |
| | **zero cross-border externalities** | regional cooperation on noncommunicable disease control | mechanisms to ensure group measures are not undermined by cross-border influences[1] | national tobacco control | mechanisms to ensure national measures are not undermined by cross-border influences | consumption of non-polluting goods and services | none |
| | **positive cross-border externalities** | regional cooperation on infectious disease control | facilitation/ promotion/ finance of group measures | national infectious disease control | facilitation/ promotion/finance of national support measures | treatment of infectious disease with potential for cross-border transmission | facilitation/ promotion/ finance of national support measures |
| | **access goods** *goods needed to benefit from enabling GPGs* | mechanisms for regional cooperation on health issues | facilitation/ promotion/ finance of group support measures | health system infrastructure | facilitation/ promotion/finance of national support measures | pharmaceuticals (access to medical technology) | facilitation/ promotion/ finance of national support measures |

[1] In the case of international club goods, cross-border externalities and influences refer to those crossing the border between members of the "club" and non-members.

## C2. Identifying Actual GPGs: General Approaches

Having identified candidate GPGs, the next stage is to determine which qualify as actual GPGs. Here, on the basis of the modified definition, **the relevant criterion is whether the relevant benefits of providing the good are at least equal to the relevant costs at some level of provision**. GPGs in the **"intrinsically-exclusive"** and **"geographically-exclusive"** categories are necessarily provided at subglobal level; and in these cases, it is the cross-border externalities which are relevant rather than the overall benefits. These are discussed separately in Section C5. In other cases, all costs and benefits are relevant.

The benefits common to health-related GPGs fall into two main categories: health effects (improvements in health status) and economic effects (increases in income, etc.). However, different health GPGs will also have other effects, e.g. on education (in the case of child health), the environment (e.g. water and sanitation infrastructure), etc.

The **health benefits** of GPGs have two direct health components and two indirect economic components (all of which are related to the level and quality of treatment received):

- the effect on quality of life of episodes of illness or disability;
- the effect of premature mortality (i.e. death earlier than would have been the case had the GPG not been provided);
- the financial and non-financial costs of treatment (both to the patient and to public sector or other subsidised providers); and
- other economic costs of ill-health to the individual concerned and his/her family (loss of income due to inability to work, loss of productivity or death).

It should be noted that the first, third and fourth of these costs may recur, and the last may arise, after the first episode of illness, to the extent that long-term health status is affected.

Equally, economic externalities are likely to have health consequences for those affected, through impacts on nutrition, health-related behaviours, living and working environments, access to health services, etc.

The coexistence of economic and health effects raises the central question of **how to aggregate financial and non-financial benefits and compare them with financial costs**. In principle, evaluating financial costs and benefits is relatively straightforward: the dollar benefits and costs to different affected parties can simply be added together. There is also a widely accepted (though by no means unproblematic) methodology for evaluating health benefits, in the form of Disability Adjusted Life Years (DALYs). However, measured in this way, health benefits cannot be aggregated with economic (or other non-health) benefits.

The most straightforward solution to this problem would be to adapt the conventional **cost-effectiveness methodology**, normally used to compare health interventions, for the evaluation of candidate GPGs. This could be done by deducting the economic benefits of a GPG from the costs of providing it, and dividing the resulting net costs by the health benefits in DALYs, to generate a figure for the *net cost per DALY saved*. While this approach is based on cost-effectiveness methods, it should be noted that its results would not be directly comparable with those generated by these methods, because they take account only of financial costs and health benefits, and not economic benefits.

However, this approach has three serious drawbacks:

- it treats financial benefits to anyone as though they accrued to the financiers of the GPG;

- the results may be very sensitive to the estimation of costs and economic benefits; but the latter in particular will at best be very approximate; and

- for a given level of overall (i.e. health and economic) benefits, it skews the results towards GPGs with primarily economic benefits.

A further problem with this approach (like most conventional approaches to project appraisal in this context) is that it takes no account of the very different impact of the same absolute change in income at different income levels. This is a serious problem even at a local or national level; but the much greater inequalities at the global level make it much more important to resolve. The welfare gain associated with a $1 gain in income for a major shareholder in a transnational company, for example, is much smaller than that of a $1 increase in income for a poor rural farmer in a low-income country. Equally, the impact of a $1 contribution to the provision of a GPG will be much greater for a poor country than in a rich country. A possible way of resolving this problem is outlined in the next section.

An alternative to the cost-effectiveness approach would be to value funding at its **opportunity cost** in terms of health-related spending. This would entail converting dollars into DALYs according to the most cost-effective alternative use of funds available. Again, however, the valuation of economic benefits would be problematic. They could be valued at the same $/DALY rate; but this would be unrealistic. In effect, this would assume that the welfare effects of all increased private incomes were equivalent to those of the most cost-effective health intervention available, which is implausible. The results would be equivalent to the approach outlined above, coupled with a direct comparison with evaluations of interventions using cost-effectiveness methodology; but, by the same token it would be subject to the same shortcomings, with the addition of the non-comparability with conventional cost-effectiveness results.

At least as problematic is *how to determine the appropriate $/DALY rate*. In principle, this should be based on the average cost-effectiveness of those interventions which would be provided without the GPG, but not if the GPG is provided. This is unproblematic on a purely theoretical level, where interventions are assumed to be sequenced in order of cost-effectiveness: the interventions forgone will be some combination of the most cost-

effective interventions which are not provided and the least cost-effective interventions which are not provided; and the difference in the $/DALY rates they imply will be only marginally different.

In practice, however, this is not the case: interventions are provided with very high costs per DALY saved, while some exceptionally cost-effective interventions are not provided. This applies even at the national level, and much more so globally, because of the disparities in the resources available in different countries. Moreover, the alternative uses of funds might well lie outside the health sector, in which case cost-effectiveness measures cannot be used.

A more realistic approach would be to use an average figure for the cost effectiveness of funds currently used in the health sector globally. In principle, this would produce conservative results, on the assumption that the expenditure forgone to produce the GPG would not be interventions of greater than average cost effectiveness. However, this assumption is questionable in practice, particularly if a significant part of the costs are borne by developing countries (where marginal cost effectiveness is likely to be much higher, due to greater health needs, more limited service provision and lower unit costs) or by aid budgets for the health sector. Again, the problem of comparability with cost effectiveness measures for interventions also arises.

A third approach is provided by **cost-benefit analysis**. This is the orthodox approach for evaluating projects and policies with diverse benefits. However, the valuation of health (and other non-financial benefits) is problematic; and while methodologies exist for such valuation, their results are not consistent. Moreover, the problem of differences in the value of absolute financial benefits between different levels of income remains. This also affects the most common approach to the valuation of non-financial benefits, which is based on willingness to pay.

Nonetheless, a variant on conventional cost-benefit analysis might be a viable approach to the evaluation of GPGs under the modified definition. Such an approach is outlined in the following sections.

## C4. Measuring Benefits and Costs

A first step towards resolving the bias of cost-benefit analysis towards benefits to developed countries would be to use purchasing power parity (PPP) exchange rates, to avoid distortions arising from discrepancies in market exchange rates. (Valued at market exchange rates, $1 can typically buy 4-5 times as much in a low-income country as in a developed country.) While exact calculation would require a country-by-country breakdown of cross-border externalities, an approximation could be made using average rates e.g. for regional and developed countries. (N.B. Using the logarithmic approach, the exchange rate used does not affect the results.)

However, this deals with only one relatively limited part of the problem, as differences in income remain vast even at PPP exchange rates. A more complete solution would require

an assumption to be made about the nature of the relationship between income and welfare. One possibility would be to assume that a 1% change, rather than a $1 change, in income has an equal effect on welfare at all income levels (or mathematically, that welfare is proportional to the logarithm of income). This would imply replacing *absolute* changes in income or expenditure in the calculation with changes in income and costs *relative to (per capita household) income*. The financial benefits of a GPG in a particular year would then be measured as a number of annual per capita household incomes.

Financial costs can be valued in the same way as income; and non-financial costs (primarily the time spent receiving treatment, waiting to receive it and travelling to and from the health facility) can be valued similarly, using hourly income as a proxy for the opportunity cost of time (although this approach also raises some problems, despite its widespread use). Costs to public and other subsidized providers might be valued on the basis of GNP per capita.

The valuation of life-for-policy purposes is a particularly controversial area – largely because it brings the valuation of money at different levels into sharp focus. However, the relative income change approach suggested above may help to resolve this issue. Methodologies based on the willingness to pay for reductions in the risk of death have generally found that the valuation of life varies broadly in line with income. This suggests that the value of life to the individual might, in principle, be stated as a multiple of income. This could be directly added to the financial benefits.

Valuing the negative welfare effects of being ill (or the benefits of escaping illness through the provision of a GPG) is again problematic. The most straightforward approach to this would be to use the weightings for illness and disability used in the calculation of DALYs for cost-effectiveness calculation, applied to the valuation of life as a multiple of income as described in the last paragraph.

This approach would provide a means of aggregating health and non-health benefits, generating a result measured in annual per capita incomes. While some aspects of this methodology are somewhat arbitrary (not least the relative income change welfare function), they should at least be less systematically skewed against those on low incomes than more conventional approaches.

A second issue is the **aggregation of benefits over time**. Both health and economic externalities are likely to be spread over a long period, possibly with a complex lag structure. In the latter case, especially, there may be a combination of positive and negative effects in different areas and for different countries. (For example, increased production of primary commodities for export is likely to reduce world prices, imposing costs on other producers, but benefiting consumers.)

Here there is a more widely-accepted methodology, namely discounting future benefits to produce a single figure for their present value, generally using the market interest rate as a discount rate. However, this rate may not be appropriate for use in conjunction with the proposed welfare function, as part of the time preference rate for which the market interest rate is a proxy may arise from the expectation of higher incomes in the future. Consideration should be given to making an adjustment for this factor.

This issue is all the more important because *the results of the present value calculation will be particularly sensitive to the discount rate used,* because of the very long-term nature of the benefits entailed (particularly if the GPG is to be provided for an extended period), and the potentially long time lags between provision and some of the health effects (e.g. inter-generational effects).

An additional problem is that converting health benefits into financial terms, amalgamating them with economic costs and benefits, and discounting the results means, in effect, discounting health benefits. While there is a sound basis for the discounting of financial costs and benefits (because saving and borrowing can be used to rephase consumption over time), it is by no means clear that the discounting of health benefits – particularly years of life, which cannot be substituted over time – is conceptually coherent.

## C5. Intrinsically Exclusive and Geographically Exclusive GPGs

As noted earlier, intrinsically exclusive and geographically exclusive GPGs are necessarily provided at a subglobal level, and therefore require different treatment from GPGs in other categories. The same general methods for aggregating health and non-health benefits and for aggregating benefits over time should be used for these goods as for other GPGs. However, it is **only the international costs** (ie costs excluding those which are met by the country or countries in which the good is provided) **and the cross-border externalities** (i.e. effects on countries other than that/those in which the good is provided) which **are relevant to the analysis**.

An second important difference is that, as discussed in Section A9, provision of a particular good may constitute a GPG (according to the modified definition) in some countries or groups of countries, but not in others, because of differences in the costs and benefits of provision. In these cases, the appropriate criterion is therefore whether there are ***some countries or groups of countries*** **in which the potential cross-border externalities are at least equal to the international cost**. (There may, however, be a question as to the political feasibility of excluding countries in which it is not a GPG. If this is not feasible, then the international costs and cross-border externalities of provision in those countries which cannot be excluded also need to be taken into account.)

The main cross-border externalities fall into two categories:

(a) **health externalities** – the effects of provision of the good in each country on the health status of people in other countries, primarily through cross-border transmission of infectious disease and/or cross-border movement of vectors; and

(b) **economic externalities** – the effects of provision of the good in each country on the incomes and economic well-being of people in other countries, primarily through effects on imports, export prices, opportunities for and the profitability of international investment, and migration.

In addition, there may be benefits arising from synergy with other GPGs, through reductions in their costs or increases in their benefits. Again, if these are intrinsically or geographically exclusive it is only the effects on provision in other countries which are relevant; and these will generally be limited.

As in the more general case, the economic effects of the health externalities and the health effects of the economic externalities should also be taken into account.

The **costs** which are relevant to analysis are those incurred outside each country in order to ensure provision within that country. This will generally be less than the total cost, as within-country externalities will justify some additional national spending (although the actual willingness of the government to provide financing will be dependent on the extent of collective action problems at the national level). The same may apply at the regional level, particularly as many externalities are regionally or locally concentrated.

In some cases, these externalities will be sufficient to ensure provision at the national level. There are two circumstances in which this will not be the case:

(a) because the relationship between cost of provision and externalities at the national or regional level does not make the good a priority use of funds, given the resource constraints; or

(b) because there is a collective action problem at the regional or national level, as a result of

  (i) the relative influence of different interest groups; and/or

  (ii) the relatively short time-horizon of most governments, as a result of their limited time in office.

The question is therefore **what side-payment to governments (or other producers at local, national or regional levels) would be required to ensure that the candidate GPG was produced at a national level?** This represents the international cost of providing the GPG.

# D. Financing and Political Feasibility

## D1. Public Goods, Private Costs and the Political Calculus

Most public goods require resources for their production; and these resources need to be provided by someone. Knowledge and information, for example, are public goods in terms of their distribution, but they first need to be produced through investigation or research.
Public goods or positive externalities may also impose costs on third parties other than the costs of their production. Thus most externalities in the area of tobacco control are

almost certain to impose costs on tobacco companies and their shareholders, because their is a direct conflict between tobacco sales (and thus their profits, dividends and share prices) and the health benefits associated with lower consumption. Similarly, reducing pollution is likely to impose additional costs on producers in polluting industries and (to the extent that they seek to pass these costs on) to consumers of their products.

The losers will not always be so undeserving or unpopular as transnational tobacco companies. Imposing stricter safety standards on internationally traded foods, for example, may result in a major loss of export revenues for low-income countries and for poor producers in those countries. This is also likely to have adverse health effects, through the resulting increase in poverty (both directly and through the negative impact on development and economic growth).

From an economic perspective, both health and financial costs need to be taken into account in assessing the merits of potential public goods and cross-border externalities. This is also critically important in political terms. Some potential losers may be in a position to exert **influence** to block policy proposals which are not in their interests, which may require prior efforts to limit their political power (e.g. tobacco or other transnational companies). The **compliance** of others may be necessary to the effective implementation of policies once they have been adopted (e.g. the governments of developing countries adversely affected by international food safety standards). Finding satisfactory solutions is therefore essential to the collective decision necessary to provide GPGs, to securing adequate and reliable financing for their provision, and to implementing the necessary measures at the national and subnational levels.

There are three key questions:

- who bears the resource costs of providing GPGs?
- what mechanism is used to determined who finances the provision of GPGs? and
- how can losers be coerced or compensated?

## D2. Who Pays?

Support and financing (or in-kind support) can be expected only from parties who either expect to gain as much from the provision of the GPG as they lose from or contribute towards its provision, or who can be effectively coerced or incentivised. Those who lose more than they gain can be expected to oppose the decision to provide it by whatever political means are available to them, and are unlikely to play any role in its provision, unless they can be successfully coerced, rewarded or (in the case of adverse effects) compensated.

It should be noted that the relevant gains are not exclusively selfish ones. International agencies, in particular, have value systems which give high priority to objectives which provide benefits to others – development and poverty reduction in the case of the World

Bank, health improvements in the case of the WHO, etc. It is largely with reference to these objectives that the gains to these institutions should be measured, although institutional interests must also be taken into account. Thus measures which would improve global health would provide a gain to WHO in terms of its overall objectives; but the institution's response would be at best unenthusiastic if it seriously undermined the international role of WHO.

Similar considerations apply, to a lesser extent, to governments: benefits to other countries can be expected to enter into their political calculus, for geopolitical, diplomatic and/or philanthropic reasons. In this case, however, national interest is likely to predominate to a much greater extent.

The main potential contributors to the financing of GPGs are international agencies; developed country governments; developing country governments; and transnational corporations:

- **International agencies** are financed and controlled (in varying ways) by their member governments, limiting their relevance as an independent source of financing (although they may provide a politically convenient means of channelling government support).

- Most **developing country governments**, though the major potential beneficiaries of most prospective GPGs, have very limited resources for contributions, whether direct or mediated through international agencies. Moreover, their resources are in general inversely proportional to their likely benefits: richer countries on the whole have fewer health problems than poorer ones.

- **Transnational corporations** are primarily motivated by profit, and will, on the whole, make contributions only to the extent that they expect to benefit (although this includes improvements in their public image as well as more direct financial benefits), unless they can be effectively coerced; and their political strength, the absence of effective legal mechanisms at the international level, and the problem of coordinating coercive measures between countries makes coercion difficult.

This suggests that **developed country governments will be the major prospective source of financing for GPGs**, either directly or through international institutions. There is also a strong welfare argument for skewing costs as far as possible towards developed countries: as noted above, the welfare cost of $1 is much smaller for a rich than a poor country. The discrepancy is still greater to the extent that countries face serious fiscal and foreign exchange constraints, as do most low-income countries.

This applies to expenditure within countries as well as at the international level. GPGs which entail activities at the national level are justified on the basis of the benefits of each country's provision for other countries. While there are also generally some benefits to the country itself, these may be relatively limited; and the activity may have a relatively low priority from a national perspective. A collective decision to provide a GPG, and a requirement that country-level activities associated with its provision be financed at the national level may therefore mean skewing expenditure away from national needs and

priorities. This might well mean worsening the health of poor people in poor countries in order to increase the incomes of rich people in rich countries. This raises serious issues, both of sovereignty and of equity. (See Box 9.)

## Box 9: GPGs and National Priorities: the Case of Disease Eradication

The global eradication of a disease, such as smallpox or polio, is a clear case of a GPG, by any definition (at least in cases where the disease is potentially global in scope). It entails collective action by all countries to secure a collective gain which is not available to any individual country through its own action.

The benefits of disease eradication arise partly in terms of health (reduced mortality, morbidity and/or disability), but also to a great extent financially (through the elimination of costs associated with treatment and preventive programmes), as a result of the elimination of the risk of cross-border transmission. However, while the benefits are, in this sense, primarily international, most of the costs entailed in disease eradication arise at the national level, e.g. for vaccination and other preventive interventions, case management, surveillance, etc.

Those countries where the benefits of elimination relative to the national costs, given resource constraints, make it a public health priority, will eliminate it without any campaign for global eradication. This means that it will not be a public health priority in those countries which adopt national elimination as an objective only *as a result of a global eradication campaign*. In other words, a global eradication programme by definition implies elimination activities in countries where it is not a priority use of funds.

The greater capacity for public health programmes, better overall population health, and, in many cases, more favourable epidemiological profile of developed countries, means that they will typically be among the first to eliminate a disease targeted for global eradication – quite probably before the beginning of the eradication programme. By contrast, developing countries, and especially low-income countries, having the opposite characteristics, are much less likely to have selected elimination of the disease as a priority. Reducing the incidence of diseases across the board is likely to be a higher priority than the elimination of a single disease, which provides more limited health benefits relative to costs. Moreover, since diseases are selected for global eradication largely by virtue of their epidemiological profiles rather than the severity of their consequences for health, there is no reason to expect that even control of such a disease will be a high priority in all, or even most, of the countries in which it is endemic. As a result, most of the efforts for eradication will occur in developing countries where elimination of the disease, and possibly even its control, is not a national priority.

For countries with effective public health systems, most of the benefits of disease eradication arise not from improved health (as any reintroduction of the disease would be effectively managed) but from the savings arising from eliminating the need for preventive programmes. These benefits will generally be greatest in absolute terms in richer countries, because of higher costs; and, unless the resources saved are consciously allocated to pro-poor expenditure, the greatest beneficiaries within those countries are likely to be the non-poor.

Thus, if in-country costs are funded locally, global disease eradication will imply a transfer of resources from high to low public health priorities within those countries, implying an overall deterioration in population health; and much of the benefit will take the form of a financial gain to better-off people in developed countries. This is clearly and seriously inequitable. The overriding of national health priorities in the interests of a global objective which has been set by decision-making mechanisms, which are de facto skewed towards developed country interests, also represents a clear breach of national sovereignty.

The only way of resolving this problem is for national-level activities linked to global disease eradication programmes to be fully funded from outside the country itself, and at least primarily by the developed countries. It is equally important that funding should not merely represent a diversion of resources from aid budgets, at least where these are effectively targeted towards the needs of low-income recipients.

However, if financing is skewed towards developed countries, **this is likely to mean that developed countries need to be substantial beneficiaries of the provision of a GPG (or of supporting and financing its provision) if it is to be produced.** As noted above, this does not mean that they need necessarily derive benefits directly *from the GPG itself* sufficient to offset the costs to them, as geopolitical and diplomatic objectives, international reputation, domestic political constituencies (notably development and environmental NGOs) and commercial interests may also contribute, as well as philanthropic or humanitarian concerns. However, some of these factors (notably geopolitical objectives and commercial interests) may contribute positively or negatively in different cases; and the provision of GPGs, and the design of their delivery and financing mechanisms, are likely to be skewed towards these objectives and interests rather than towards the maximization of global benefits.

There is therefore a danger that focusing excessively on the provision of GPGs as an objective of development policy will skew global policy further towards developed country and commercial interests, and away from low-income country interests and poverty reduction. This would not have a negative impact if GPG provision were additional to other developmental activities; but this is unlikely to be the case. The capacity of the international system to take decisions on a global level is limited, due to the combination of institutional weaknesses and time constraints on national and international policy-makers and the staff of international agencies, and the time and effort required to develop an international consensus on a particular issue. In practice, deciding to provide GPGs is likely to mean slower progress in some other areas of international activity; and, given the current international decision-making process, it is unlikely to be activities which serve the interests of developed countries or transnational corporations which suffer. This problem would be accentuated to the extent that developed countries' contributions to the provision of GPGs were funded from aid budgets.

## D3. Financing Mechanisms

The mechanism by which the costs are allocated between parties is also critical. Options include:

- uncoordinated voluntary contributions;
- coordinated contributions, divided between parties according to an agreed formula;
- earmarked taxes coordinated between countries;
- taxes imposed and collected at the global level (e.g. the "Tobin tax" on international financial transactions); and
- market-based mechanisms (e.g. the purchase and sale of rights to perform activities with negative health consequences).

Even if all parties whose support and cooperation is required gain more than they lose, relying on voluntary contributions may remain problematic, as each individual party has an incentive to minimise its own contribution. Even where a formula for cost-sharing is agreed, this needs to reflect the ability of different parties to pay – particularly as benefits will often be non-financial and/or arise only in the very long term. Moreover, even where a party is financially well able to meet its contribution, political factors may impede the process (cf. the developed countries' 0.7% of GNP "target" for aid budgets, and US contributions to the UN). Agreement of contributions or the subsequent threat of withholding them may also be used to distort GPG provision, to the benefit of major contributors and the detriment of the collective good; or a formal quid pro quo may be demanded through voting mechanisms linked to the level of contributions (cf. the IMF and World Bank).

In principle, an international tax is a much more attractive option. The "Tobin tax", for example, has the potential to raise substantial sums (although there are very wide variations in estimates of the amount, and many competing uses for the proceeds). It is also increasingly seen as practicable, and it is gathering substantial international support. However, it is likely to be resisted strongly by some major developed countries, as a matter of political principle, because of commercial interests (notably the financial sector in the case of the "Tobin tax"), or because it threatens their dominance in international decision-making. It is therefore inadvisable to predicate the provision of GPGs on the implementation of such a proposal.

Coordinated earmarked national taxes are also an attractive option economically – particularly because they would also provide a means of discouraging economic activities or transactions with negative health consequences (e.g. tobacco or alcohol sales) or (preferably) negative health externalities (e.g. pollution). However, the political feasibility of this approach is unclear. There may be resistance to the concept of taxation policies being decided collectively, and intractable disagreements over its design – e.g.

the activities on which the tax should be levied seem inevitable, whether it should be set in absolute or percentage terms, the rates at which it should be set, or in some cases (e.g. pollution) how it should be calculated.

The inclusion of low-income countries would seem particularly problematic, as most have very low government revenues (giving rise to political pressure to retain the revenues raised) and/or weak collection and enforcement mechanisms (giving rise to resentment in other countries that they were not making their full contribution, despite possibly being the greatest and most direct beneficiaries of the GPG provided). However, the latter perception might well also arise if low-income countries were explicitly excluded.

Market-based mechanisms, such as licence trading, are particularly fashionable in the neoliberal world; and there is a precedent in the Kyoto agreement, which allows trading of emission rights. However, this is not universally applicable, in that there is not always something to trade. Also, it does not generate additional resources unless transactions are taxed (which reduces the efficiency of the market); and the Kyoto mechanism has not, as yet, proven itself to be successful. There is also a risk that trading in rights to damage human health may be seen as less politically acceptable than trading in rights to damage the global environment.

## D4. Dealing with Losers: Compensation versus Coercion

Many GPGs will have adverse effects on some people, companies, organizations and/or governments, beyond the financial costs of providing them; and the nature, scale and distribution of these effects will be extremely variable between different cases. This creates incentives for political action against the decision to provide the public good, and/or a failure to play a part in its provision.

There are three areas in which the win-lose calculus for different agents are important:

- in the initial international decision to produce the GPG;
- in the enactment of legislation and the creation of mechanisms required at the national level to provide the GPG; and
- in the enforcement of legislation, the operation of supply mechanisms and compliance by all parties with the terms of the international decision.

There are broadly four categories of agents who may play a critical role at each stage of the process.

- **Governments** (of developed and developing countries) must support the initial decision to provide the GPG, enact and enforce legislation, and establish and operate appropriate institutions to ensure its provisions.

- **Companies** (national and transnational) should not use their political influence to oppose the initial decision to provide a GPG, or to oppose or impede the national legislation, etc. required for its provision. They must also comply with such legislation, which may be more problematic where enforcement mechanisms are weak.

- **Nongovernmental organizations** (national and international campaign groups, interest groups and service providers) should also not oppose or impede decisions to provide a GPG at the national or international level. In some cases they may also be important as providers or intermediaries (e.g. in service provision or health education).

- **People** (as voters, workers, health service users, etc.) should support, or at least not oppose, decisions to provide GPGs; and their compliance with national legislation, whether as recipients, providers or participants in the process will be important.

There are essentially two means of dealing with this problem: coercion (through formal legal instruments and/or through the exertion of influence and extra-legal pressures); and compensation.

## D5. Coercion

The scope for **formal coercion** is determined legally and politically. At present, the limitations of international law (as compared with national law) impose serious constraints on the scope for formal coercion at the global level even where political agreement exists. This means that there are no mechanisms available for formal coercion of national governments; and that formal coercion of non-state actors must rely on governments introducing laws voluntarily (or at least without formal coercion) within their respective jurisdictions.

As a result, **in the absence of a radical change in the system of global governance, the collective action problem will remain**. Moreover, this problem is not limited to the initial decision to provide a GPG: each government (including new governments coming to office) will have the opportunity to reverse the laws which give effect to formal coercion at the national level.

This problem is compounded by the disproportionate influence conferred on companies, organizations and even influential individuals by most national political systems. Since companies and powerful individuals will often be the subject of GPG legislation (e.g. on marketing of unhealthy products, international trade in narcotics, sex tourism, food safety, etc.), this makes national legislation a still more unreliable mechanism in many contexts. The potential for transnational corporations to relocate their operations (and headquarters) further discourages legislation which has substantial adverse effects on them, and provides a means of escaping its provisions if necessary.

Action to discourage tobacco consumption, particularly in the USA, demonstrates that it may nonetheless be possible at least for major developed country governments to take action against powerful commercial interests, provided they constitute only a small part of the overall business sector. For most developing country governments, however, the balance of power is such as to make even this limited engagement at best very difficult.

**Informal coercion and inducement** is more often used with respect to developing country governments. Mechanisms include offers of economic or military aid, favourable market access, etc.; aid conditionality; support for membership of or loans from international institutions; concessions in political or economic negotiations, or political pressure on or inducements for other governments to make such concessions; support in bilateral disputes with other countries; the threat of trade sanctions or support for their relaxation; the offer of support in seeking positions of international influence, etc. A similar approach might also be adopted with respect to transnational companies, although governments have shown much greater reluctance in this regard.

Informal coercion and inducement have the potential at least to reduce the collective action problem to one among the major developed countries, who have the resources and international influence to apply it effectively. However, as experience with structural adjustment programmes has amply demonstrated, informal coercion has serious limitations even where solidarity is strong, international agencies can be harnessed to apply pressure and considerable economic rewards and sanctions are available. In particular, it is often more effective in securing formal agreement to comply than actual compliance, particularly where insufficient account is taken of the political dynamics of the country concerned. This problem may be compounded by a lack of "ownership" – i.e. a perception that changes are being imposed from outside – which may be exploited by vested interests resisting change. Similarly, the use of informal coercion to secure support for an initial decision to produce a GPG may seriously weaken the legitimacy of the decision-making process.

A similar compliance problem is also likely to arise in the case of transnational companies (TNCs). Moreover, the extra-legal nature of informal coercion means that TNCs may increasingly be as well placed as developed country governments to use it to exert pressure on developing countries (albeit through different mechanisms), both to limit their compliance or enforcement and to discourage their support for the initial proposal. The main constraints on this type of activity by TNCs are the threat of developed country sanctions against them; and the potential impact on a company's image of using its economic power to pursue evidently self-serving objectives to the detriment of public health. The former is limited by the political strength of TNCs in most developed countries, the latter by carefully managed public relations.

## D6. Compensation

Even with informal coercion, compensation for any substantial costs incurred by low-income country **governments** is likely to be essential for the provision of GPGs. If such costs are not externally financed, they will be a major obstacle to their support for GPG

provision. Even if support is nonetheless secured (e.g. by failing to make the costs explicit and/or through informal coercion), resource constraints are likely to prevent effective implementation of the measures necessary at the national level (cf. the implementation of requirements under the WTO agreements on Sanitary and Phytosanitary Measures, Trade-Related Intellectual Property Rights and Customs Valuation). If internally financed, there is also a serious risk that the cost of implementation would divert resources away from other health-related expenditure, to the detriment of public health.

The costs of implementation go beyond the administrative costs of establishing and operating institutions charged with GPG provision, and may give rise to a major disincentive to their effective operation. For example, a government has little incentive to ensure that food safety monitoring which triggers restrictions on agricultural exports operates effectively if the sole effect is to reduce much-needed foreign exchange earnings. The same applies to disease surveillance and reporting mechanisms which may trigger travel restrictions or discourage tourism. In such cases, **compensation for the negative economic effects of each instance of compliance are likely to be needed; and this needs to be certain, rapid, and at least as great as the cost involved**.

Similar arguments apply to **individuals** within developing countries. Those who expect to lose as a result of GPG provision can be expected to oppose them at the national and international levels – although the effects of their opposition will depend on national political structures.

More importantly, they will also have little incentive to comply with requirements under national legislation. For example, farmers will have an incentive to conceal rather than to reveal potential food safety problems. However, there is an important question of balance: while compensation mechanisms should be designed to avoid disincentives for compliance, it is important to avoid creating counterproductive incentives (e.g. reporting of false positives or deliberate infection of livestock in the food safety case). Again, if low-income households bear significant economic costs (including time costs) as a result of GPG provision, this may have a negative impact on their health, which needs to be taken fully into account, and compensated if possible.

**NGO**s need to be compensated for the services which they are expected to provide, both to ensure that they participate (the vague definition of NGOs undermines the potential for formal or informal coercion to achieve this), and to ensure that their activities are adequately resourced. Political opposition is likely primarily from interest groups whose members are adversely affected (although this may extend to tactical opposition to seek net benefits for members). However, opposition is also possible from service providers, e.g. if the proposed GPG provision creates alternative sources for the services they provide, or favours competing providers. Direct compensation is unlikely to be effective in such cases: developing an alternative role for the NGOs concerned may be a more viable option.

In the case of **companies**, it would in principle make sense to use coercion to restrict activities which have negative health effects (e.g. the promotion of tobacco and alcohol consumption and unhealthy diets and behaviours), and compensation or reward to

encourage them to provide health-favouring externalities (e.g. research into new drugs and vaccines). In practice, however, the limitations of formal and informal coercion at the national and international levels may require compensation to be used also in the former case.

Again, there is a need in the latter case to design compensation mechanisms to ensure effectiveness and avoid perverse effects. For example, compensating tobacco companies for reducing their marketing from current levels could create incentives for new entrants to come into the market (with active marketing strategies) to fill the vacuum; but extending coverage of the compensation to these new companies might merely strengthen this incentive.