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The health impacts of globalisation:
a conceptual framework

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Abstract

The health impacts of globalisation: a conceptual framework

This paper describes a conceptual framework for the health implications of the globalisation process in the following three steps: 1) defining the concept of population health and identifying its main determinants; 2) defining the concept of globalisation and identifying its main features; and 3) constructing the conceptual model of globalisation and population health. The main health determinants are identified and structured by means of a conceptual model, which is based on an analysis of existing health models. The nature of the determinants (institutional, socio-cultural, economic, and environmental) and their level of causality (proximate, distal, and contextual) are combined into a basic framework that conceptualises the complex multi-causality of population health. Contemporary globalisation is defined as an intensification of cross-national cultural, economic, political, social and technological interactions that lead to the establishment of transnational structures and the global integration of cultural, economic, environmental, political and social processes at various levels. The following features of globalisation are distinguished: global governance structures, global markets, global communication and diffusion of information, global mobility, cross-cultural interaction, and global environmental changes. The conceptual framework, subsequently, links features of globalisation with health determinants and specifies how distal and proximate health determinants are affected by globalisation. This study has resulted in valuable insights in health effects resulting from globalisation. The described conceptual framework could give a meaningful contribution to further empirical research by serving as a 'think-model' and is a useful tool to structure future explorations of the health implications of globalisation by means of scenario analysis.

Keywords: Population health, globalisation, health determinants, conceptual model

Rapport in het kort

De gezondheidseffecten van mondialisering: een conceptueel raamwerk

Dit rapport beschrijft een conceptueel model met betrekking tot de gezondheidseffecten van mondialisering in drie stappen: 1) definiëring van het concept volksgezondheid en identificatie van de belangrijkste gezondheidsdeterminanten; 2) definiëring van het concept mondialisering en identificatie van de belangrijkste aspecten van mondialisering; en 3) ontwikkeling van het conceptuele model voor mondialisering en gezondheid.
De belangrijkste gezondheidsdeterminanten zijn geïdentificeerd en gestructureerd met behulp van een conceptueel model dat gebaseerd is op bestaande gezondheidsmodellen. De aard van de determinanten (institutioneel, economisch, sociaal-cultureel en ecologisch) en hun positie in de causale keten (proximaal, distaal, contextueel) zijn gecombineerd tot een basis raamwerk dat de multi-causaliteit van de volksgezondheid weergeeft. Mondialisering is gedefinieerd als een intensivering van crossnationale culturele, economische, politieke, sociale en technologische interacties die resulteren in het tot stand komen van transnationale structuren en de mondiale integratie van culturele, economische, ecologische, politieke en sociale processen op verschillende schaalniveaus. Onderscheiden worden de volgende mondialiseringsaspecten: mondiale beleidsstructuren, mondiale markten, mondiale communicatie en de verspreiding van informatie, crossculturele interactie, mondiale mobiliteit, en mondiale milieuproblemen. Het conceptueel raamwerk relateert vervolgens deze aspecten van mondialisering aan gezondheidsdeterminanten en geeft aan hoe distale en proximale gezondheidsdeterminanten worden beïnvloed door mondialisering.
Deze studie resulteert in belangrijke inzichten in de relaties tussen mondialisering en gezondheid. Het beschreven conceptuele model kan een substantiële bijdrage leveren aan verder onderzoek door te fungeren als een ‘denkmodel’ en is een bruikbaar instrument om toekomstige verkenningen van de gezondheidseffecten van mondialisering door middel van scenario’s te structureren.

Trefwoorden: volksgezondheid, mondialisering, gezondheidsdeterminanten, conceptueel model

Contents

1. Introduction

Looking at past and contemporary developments in our health, we can state that there have been broad gains in life expectancy over the past century. But health inequalities between rich and poor persist, while the prospects for future health depend increasingly on the relative new processes of global change and globalisation. In the past, globalisation has often been seen as a more or less economic process characterised by increased deregulated trade, electronic communication and capital mobility. However, globalisation is becoming increasingly perceived as a more comprehensive phenomenon that is shaped by a multitude of factors and events and which is reshaping our society rapidly; it encompasses not only economic, political and technological forces, but also social-cultural and even environmental aspects. We perceive globalisation as an overarching process in which simultaneously many different processes take place in many domains. This paper develops a conceptual framework for the effects of globalisation on population health. The framework has two functions: serving as 'think-model', and providing a basis for the future development of scenarios on globalisation and health.

Two recent and comprehensive frameworks concerning globalisation and health are the ones developed by Woodward et al. (1) and by Labonte and Togerson (2) (Appendix A). However, the effects that are identified by Woodward et al. (1) as most critical for health are mainly mediated by economic factors and they do not comprehensively describe the 'effects on other influences on health at population level'. Labonte and Torgerson (2) primarily focus on the effects of economic globalisation and international governance. In addition, this framework argues that the health impacts of the imposed macro-economic policies, enforceable trade agreements, official development assistance, and unenforceable multilateral agreements are primarily mediated by effects on the capacity and regulatory authority of domestic, regional and local governments (2, 3).

The pathways from globalisation to health are often complex: the health effects of globalisation are mediated by a multitude of factors like, for example, economic development, lifestyle and environmental changes. Therefore, a conceptual framework of globalisation and health requires a more holistic approach and should be rooted in a broad conception of the determinants of population health as well as of globalisation. This paper develops a conceptual framework for globalisation and health in the following three steps:

1. Defining the concept of population health and identifying its main determinants.
2. Defining the concept of globalisation and identifying its main features.
3. Constructing the conceptual model for globalisation and population health.

Chapter 2 first defines population health and Chapter 3 identifies the determinants of population health (step 1). Accordingly, Chapter 4 defines the concept of globalisation and its most important features (step 2). Chapter 5 presents the conceptual framework for globalisation and health (step 3) and discusses how the features of globalisation affect the identified health determinants. Our subsequent conclusions are discussed in Chapter 6.

2. Population health

This chapter first defines population health and describes accordingly the difference between international and transborder health issues.

2.1 Defining population health

The world around us is becoming progressively interconnected and complex and human health is increasingly perceived as the integrated outcome of its ecological, social-cultural, economic and institutional determinants. Therefore, it can be seen as an important high-level integrating index that reflects the state –and, in the long term, the sustainability- of our natural and socio-economic environment (4, 5). Good health for all populations has become an accepted international goal, but good health means different things to different people, and its meaning varies according to individual and community expectations and context. This subjectivity makes it very difficult to define (good) health. Table 2.1 gives several examples of existing definitions of health, divided into three groups: 1) definitions describing health as a state, 2) definitions describing health as a resource or capacity and 3) definitions describing health as an outcome.

Table 2.1: Definitions of health

Health as a state
Health is a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity (6).
Health is the absence of diseases and disability (7).
Health is the condition of being sound in body, mind or general spirit, especially freedom from physical disease or pain (8).
Health is a condition in which all functions of the body and mind are active (9).
Optimal health is a balance of physical, emotional, social and spiritual well-being (10).
Health as a resource/capacity
Health is a positive concept emphasising social and personal resources, as well as physical capacities (11).
Health in human beings is the extent of an individual's continuing physical, emotional, mental and social ability to cope with his environment (12).
Health as an integrated method of function, which is oriented toward maximising the potential of which the individual is capable of within the environment where he is functioning (13).
Health is the capacity of people to adapt to, respond to, or control life's challenges and changes (14).
Health as an outcome
Health is an outcome of family functional and social support, resourcefulness and versatility (15).
Population health is determined by a complex mixture of genetic, environmental and social factors, as well as individual behaviour (16).

A distinction can be made between individual and population health. Traditional medical thinking has been largely concerned with individuals that were already sick or those that were at the greatest risk of developing a health problem. In order to understand and improve the health status of an entire population a broader conception of health and its interrelated

institutional, economic, social-cultural, and ecological determinants is required (17). In this paper, we prefer to perceive population health as the integrated outcome of the economic, social-cultural, institutional and ecological determinants that affect a population's physical, mental and/or social abilities/recourses to function normally. For practical reasons, however, this paper primarily focuses on the physical aspects of population health like mortality and physical morbidity, because the determinants of mental health are very complex and less well known at the population level.

2.2 Population health in a globalising world

In today's globalising world, the geographical scale of important health issues is also increasing (see Figure 2.1). As already discussed, a distinction can be made between *individual* health and population health. In turn, population health can refer to health at different geographical scale levels ranging from a (small) community (*community health*) to an entire country (*national health*) or beyond (*international health*). In addition, our health is also becoming more and more affected by factors that transcend national borders (*transnational health*) and the implications of globalisation are leading to new patterns of health and disease that do not necessarily conform to, or are revealed by, national boundaries alone (18).

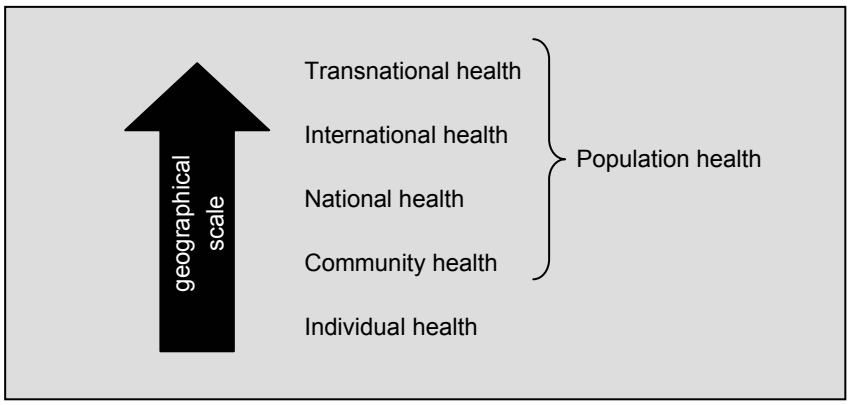

Figure 2.1: Geographical scales of health

Lee (18) explicitly distinguishes transborder health from international health. International health issues refer to health matters that concern two or more countries. (Alternatively, within the development community, international health usually refers to health matters relevant to the developing world.) According to Lee, the distinguishing characteristic of international health is the fact that although developments in other countries can have a possible effect on national health, national governments can avert these foreign influences on the health of their population by means of policy boundaries. One speaks of transborder health issues, when 'the causes or consequences of a health issue circumvent, undermine or are oblivious to the territorial boundaries of states and, thus, beyond the capacity of the states to address effectively through state institutions alone'. Transborder health issues are also concerned with factors that contribute to changes in the capacity of states to deal with the determinants of

health. Thus, transborder health issues are not confined to a specific country or group of countries, but are transborder in cause or effect, although great inequities in impact are being experienced within and across populations. Lee argues, however, that it is sometimes difficult to make this distinction in practice as many of today's health issues are, in theory, international health issues, but in reality governments often do not have the capacity or will to deal with them properly, leading to transborder causes and/or effects.

The health effects associated with globalisation are believed to be sometimes beneficial and sometimes not (5, 19). Chapter 5 discusses the health implications of the globalisation process in more detail.

3. The determinants of population health

A comprehensive framework for the effects of globalisation on population health should be rooted in a broad conception of the determinants of population. This chapter identifies the most important factors influencing health by developing a holistic framework for population health and its determinants.

3.1 Existing health models

The population health paradigm places the traditional medical model (i.e. individual health and health care) within the context of multiple determinants of health. In order to do so, it is necessary to combine the multiple health determinants into a coherent analytical framework. To give an indication of the diversity of health models around, we have selected several models that were developed for a wide range of purposes. This selection, representing the diversity of existing health models, includes (see also Appendix B):

- two models that were formulated in order to (quantitatively) explore future health: the Public Health Status and Forecasts (PHSF) model (20) and TARGETS' population and health sub-model (21).
- two models that are widely accepted and used as conceptual frameworks of health determinants: Dahlgren and Whitehead (22) and Evans and Stottart (23).
- two models that were formulated in order to explain the transition in public health status respectively mortality: Frenk et al. (24) and Wolleswinkel (25).
- two models that place human health in an ecosystem context: the Butterfly Model of Health (26) and the Mandala of Health (27, 28).
- one model which applies a conceptual framework for complex issues to health: Huynen and Martens (29).

In the Public Health Status and Forecasts (PHSF) model (20, 30) the determinants influence public health status, which in turn influences the health care use. Public health status as well as the health determinants and health care determine health policy. Health policy has an indirect effect on health status via the determinants and a direct effect on health care use. This whole process is influenced by demographic, macro-economic, social-cultural and medical-technological autonomous developments. The model compromises a comprehensive list of different determinants with a direct effect on health as well as a wide-ranging list of autonomous developments. In our view, however, these autonomous developments can better be perceived as more indirect (distal) determinants of public health, which can be influenced by policies measures in order to improve public health status. In the PHSF-model, this is, unfortunately, not the case. In addition, a link from health care use in the direction to health status is missing.

A key project within the 'Global Dynamics and Sustainable Development' program was the development of a global model called TARGETS (Tool to Assess Regional and Global Environmental and Health Targets for Sustainability) (21). TARGETS consists of five interlinked sub-models, of which the 'Population and Health sub-model' includes a disease

module simulating the process of being exposed to and dying of several health risks. However, the number of health determinants in this disease module is limited; they can be divided into socio-economic factors (Gross World Product and literacy status), environmental factors (food and water availability, and temperature increase), and lifestyle. The model does not distinguish between determinants with direct and indirect effects. The model includes a response module comprising water policy, food policy, health services and reproductive policies.

In 1995, Dahlgren and Whitehead (22) conceptualised the determinants of health diagrammatically as a number of layers of influence, each enveloping the previous one. This multi-layer model has become a widely used approach (see e.g. Acheson (31) and IOM (17)) and we think that the structure of different layers of influence is very appealing. However, there is some discrepancy between the layers in this models and the position of the selected health determinants in the causal chain. This model suggests that health is only directly influenced by the factors in the first layer, namely individual lifestyle factors. However, we believe that many other factors have a direct influence on health as well, like for example the availability of sufficient clean water or the quality of the work environment. Unfortunately, the model does not distinguish between determinants of different nature. Additionally, other response variables besides health care services are not included. It is, of course, possible that incorporating the various response options available to improve health was beyond the intended scope of this model. In our view, however, including response variables should be part of a population health model.

Evans and Stottard (23) present a conceptual model in order to construct a framework with which evidence on the determinants of health can be fitted, and which highlights the ways in which different types of factors and forces can interact. They constructed their model component by component, progressively adding complexity, building on the ‘health field concept’ (32). Their model identifies several major fields of influence of health status and their interactions. However, the model does not distinguish between determinants of different levels of causality and it primarily focuses on factors with a direct influence on health. The response options in this model include health care interventions and the individual behavioural response, but health(-related) policies are not taken into account.

The purpose of the framework proposed by Frenk et al. (24) in 1991 is to organise conceptually the complex multi-causality of health conditions and systems in order to add a formulation about the determinants of health status to the health transition field. Their model is very comprehensive, but it is also very complex. They use two figures to clarify their framework: the first distinguishes between factors of different nature, while the second figure explicitly distinguishes between factors of different analytical levels of causality. The model needs a lot of explanation and is due to its complexity not very practical. The health care system included in the model compromises a wide range of health-promoting efforts such as diagnoses and treatment, health promotion, prevention, family planning, genetic counselling, occupational health services and environmental health services. However, the health care system is not explicitly included as response, as the link from health status to the health care system is missing. Political institutions are also incorporated in this model, but the only

policies resulting from these institutions seem to concern redistribution mechanisms affecting the level of wealth and social stratification.

Wolleswinkel (25) describes a simple framework of determinants of mortality decline, consisting of two analytical levels: a proximate level and a distal level. Again, we think that a structure of different layers of causality is very compelling, but the model's structure is perhaps a bit too narrow in order to apply it to public health as it only distinguishes between two broad levels of causality with no differentiation between determinants of different nature and without including a response variable. Although political institutions are included in this model, explicit responses such as health policy or health-related policies are not.

The Butterfly Model of Health (26) has been presented as a descriptive model for presenting and studying human health in ecosystems. Within the model, health- enveloped by biological and behavioural filters- is affected by both the biophysical (BP) and socio-economic (SE) environment. Health depends on the balance within and between BP and SE environments, and the ecosystems around them. This model does make a distinction between factors of different nature: biological/behavioural filters, BP environments and SE environments. It acknowledges the influence of other ecosystem on the internal environments, but there is no more explicit distinction between different levels of causality. Even though political institutions are included in this model, explicit responses such as health policies or health-related policies are not.

The Mandala of Health (27, 28) is a model of the human ecosystem, which presents the influences on health by three circles or levels around the individual: the family, the community and human made environment, and finally, the culture and biosphere. Four subgroups of health influence are identified which impinge on the family and individual directly: personal behaviour, human biology, the physical environment and the psycho-socio-economic environment. Individual health is subdivided into three parts: body, mind and spirit. This approach makes a distinction between determinants of different nature as well as between determinants of different levels of influence. However, there is some discrepancy between the layers in this models and the position of the selected health determinants in the causal chain. The model does include the medical system, which influences human biology and personal behaviour, but there is no reference to other response options.

Huynen and Martens (29) applied the structure of the SCENE-model (a conceptual framework for complex issues) (33) to population health and its determinants. This framework makes the traditional distinction of different forms of capital as developed at UN-DPCSD and the World Bank (33). However, its application to population health does not categorise the selected social-cultural, economic and environmental health determinants according to different levels of causality. Additionally, it does not explicitly include a response variable (e.g. policy measures), as institutional factors are included in the social-cultural domain.

Although the above selection of existing health models is far from exhaustive, it does give a good indication of the strengths and weaknesses of the individual models, which are summarised in Table 3.1.

Table 3.1: Strengths and weaknesses of selected health models

Health Model	Strengths	Weaknesses
PHSF-model (20) 1997	comprehensive list of determinants; distinction between determinants of different nature	the more indirect (distal) health determinants are perceived as autonomous developments; health care use is not explicitly included as response to health status
TARGETS' population and health module (21). 1997	distinction between determinants of different nature; several response variables	limited number of health determinants; no distinction between determinants of different levels of causality
Dahlgren and Whitehead (22) 1991	distinction between determinants of different levels of influence	discrepancy between the layers in this models and the position of the selected health determinants in the causal chain; no distinction between determinants of different nature; only health care services included as response variable
Evans and Stottart (23) 1990	distinction between determinants of different nature	no distinction between determinants of different levels of causality; focus on factors with a direct health effect; health(-related) policies are not included as response
Frenk et al. (24) 1991	comprehensive; distinction between determinants of different nature and levels of causality; wide range of health-promoting efforts	too complex; health-promoting efforts are not explicitly included as response to health status
Wolleswinkel (25) 1998	distinction between determinants of different levels of causality	limited number of health determinants; no distinction between determinants of different nature; no response variable
Butterfly Model of Health (26) 1999	distinction between determinants of different nature	no distinction between determinants of different levels of causality; no response variable
Mandala of Health (27, 28) 1985, 1993	distinction between determinants of different nature ; distinction between determinants of different levels of influence	discrepancy between the layers in this models and the position of the selected health determinants in the causal chain; only medical system included as response variable
SCENE applied to health (29) 2002	distinction between determinants of different nature	no distinction between determinants of different levels of causality; no response variable

3.2 A new framework for population health and its determinants

Although the existing models discussed in the previous section vary with regard to complexity, purpose and content, their strengths and weaknesses reveal the following criteria or guidelines for an ideal-type model for population health:

- make a distinction between determinants of different nature in order to explicitly address population health as the integrated outcome of multi-nature determinants;
- make a distinction between determinants of different hierarchical levels of causality;
- be as comprehensive as possible without becoming too complex (e.g. keep the number of determinants manageable);
- include response variables/determinants.

In order to deal with the first two criteria, the nature of the determinants and their level of causality can be combined into a basic framework that conceptualises the complex multi-causality of population health. In order to differentiate between health determinants of different nature, we will make the traditional distinction between institutional, socio-cultural, economic, and environmental factors.

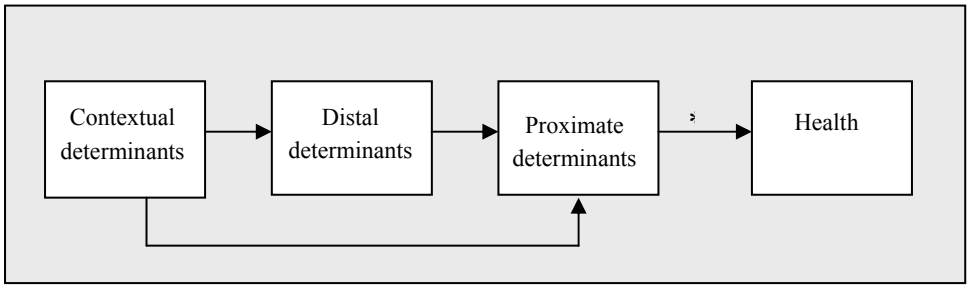

Figure 3.1: Health determinants: different hierarchical levels of causality

These factors operate at different hierarchical levels of causality, because they have different positions in the causal chain (Figure 3.1). The chain of events leading to a certain health outcome includes both proximate and distal causes- proximate factors act directly to cause disease or health gains, and distal determinants are further back in the causal chain and act via (a number of) intermediary causes (34). In addition, Figure 3.1 also distinguishes contextual determinants. These can be seen as the macro-level conditions shaping the distal and proximate health determinants; they form the context in which the distal and proximate factors operate and develop. Subsequently, a further analysis of the selected health models (Table 3.2) and an intensive literature study (see also paragraphs 3.2.1, 3.2.2. and 3.3.3) resulted in a wide-ranging overview of the health determinants that can be fitted within this framework. The resulting Figure 3.2 shows a manageable number of general determinants, while Table 3.3 describes these determinants in more detail in order to give a comprehensive set of variables. In addition, this new framework for population health includes important response variables like health and health-related policies.

Table 3.2: Overview of the health determinants in existing health models

Health Model	Health determinants
PHSF-model (20)	Health policy, health related policy, medical consumption, physical environment (biotic factors, physical factors, chemical factors), material factors, spatial factors, lifestyle (activity, food consumption patterns, behaviour, dental care, stress-coping, drug/alcohol use), social environment, genetic factors, demographic developments, population size, population age structure, gender, ethnicity, family structure, economic developments, income employment, trade, income/price developments, health care budget, environment, social developments, education, available informal care, medical- technological developments
TARGETS' population and health module (21).	Socio-economic factors (Gross World Product, literacy), environmental factors (food availability, drinking water availability, temperature increase), response (food policy, water policy, health services, reproductive policy)
Dahlgren and Whitehead (22)	General socio-economic conditions, general cultural conditions, general environmental conditions, living conditions, working conditions, work environment, education, agriculture and food production, unemployment, water and sanitation, health care services, housing, social and community network, age, sex, constitutional factors
Evans and Stottart (23)	Social environment, social support, emotional deprivation, physical environment, exposure to harmful substances, genetic endowment, behaviours, biological response, health care interventions, prosperity
Frenk et al. (24)	Population size, population growth, population age structure, geographical distribution of population, environment, altitude, climate, natural resources, types of parasites, quality of urbanisation, social organisation, culture and ideology, political structures, science and technology, economic structure, level of wealth, occupational structure, social stratification, working conditions, living conditions, education, social security, food, housing, water and sanitation, family, lifestyle, genome, structure and function of body, environment, pollution, biological, physical or chemical disease agents
Wolleswinkel (25)	Living conditions, nutritional status, working conditions, housing conditions, lifestyle/behaviour, fertility, child care, breastfeeding, medical factors, medical consumption, vaccination, treatment, public health measures, clean drinking water, sewage, socio-economic factors, wealth education, culture, religion, political institutions, political environment, ecological setting, soil type, climate)
Butterfly Model of Health (26)	Biological filters, behavioural filters (behaviour and lifestyle), air (quantity and quality), water (quantity and quality), food (quantity and quality) soil, climate, microbes, plants, animals, aesthetic quality and quantity, home/family, neighbours/friends, workplace/workers, voluntary organisations, political institutions, social support (networks), health care system, early childhood development, personal empowerment, community attachment, neighbouring ecosystems.
Mandala of Health (27, 28)	Family, community (values, standards, support systems and networks), human made environment (urban setting, and the energy, transportation, agricultural and other man-made systems), culture (values, attitudes, beliefs), biosphere, personal behaviour (specific dietary habits, smoking and drinking, the use of seat belts and other driving habits, as well as to more general risk taking and preventive behaviour), human biology (genetic traits and predispositions, the competence of immune system, and the biochemical, physiological and anatomical state), the physical environment (adequate housing, the physical state of the workplace, and the physical state of the local neighbourhood) and the psycho-socio-economic environment, (socio-economic status, peer pressure at school and work, exposure to advertising, social support systems) work, medical care system.
SCENE applied to health (29)	Population growth, migration, urbanisation, social change, lifestyle, education, equity, conflict, water, food, environmental degradation (pollution, biodiversity loss), climate change, economic growth and development, technology, governance, globalisation.

We must keep in mind, however, that determinants within and between different domains and levels interact along complex and dynamic pathways to produce health at the population level; the health determination pathway is not unidirectional and several feedbacks are possible. There is interaction between and within determinants of different nature and level of

determination. To illustrate: economic inequity is related to education and social equity, while these factors are in turn related to lifestyle, which directly influence population health. Another example of the involved complexity: changes in health or health-related policies can be a response on problems with regard to determinants at the proximate level, indicating associations in the direction from the proximate to the distal level. Additionally, health in itself can also influence its multi-level, multi-nature determinants; for example, ill health in itself can have a negative impact on economic development (35).

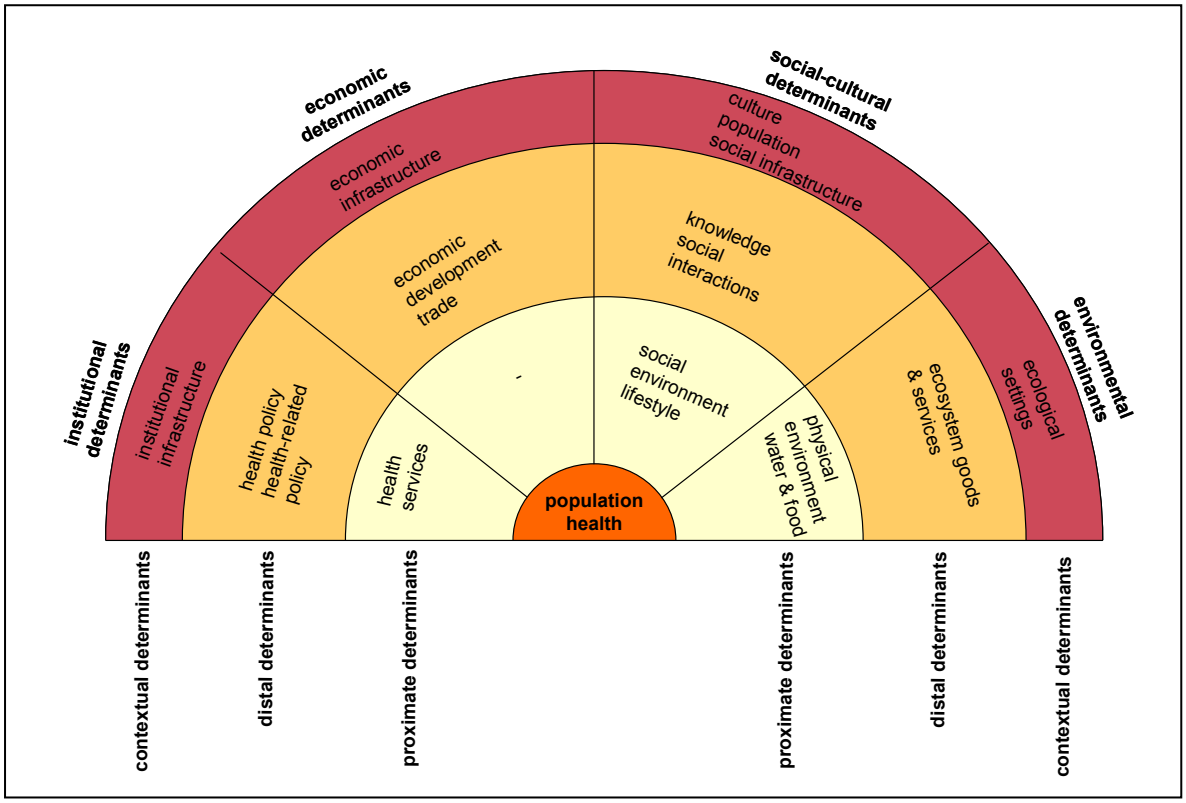

Figure 3.2: Multi-nature and multi-level framework for population health

Table 3.3: Determinants of population health

Level/ Nature	General determinants	More detailed determinants
Contextual level		
Institutional	Institutional infrastructure	Governance structure
		Political environment
		System of law
		Regulation
Economic	Economic infrastructure	Occupational structure
		Tax system
		Markets (incl. demand and supply)
Social-cultural	Culture	Religion
		Ideology
		Customs
	Population	Population size
		Structure (incl. age)
		Geographical distribution (incl. urbanisation)
	Social infrastructure	Social organisation
		Knowledge development (incl. technology)
		Social security
		Insurance system
		Mobility and communication
Environmental	Ecological settings	Ecosystems
		Climate
Distal level		
Institutional	Health policy	Effective public health policy
		Sufficient public health budget
	Health-related policies	Effective food policy
		Effective water policy
		Effective social policy
		Effective environmental policy
Economic	Economic development	Income/wealth
		Economic equity
	Trade	Trade in goods and services
		Marketing
Social-cultural	Knowledge	Education and literacy
		Health education
		(Healthy) technology
	Social interactions	Social equity
		Conflicts
		Travel and migration
Environmental	Ecosystem goods and services	Habitat
		Information
		Production
		Regulation

Proximate level		
Institutional	Health services	Provision of and access to health care services
Economic	-	-
Social-cultural	Lifestyle	Healthy food consumption patterns
		Alcohol and tobacco use
		Drug abuse
		Unsafe sexual behaviour
		Physical activity
		Lifestyle related endogen factors: high blood pressure, obesity, high cholesterol levels
		Stress coping
		Child care
	Social environment	Social support and informal care
		Intended injuries and abuse/violence
Environmental	Food and water	Sufficient quality
		Sufficient quantity
		Sanitation
	Physical environment	Quality of the living environment (e.g. housing, work, school): biotic**,** physical and chemical factors
		Unintended injuries (e.g. disasters, traffic accidents, work-related accidents)

The following paragraphs discuss the identified determinants of population health in more detail.

3.2.1 Proximate determinants

As already explained the determinants at the proximate level have a direct impact on population health. **Health services** are, of course, directly concerned with improving human health. In the **social environment**, the negative health effects of abuse and violence are very important as well as informal care and social support. The World Health Organization (WHO) (36) defines violence as 'the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either result in or has a likelihood of resulting in injury, death, psychological harm, mal-development or deprivation'. It is estimated that in 2002 1.6 million people died worldwide as a result of self-inflicted, interpersonal or collective violence (36). Lack of social support is believed to constitute an important risk for health and several studies confirm that psychosocial factors such as social relations and family environment are influencing our health (37). Social relations can also underpin unhealthy behaviours via social influence (38). This leads us to another social determinant at this level, namely **lifestyle**. It is already widely acknowledged and demonstrated that several modern behavioural factors such as an unhealthy diet, physical inactivity, smoking, alcohol misuse and the use of illicit drugs are having a profound impact on human health (Box 3.1).

Box 3.1: Health and lifestyle

Diet: Excess energy intake results, together with physical activity, in obesity. Obesity is an increasing health problem and has several co-morbidities such as non-insulin dependent diabetes and cardiovascular diseases (39). The nutritional quality of the diet (e.g. fruit and vegetable intake, saturated versus unsaturated fats) is also very important for good health.
Inactivity: Physical inactivity has been linked to obesity, coronary hearth disease, hypertension, strokes, diabetes, colon cancer, breast cancer and osteoporotic fractures (39).
Smoking: Tobacco is predicted to be the leading health risk factor by 2030 (40). It causes, for example, cancer of the trachea, bronchus and lung (39), and cardiovascular diseases.
Alcohol use: The consumption of alcoholic beverages increases to risk on liver cirrhosis, raised blood pressure, heart disease, stroke, pancreatitis and cancers of the oropharnix, larynx, oesophagus, stomach, liver and rectum (39). The role of alcohol consumption in non-communicable disease epidemiology is, however, complex. For example, small amounts of alcohol reduce the risk on cardiovascular diseases, while drinking larger amounts is an important cause of these very same diseases (41).
Illicit drugs: According to the World Health Report 2001 (42), 0.4 % of the total disease burden is attributable to illicit drugs (heroin and cocaine). Opiate users can have overall mortality rate up to 20 percent higher than those in the general population of the same age, due to not only overdoses but also to accidents, suicides, AIDS and other infectious diseases (39).

Crucial for maintaining adequate health levels is the availability of sufficient quantities of adequate **food** and **water**. However, billions of people still lack access to basic water services; 1.4 billion people are without access to safe drinking water, while 2.3 billion are lacking sanitation systems necessary for reducing exposure to water-related diseases (43). As a result, an estimated 14 to 30 thousand people die each day from water related diseases (44). Malnutrition is estimated to be still the single most important risk factor worldwide for disease, being responsible for 16% of the global burden in 1995, measured in Disability Adjusted Life Years (DALYs) (45). It even appears that the number of undernourished people in the developing world is no longer falling but climbing (46). In the **physical environment**, the conditions in our direct living environment (e.g. housing, work, school) directly affect population health. The quality of our living environment is determined by biotic (e.g. disease pathogens), chemical (e.g. pollution) and physical (e.g. temperature, radiation, injuries) factors. Especially in the developing world infectious diseases pathogens are still a major problem (47). One has to realise, however, that aspects of lifestyle (or behaviour) are important factors in the exposure to the physical environment. For example, the actual exposure to infectious disease pathogens in the environment is, to a large extent, determined by lifestyle factors such as, unhygienic practices. The increased exposure to harmful UV-radiation by sunbathing is another example.
It is interesting to note that the majority of the risk factors selected by the WHO in their World Health Report 2002 (34) (see Box 3.2) are proximate determinants and, therefore, they show great overlap with the proximate determinants identified in this chapter (Table 3.4). Only climate change, selected by the WHO as a risk factor, cannot be categorised as a proximate determinant, although the direct effect of temperature increase or flooding can be classified under physical environment.

Box 3.2: Selected risk factors in the World Health Report 2002

T*he World Health Report 2002* (34) represents one of the largest research projects ever undertaken by the World Health Organization. The report describes the amount of disease, disability and death in the world today that can be attributed to a selected number of the most important risks to human health. The analysis in the report covered the following risk factors:

- **Childhood and maternal undernutrition**: Underweight; Iodine deficiency; Iron deficiency; Vitamin A deficiency; Zinc deficiency; Lack of breastfeeding.
- **Other diet-related risk factors and physical inactivity**; High blood pressure; High cholesterol; Obesity, overweight, and high body mass; Low fruit and vegetable intake; Physical inactivity.
- **Sexual and reproductive health**: Unsafe sex; Lack of contraception.
- **Addictive substances**; Smoking and oral tobacco use; Alcohol use; Illicit drug use.
- **Environmental risks**; Unsafe water, sanitation and hygiene; Urban air pollution; Indoor smoke from solid fuels; Lead exposure; Climate change; Traffic and transport.
- **Selected occupational risks**; Work-related risk factors for injuries; Work-related carcinogens; Work-related airborne particulates; Work-related ergonomic stressors; Work-related noise
- **Other risks to health**; unsafe health care practices, Abuse and violence.

Clearly, many thousands of other threats to health exist within and outside the categories outlined above. These include very large causes of disease burden, such as risk factors for tuberculosis and malaria (which is currently responsible for 1.4% of global disease burden, with the vast majority of burden from this disease among children in sub-Saharan Africa).

Table 3.4: Proximate health determinants and the selected risk factors in the World Health Report 2002

Proximate health determinants		**Selected risk factors in the World Health Report 2002 (34)**
Health services	provision of and access to health services	unsafe health care practices
Lifestyle	food consumption patterns	low fruit and vegetable intake
	tobacco and alcohol use, drug abuse,	addictive substances
	unsafe sexual behaviour	unsafe sex, lack of contraception
	physical activity	physical inactivity
	lifestyle related endogen factors	obesity, high blood pressure, high cholesterol
	stress coping	-
	child care	lack of breastfeeding
Social environment	intended injuries	abuse and violence
	social support and informal care	-
	intended injuries and abuse/violence	-
Food	sufficient quality/quantity	iodine deficiency; iron deficiency; vitamin A deficiency; zinc deficiency
Water	sufficient quality/quantity	unsafe water, sanitation and hygiene
Physical environment	quality of living environment	indoor smoke from solid fuels, lead exposure, urban air pollution, occupational exposure to carcinogens, airborne particulates, noise, ergonomic stressors
	unintended injuries	occupational injuries, traffic and transport

3.2.2 Distal determinants

Institutional factors at the distal level include, of course, **health policy** and **health-related policy** (food policy, water policy, social policy, environmental policy etc.). **Economic development** is also an important distal determinant; economic development and wealth have enhanced health and life expectancy in many populations; gross national product per capita correlates strongly with national health status (48). Wealth affects health in a number of ways, for example by bringing about improvements in the quality and quantity of food and water, by instituting effective public health measures (including medical care), and by leading to improvements in literacy and the physical environment (49). However, the relationships between economic development and health are complex: for example, despite high income levels, the Middle Eastern oil producing countries have a relatively low life expectancy, whereas countries such as China and Sri Lanka are 'healthier' than their per capita income would lead one to expect (50). In addition, economic inequity within and between populations plays an important role, for it induces absolute poverty in much of the world's population, thereby exacerbating health-related problems. Economic development has also been accompanied by an increased **trade**. The links between trade and disease have been recognised for centuries, as is demonstrated by the fact that the path of the Black Death in the 14th century followed the international trading routes (51). The increasing global food trade, for example, creates new opportunities for infections to flourish due to the movement of contaminated food products or the shipment of livestock. Global food trade is also accompanied by global marketing and altered eating habits. Health issues related to **social interactions** include conflicts, travel and migration, and social equity. Modern warfare affects public health directly through the soldiers and civilians who die or are injured in fighting (52). But there are also indirect health impacts of conflicts through effects on, for example, the economic system, food and water availability, the provision of health care, welfare and adverse impacts on the environment. Warfare can also create a hospitable environment for infections in many ways (53). Garfield and Neugut (54) suggest that civilian deaths compose 90% of all deaths in twentieth century wars. Travel and migration is a potent force in the emergence of disease. When humans travel they carry their genetic makeup, immunologic sequelae of past infection, cultural preferences, customs and behavioural patterns, while microbes, animals and other biological life also accompany them. People also change the environment when they travel or migrate; introduced technology, farming methods, deforestation, dam-building, opening of new roads, treatment and drugs, chemicals, and pesticides all may have great health impacts (55). Health is also closely related to **knowledge**; people and households with more education enjoy better health. Even independent of wealth, improvements in education – particularly women's education – have a considerable bearing on improvements in family health. Unfortunately, in many poor countries, levels of literacy and education are still very low. Technological and scientific knowledge, and proper health education are also important factors. Environmental determinants at the distal level are **ecosystem goods and services.** Ecosystems (contextual layer of influence; see paragraph 3.2.3) provide us with most basic necessities or goods and

essential services, which are the result of the natural processes within the ecosystem. De Groot (56, 57) defined ecosystem functions as the capacity of natural processes and components to provide goods and services that satisfy human needs (including good health). In today's world, several environmental threats compromise the provision of ecosystem goods and services, like climate change, loss of biodiversity and land use changes.

3.2.3 Contextual determinants

Contextual determinants concern the macro-level conditions, which shape the distal and proximate health determinants. At this level the **institutional infrastructure** (governance structure, political environment, system of law, regulation) and **economic infrastructure** (occupational structure, tax system, markets) can be identified. In the social domain we distinguish **culture** (ideology, religion, customs), **population** (size, structure, distribution) and **social infrastructure** (social organisation, knowledge development, social security, insurance system, mobility and communication). Contextual environmental determinants encompass the **ecological setting** (e.g. ecosystems, biodiversity, climate). However, the direction (positive or negative) of the relationship between most contextual factors and human health cannot be easily determined, as complexity increases as one moves further away from the more proximate causes. For example, the effectiveness of certain governance structures is determined by the background of the health problems. The same is true for the effectiveness of 'social organisation'. Another example is the fact that some customs have negative health implications (e.g. circumcision of women), while others are more beneficial (e.g. a diet rich in unsaturated fats). Other contextual aspects might have a somewhat more unidirectional association with health such as social security and population growth- although these still have to be viewed against the background of the existing societal context.

4. Globalisation

In the whole discussion about globalisation hardly anybody seems to deny the phenomenon as such. Apparently, it is widely accepted that we are living in a globalising world. However, globalisation is not an abstract concept; it does not refer to a concrete object, but to an interpretation of a societal process (58). This chapter first defines globalisation against its historical background and, subsequently, discusses its most important features.

4.1 Perspectives on the history of globalisation

Globalisation became a hot topic from the late 1980s on, but hardly anybody mentioned it in the early 1980s, which brings us to the question why globalisation is such a hot issue now, but not twenty years ago? There are three dominant views in historical analyses of globalisation (59): a sceptical approach, a hyperglobalist approach and the transformationalist thesis.

Those who follow the sceptical line argue that internationalisation and global connections are by no means new phenomena. The globalisation sceptics argue that the extent of 'globalisation' is wholly exaggerated. As international interdependence has existed for centuries, the historical evidence at best confirms only heightened levels of internationalisation (59). The hyperglobalist approach, on the other hand, does not deny the importance of previous developments of growing interdependence, but identifies globalisation as a new epoch of human history characterised by 'denationalisation' and resulting in a global age (59). The followers of the transformationalist thesis argue that globalisation is not a new process, but a long-term historical process (59). To illustrate, the expression 'citizen of the world' was already coined by Diagenes, a Greek philosopher in the fourth century B.C. (60). However, current levels of global interconnectedness are historically unprecedented and contemporary globalisation is perceived as a dynamic and open-ended process, which is transforming modern societies and the world order (59).

4.2 Defining globalisation

Scholte (61) distinguishes five different approaches towards globalisation:

- Internationalisation; 'global' is used to describe cross-border relations between countries and 'globalisation' designates a growth of international exchange (e.g. of capital, people, messages, ideas) and interdependence.
- Liberalisation; a process of removing government-imposed restrictions on movements between countries in order to create an open world economy (i.e. international economic integration).
- Universalisation; here 'global' means 'worldwide' and globalisation is explained as the process of spreading various objects and experiences to people at all corners of the world.
- Westernisation or modernisation; globalisation is seen as a dynamic whereby the social structures of modernity (capitalism, rationalism, industrialism, bureaucratism, etc.) are

spread throughout the world, normally destroying pre-existent cultures and local self-determination in the process.

- Deterritoralisation or the spread of supraterritoriality; globalisation entails a reconfiguration of geography, so that social space is no longer wholly mapped in terms of territorial places, territorial distances and territorial borders.

All these different approaches to globalisation result in a wide range of definitions (see for examples Table 4.1), which tend to reflect different aspects of the process. It cannot be denied, however, that what once has been characterised as an in essential economic, technological and political driven phenomenon, is taking place in a social-cultural and environmental (national and international) setting. There is more and more agreement on the fact that globalisation is an extremely complex phenomenon; it is the interactive co-evolution of multiple technological, cultural, economic, institutional, social and environmental trends at all conceivable spatiotemporal scales. According to Scholte (61) only the last of these five approaches offers the possibility of a clear and specific definition of globalisation. The notion of supraterritoriality (or trans-world or trans-border relations), he argues, provides a way into appreciating what is global about globalisation.

Table 4.1: Different approaches to and definitions of the concept of globalisation

Approach	Examples
Internationalisation	Globalisation is, briefly, the intensification of economic, political, social and cultural relations across borders (62).
Liberalisation	Globalisation has become a prominent catchword for describing the process of international economic integration (63).
Universalisation	Planetary synthesis of cultures (64).
Westernalisation/ modernisation	Globalisation can be described as an imperialism of McDonalds, Hollywood and CNN (65).
Deterritoralisation	Globalisation is a process (or set of processes), which embodies a transformation in the spatial organisation of social relations and interactions (59). Globalisation can be defined as significant global connection, with a corresponding diminution in the significance of territorial boundaries and state structures (66).

In order to avoid simplification of the complexities involved in approaching globalisation, Rennen and Martens (67) describe this phenomenon by means of a timeline identifying key historical landmarks of economic, political, technological, social-cultural and environmental developments that have pushed the process of globalisation further. They argue that, taking the extensiveness, intensity, velocity and the impact of contemporary globalisation into account, it is legitimate to assume that the processes underlying it have the potential to change over time, in a non-linear way, characterised by periods of progress, stabilisation, and temporary decline. Before the 1960s, globalisation was intrinsically an economic, political and technological process. However, this approach refers to the emergence of globalisation and not to its current state. From the 1960s on, social, cultural and environmental developments also became important factors that co-shaped globalisation. Hence, they define *contemporary* globalisation as an intensification of cross-national cultural, economic,

political, social and technological interactions that lead to the establishment of transnational structures and the global integration of cultural, economic, environmental, political and social processes on global, supranational, national, regional and local levels. This definition is in line with the view on globalisation in terms of deterritorialisation and it explicitly acknowledges the multiple dimensions involved. Consequently, the term globalisation can be viewed as a collective label, instead as one giant process in itself (68).

4.3 Features of globalisation

Globalisation is causing profound and complex changes in the very nature of our society, bringing new opportunities as well as risks. However, the identification of all possible health effects of the globalisation process goes far beyond the current capacity of our mental ability; due to our ignorance and interdeterminacy of the global system that may be out of reach forever (68).

Table 4.2: Features of globalisation

Features of globalisation	
New global governance structure	Globalisation influences the interdependence among nations as well as the nation state's sovereignty leading to (a need for new) global governance structures.
Global markets	Globalisation is characterised by worldwide changes in economic infrastructures and the emergence of global markets and a global trading system.
Global communication and diffusion of information	Globalisation makes the sharing of information (incl. technological knowledge) and the exchange of experiences around common problems possible.
Global mobility	Global mobility is characterised by a major increase in the extensity, intensity and velocity of movement and by a wide variety in 'types' of mobility.
Cross-cultural interaction	Globalising cultural flows result in interactions between global and local cultural elements.
Global environmental changes	Global environmental threats to ecosystems include global climate change, loss of biodiversity, global ozone depletion and the global decline in natural areas.

In order to focus our conceptual framework, we distinguish- with the broader definition of globalisation in mind- the following important institutional, economic, socio-cultural, and ecological features of the globalisation process: (the need for) new global governance structures, global markets, global communication and diffusion of information, global mobility, cross-cultural interaction, and global environmental changes (Table 4.2).

4.3.1 The need for global governance structures

Governance is concerned with the manner in which an organisation or society steers itself (69) and its structure involves the interaction between the state, private sector and civil society (70). Global health governance concerns the collective forms of governance, from the sub-national to global level, which address health issues with global dimensions (71). Obviously, good (global) health governance is necessary to deal with the health implications

of globalisation. On the other hand, however, many believe that globalisation itself is affecting governance and challenges the governments' ability to deal with health threats to their population; it influences the interdependence among nations as well as the nation state's sovereignty (Box 4.1). As a result, current governance structures have become inefficient and ineffective as the changes in our social and economic reality have outpaced change in the (political) institutions (72) and nations no longer represent truly independent, sovereign countries (60). From a health perspective, international health issues threaten external sovereignty, while transborder health problems compromise internal sovereignty.

Box 4.1: Globalisation and the nation state's sovereignty

Internal sovereignty concerns the relationship between a government and society at large. In operational terms, internal sovereignty in today's democracy means the ability of a government to formulate, implement and manage public policy; governments exercise internal sovereignty when they make laws and regulations, decide on the best and most effective ways to implement those laws and regulations and monitor compliance with them. A treat to a countries operational internal sovereignty implies a threat to its ability to conduct public policy (72). Due to the fact that new global forces have eroded national borders, national regulations loose their grip on national societies in multiple policy domains. For example, transnational cooperations control a large share of the world's capital and currencies leap from one financial market to the next, often defying national regulation (60).

In contrast to internal sovereignty, where the state is the central authority, external sovereignty has as its main characteristic the absence of central authority; external sovereignty implies the independence of states in the international system (72). Keohane and Ney (73) defined the term complex interdependence to characterise a condition in which independent states are connected by an increasing number of channels-political, social, economic, cultural and others. It implies sensitivity to an external force (e.g. the Asian financial crisis affected economies worldwide) and the growing interdependence challenges a nation's external sovereignty.

In order to be able to conduct effective policy, there is a need for new institutional arrangements and a new form of global health governance. The need for new institutions and regulations is, for example, demonstrated by the fact that global economic competition may persuade countries to avoid the costs of social protection in order to be more competitive (social dumping) unless supranational or global regulations are in place that discourage this (74).

International health organisations seem to be the ideal vehicle to start dealing with health problems that go beyond the capacity of national systems. However, the existing health(-related) institutions for multilateral cooperation are experiencing inefficient overlap, while at the same time other crucial responsibilities are not carried out at all. In addition, new actors in the health policy arena like NGO's and transnational organisation are gaining prominence (60). The current loose set of institutions needs to develop into effective networks of governance and consensus has to be achieved about the core functions of international (health) organisations (74).

4.3.2 Global markets

Globalisation is characterised by worldwide changes in economic infrastructures. One of the main drivers of these changes is the emergence of capitalism (67), which is based on a free market, open competition, profit motive, private ownership and minimal government interference. In addition, significant improvements in transport and communication networks also contributed to the infrastructure for a global trading system and the institutionalisation of trade liberalisation (e.g. World Trade Organization) provided the basis for open worldwide markets (59) and the integration of the world's economies (72). One could perhaps even speak about a 'global market', which is characterised by, for example, global products, fragmentation of production, global sales strategies, global trading systems, global currencies and the proliferation of transborder corporate networks.

4.3.3 Global communication and diffusion of information

The globalisation process facilitates the sharing of knowledge and makes the exchange of experiences around common problems possible, especially as information is more and more perceived as a global public good (75). (Although there are also some new barriers to the spread of knowledge like Trade Related Intellectual Property rights). Whether it concerns the transfer of information in written or spoken form or via images (e.g. television), communication networks have acquired a global reach. Additionally, English has become a global lingua franca and has served as the chief medium of verbal communication in international relations (61). As a result, the worldwide diffusion of know-how, knowledge and technological expertise is growing and has become increasingly important (76). Many innovations in communication technology have transformed the capacity, costs, speed and complexity of telecommunications systems (59) and spurred the emergence of global communication networks and global communication tools. The Internet, for example, came into widespread use in 1990s via implementation of World Wide Web and is now facilitating electronic communication across the globe. The 'globalisation of knowledge' even goes beyond the exchange of knowledge across national boundaries, and also implies that the production of knowledge will be organised on a global scale involving international collaborations across greater geographical distances. Furthermore, the extended range of communication possibilities could also help to address the interface between science and the general public (77).

The globalisation process also facilitates the diffusion of (medical) technology. Archibugi and Michie (78) presented a taxonomy of the different forms that the 'globalisation of technology' can take (Box 4.2).

Additionally, many minorities (e.g. ethnic groups, poor, women) in the world do not have governments that are really concerned with their health and well-being. Due to the worldwide flow of information and ideas, their needs are drawn to the attention of the international community and actions to improve their situation often follow. For example, the strong international mobilisation in order to secure cheaper drugs for AIDS patients in poor countries has yielded promising results (79).

Box 4.2: A taxonomy of the globalisation of technology
(Adopted from Archibugi and Michie 1995 (78) and Archibugi and Iammarino 2000 (80))

The aim of this taxonomy is to classify individual innovations according to the ways in which they are produced, exploited and diffused internationally in order to help to identify the several forms of the 'globalisation of technology'. Three main categories can be distinguished:

1. *The international exploitation of nationally produced technology*
   This includes the attempts of innovators (firms and individuals) to obtain economic advantages by exploiting their technological competences in markets other than the domestic one (e.g. exports of innovative goods, sale of licenses and patents, foreign production of innovative goods that are internally generated).
2. *Global generation of innovations*
   This includes innovation generated by single proprietors (multinational enterprises) on a global scale. The authentic global generation of innovations requires the existence of inter-national but intra-firm Research and Development (R&D) centres.
3. *Global technological collaborations*
   This form of knowledge transmission emerged in the academic world, which always had a transnational spectrum of action: knowledge is disseminated without always requiring financial compensation (e.g. joint scientific projects and networks, scientific exchange, sabbatical years, international flow of students). Technological collaboration also occurs when two different firms (national or multinational) decide to establish joint-ventures with the aim of developing knowledge and/or products.

4.3.4 Global mobility

Mobility broadens our horizon and enables us, for example, to establish new contacts, to gain new experiences, and to increase our knowledge. Global mobility is characterised by a major increase in the extensity, intensity and velocity of movement and by a wide variety in 'types' of mobility. Improved infrastructures, institutions of transport, communication and regulation (59) have resulted in the current unprecedented volume, speed, and reach of travel (55). During the 20th century, the motorised movement of people increased more than one hundredfold (81). The expanding mobility is also demonstrated by the fact that there is almost no populated place on earth that cannot be reached by a migrant or product within 1-2 days of travel (82).

4.3.5 Cross-cultural interaction

Many developments in the globalisation process are causing worldwide changes in culture, but does this mean that a unified world culture is emerging? Coca-Cola's famous 1970s advertisement that had children representing cultures from around the world singing and, of course, drinking Coke together symbolised implicitly the emergence of a 'global culture'. Some even speak about cultural imperialism or 'McDonaldisation' (83, 84). This perspective is based, however, on the assumption that western cultural elements are uncritically absorbed in non-western nations and that cultural inflows are suppressing of existent local meanings and forms (85).

A second theory refers to cultural differentialism or lasting difference. According to this view, the future will be characterised by a mosaic of immutably different cultures and civilizations (86). Huntington (87) argues that world politics is entering a new phase and that the fundamental source of conflict in this new world order will be cultural. The increasing interaction between peoples of different civilisations will 'intensify civilization consciousness and awareness of differences between civilisations and commonalities within civilizations'. He envisions that 'civilisation identity will be increasingly important in the future' and that the world will be shaped in large measure by the interactions among seven or eight major civilizations (i.e. cultural entities), which include Western, Confucian, Japanese, Islamic, Hindu, Slavic-Orthodox, Latin-American, and possibly African civilisation. However, Huntington's views have given rise to extensive debates and his argument has been widely rejected (86).

A third theory argues that local cultures are more robust and adaptive than the rhetoric of globalisation would have us believe: a well-established viewpoint among social-cultural scientists considers globalisation as a process of hybridisation that gives rise to a global mélange (86). Cultural hybridisation or cultural mixing refers to processes of local absorption of cultural flows and the mixture between global and local cultural elements. Inflowing cultural elements, such as television series, western consumer articles and values introduced by migrants, can become elements of the local daily life, often in changed forms and adapted to the local context (85). Hannertz (88) argues, for example, that the local is the area 'where the global, or what has been local somewhere else, also has some chance of making itself at home'.

4.3.6 Global environmental changes

The health of the people and that of the environment are intimately interlinked. The WHO estimated that the environmental contribution to the global burden of disease and injury is approximately 23% (52). Pollution affects health at the more proximate level, although the spread of the pollution or its sources could have a more global character. Several other global environmental issues threaten our health more indirectly by posing risks to the world's ecosystems and, subsequent, to the provision of ecosystem goods and services. These global environmental changes caused by a combination of population growth, and modern production and consumption patterns are impacting our health at a global scale. For example:

- ozone depletion due to emissions in some countries may increase the risk on disease in others;
- climate change is not restricted to the geographical areas of the polluting sources and its health effects are expected to be widespread around the globe;
- the loss of biodiversity often has transborder causes and could result in widespread health effects;
- the decline in natural areas is also an important global environmental problem as the natural systems of our planet are increasingly competing with the human made

environment (e.g. cropland, cities) due to anthropological changes in land cover and land use.

In today's world, it becomes more and more clear that anthropogenic ecological changes have acquired a global dimension (61) and that humans are increasingly polluting and degradating the global commons. In addition, poor societies have a relatively modest per capita consumption of resources, but as globalising countries in the developing world are increasing their economic activity and consumption patterns they will increase their impact (e.g. pollution) on the environment as well (60).

5. Globalisation and health: a conceptual model

The pathways from globalisation to health are often complex and the health effects of globalisation are mediated by a multitude of factors. Therefore, a conceptual framework for 'globalisation and health' requires a holistic approach and should be rooted in a broad conception of the determinants of population health as well as of globalisation. This chapter builds on the previous chapters and develops a conceptual framework for the effects of globalisation on population health.

5.1 Conceptual model for globalisation and health

We have identified (the need for) global governance structures, global markets, global communication and the diffusion of information, cross-cultural interaction, global mobility, and global environmental changes as important features of globalisation. Based on Chapter 3, it can be concluded that these features all operate at the contextual level of health determination and influence distal factors like health(-related) policy, economic development, trade, social interactions, knowledge, and the provision of ecosystem goods and services. In turn, these changes in distal factors have the potential to affect the proximate health determinants. Our conceptual framework for globalisation and health, subsequently, links the above-mentioned features of the globalisation process with the health determinants identified in Chapter 3. This exercise results in Figure 5.1.

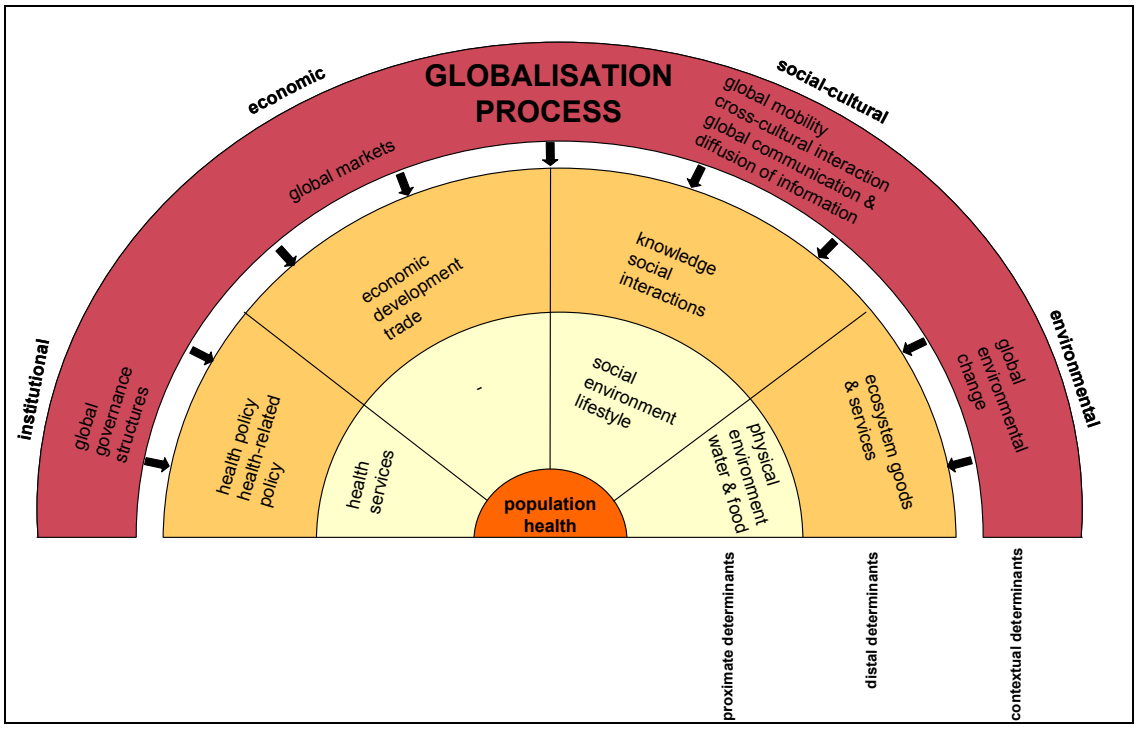

Figure 5.1: Conceptual framework for globalisation and population health

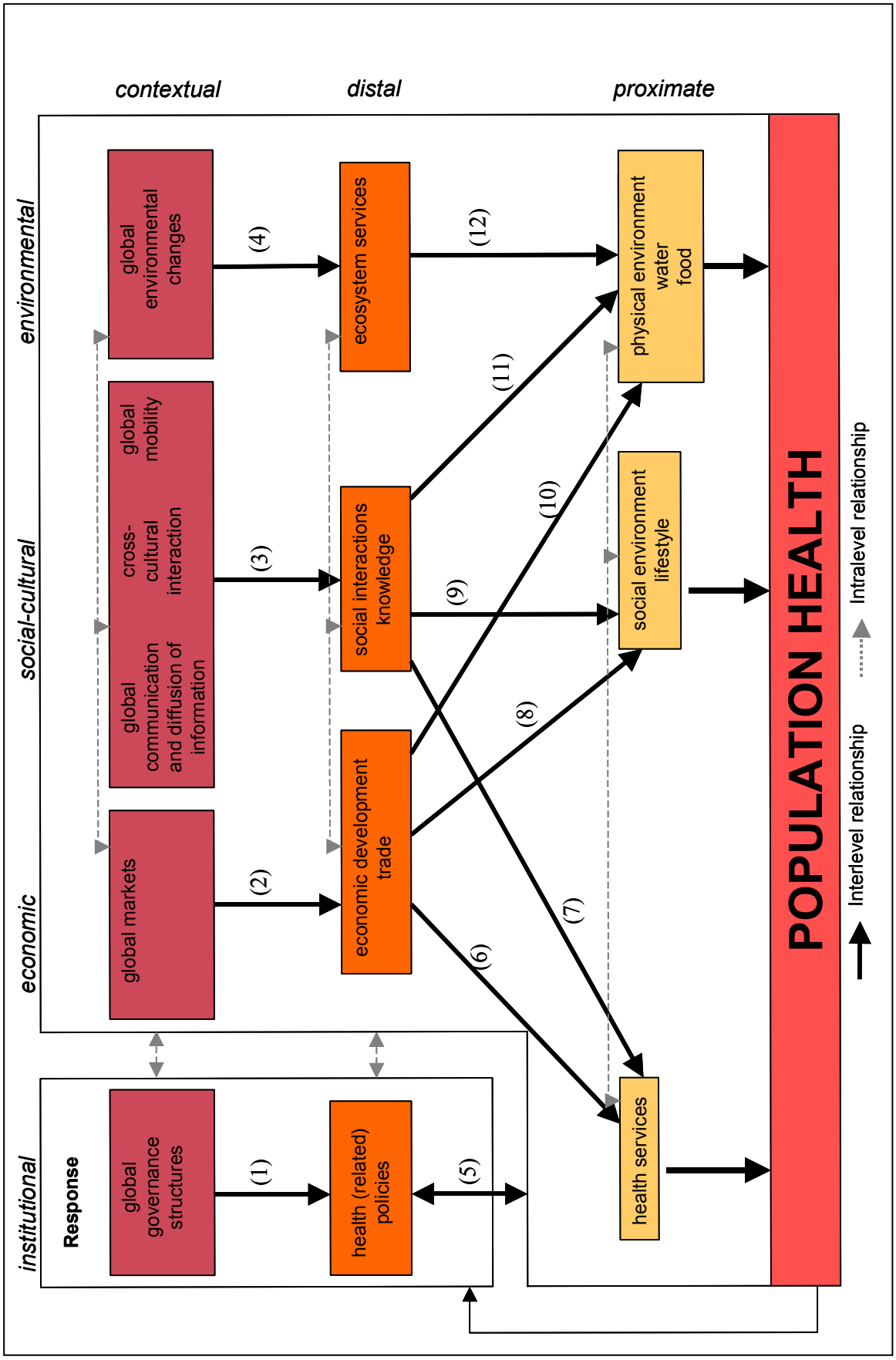

Figure 5.2: Conceptual model for globalisation and population health

Figure 5.2, subsequently, shows that within the developed framework, several links between the specific features of globalisation and health can be derived. These important links between globalisation and health are discussed in the following paragraphs. It is important to note that Figure 5.2 primarily focuses on the relationships in the direction from globalisation to health. This does not mean, however, that globalisation is an autonomous process. One has to keep in mind that globalisation is influenced by many developments at the other levels, although these associations are not included in the Figure for reasons of simplification. In addition, the only feedback that is included in Figure 5.2 concerns the institutional response (i.e. changes in governance structures and health(-related) policies) on changes in population health.

5.2 Globalisation and distal health determinants

Figure 5.2 shows that the processes of globalisation can have an impact on all identified distal determinants (Figure 5.2; arrows 1-4). Below, the implications of the globalisation process for these distal determinants will be discussed in more detail.

5.2.1 Health(-related) policy

Global governance structures are gaining more and more importance in formulating health(-related) policies (Figure 5.2; arrow 1) and many different actors are participating in the field of global health governance. According to Dodgson et al (89), the most important organisations in global health governance are the WHO and the World Bank (WB).

The WHO is a United Nations specialised agency concentrating exclusively on health. The WHO's mission statement includes important objectives like, for example, to act as the directing and co-ordinating authority on international health work, to assist governments to strengthen health services and to promote- in co-operation with other agencies- the improvement of nutrition, housing, sanitation, recreation, economic or working conditions and environmental hygiene (90).

The WB is one of the biggest organisations of the United Nations and it provides loans and technical assistance to developing countries to reduce poverty and advance sustainable economic growth (91). In the fight to eradicate poverty, the WB plays an important role in the field of global health governance as it acknowledges the importance of good health for economic development and focuses on reaching the Millennium Development Goals (Box 5.1). The WB also influences health policies together with the International Monetary Funds (IMF) through the Structural Adjustment Programmes (Box 5.2).

In addition, the policies of the World Trade Organization (WTO) are also increasingly influencing population health. The WTO was formed in January 1995 and governs global trade. The WTO contains a framework for enforcement of rights and obligations to more than 20 international trade agreements (92), like the General Agreement on Tariffs and Trade (GATT), the Trade Related Intellectual Property rights (TRIPs) and the General Agreement on Trade in Services (GATS). Fidler argues that 'international law on public health in the first half of the 21st century will, in large part, be driven by the WTO and its multilateral

agreements. The combination of the multiple interfaces between the WTO Agreements and public health, combined with the revolutionary dispute settlement mechanism, put the WTO in a much more powerful international legal position than WHO with respect to public health. From the international legal perspective, the centre of power for global health governance has shifted from WHO to the WTO'. Opinions differ with regard to whether the WTO agreements provide sufficient possibilities to protect to population from the adverse (health) effects of free trade or not (93) (see also Box 5.3).

Box 5.1: The Millennium Development Goals

The Millennium Development Goals, or MDGs, are a set of eight major international development goals, to be achieved by the year 2015, that are derived from the United Nations Millennium Declaration (94):

- Eradicate extreme poverty and hunger
- Achieve universal primary education
- Promote gender equality and empowerment of women
- Reduce child mortality
- Improve maternal health
- Combat HIV/AIDS, malaria and other diseases
- Ensure environmental sustainability
- Develop a global partnership for development

Box 5.2: Structural Adjustment Programmes and health

The World Bank (WB) and the International Monetary Fund (IMF) introduced Structural Adjustment Programmes (SAPs) in order to promote efficiency and a more practical allocation of productive resources based on markets mechanisms. The SAPs-packages include massive deregulation, privatisation, currency devaluation, social spending cuts, lower corporate taxes, export driven strategies and removal of foreign investment restrictions (92). Introducing SAPs was a precondition for 'soft loans' to indebted countries, while other more advanced developing countries voluntarily introduced SAPs (95). The policies demanded under SAPs have had adverse effects on multiple health determinants and the restructuring of the health sector has led to the 'collapse of preventive and curative care', while user fees in health care has resulted in 'the exclusion of large sectors of the population from health services'. In addition cuts in public expenditure caused a drastic decline in control and prevention measures and as a result diseases are re-emerging (92).

Box 5.3: The WTO Agreements and public health

The World Trade Organization (WTO) was formed in January 1995 and governs international trade. The WTO contains a framework for enforcement of rights and obligations to more than 20 international trade agreements (92), like the Trade Related Intellectual Property rights (TRIPs) and the General Agreement on Trade in Services (GATS).

- *TRIPs:*
  The WTO intellectual property rules, or TRIPs, oblige member states to provide a minimum 20-year term monopoly patent protection on drugs. Most of these patents have been granted in the developed countries and the larger share of the patents that are granted in the developing world belong to residents of industrialised countries (92). Many health advocates are convinced that this system drives up drug costs, restricts the availability of affordable medicines (96), affects the spread of medical knowledge and will shift research and innovation from science to the corporate business (92) The TRIPS agreement attempts to strike a balance between the longer-term objective to provide incentives for future inventions and the shorter-term objective to allow people to use existing ones. For this reason the agreement does provide some flexibilities for governments in order to protect public policy objectives, provided certain conditions are fulfilled (97). For example, Article 31 of TRIPs allows countries to grant a license to copy the patented drugs to domestic pharmaceutical suppliers without permission from the patent holder for reasons of public interest. This compulsory drug licensing is allowed as long as the drug is intended for use in the domestic market and royalties still have to be paid to the patent holder (97). The U.S. have already used this option many times to restrict the monopoly rights of the patent holder in the interest of the public good (92, 98). Third World countries, however, have been pressured not to provide compulsory licensing. And although Article 27.3(a) allows member states to exclude diagnostic, therapeutic and surgical methods from patentability, pressure is expected from the industry to expand their rights in this area (92).
- *GATS:*
  The WTO service agreement known as the General Agreement on Trade in Services (GATS) sets out rules governing international trade in almost all services. GATS encourages international trade in services as it obliges WTO member states to treat all countries the same and to treat foreign companies as if they were domestic ones. A total of 160 service sectors are covered by GATS, of which some are essential social services concerning public good (99). However, each country can choose in which service sectors they want to make GATS commitments. Health services and social services are lacking behind with regard to the rate they are being listed as open to competition, but still 40 percent of the WTO members have made some type of commitment on health services (e.g. hospital management) (97). Under Article XIV of GATS, WTO members are entitled to take measures necessary to protect human health, regardless of their obligations under the agreement. However, affected WTO countries may in turn challenge such measures if they feel that the relevant provisions have not been respected (97). In the mean time, little information exists on the economic benefits of GATS or its social and environmental effects, and it is argued that the major traders in the industrial world are to gain most due to their far greater capacity to supply services (99).

Another important development is the growing number of public-private partnerships for health both at the national as global level. Until the late 1970s, there was minimal cooperation between the private and the public sector, but today governments attract private sector companies to undertake task that were formerly the responsibility of the public sector. At the global level, public-private partnerships are increasingly perceived as a possible new

form of global governance (98) and could have important implication for health polices, but also for health-related policies.

5.2.2 Economic development

Opinions differ with regard to the economic benefits of economic globalisation (Figure 5.2; arrow 2). On the one side, 'optimists' argue that globalisation, global markets, and economic growth benefit health. They base themselves on the results of several studies. First, developing countries, which have increased trade and reduced import tariffs, have grown faster than the wealthy countries in the Organisation for Economic Co-operation and Development (OECD), therefore narrowing the inter-country inequity (100). A study with regard to economic growth and inequity within countries showed that on average the incomes of the poor change in line with changes in national wealth and that national economic growth is not systematically associated with a widening of the income gap within countries (101). A study by Ben-David (102) showed that countries who trade extensively with one another tend to exhibit a much higher incidence of income convergence than countries that do not trade much with each other and that this trade-related income convergence was accompanied by faster growth by the liberalising countries. Finally, it is argued that although other nations/households might become richer, absolute poverty is reduced and that this is beneficial for the health of the poor (79).

On the other side, 'pessimists' are worried about the health effects of the exclusion of nations and persons from the global market. They argue that the risk of exclusion from the growth dynamics of economic globalisation is significant in the developing world (103). In fact, notwithstanding some spectacular growth rates in the 1980s, especially in east Asia, incomes per capita declined in almost 70 countries during the same period. And although developing countries have become somewhat integrated into the global economy in the last few years, this observation has to be interpreted with care, as it is liable to short-term influences and may not reflect a sustainable trend (72). Many worry about what will happen to the countries that cannot participate in the global market as successful as others? Will the movement towards freer trade benefit all, or will some countries be left behind?

5.2.3 Trade

Due to the establishment of global markets and a global trading system, there has been a continuing increase in world trade (Figure 5.2; arrows 2). In the post-war period trade grew even more rapidly than world income (59). According to the WTO, total trade multiplied by a factor 14 between 1950 and 1997 (104). Today, all countries trade internationally and they trade significant proportions of their national income; around 20 percent of world output is traded (59). The array of products being traded is wide-ranging; from primary commodities such as oil to manufactured goods such as cigarettes. Besides goods, services are also increasingly being traded around the globe (59). In addition to legal trade transactions, illegal drug trade is also globalising since the 1970s; it circumvents national and international

authority and takes advantage of the global finance systems, new information technologies and transportation.

5.2.4 Social interactions: migration

Migration refers to the movement of people and their temporary or permanent geographical relocation. Due to the changes in the infrastructures of transportation and communication, human migration has increased at unprecedented rates (Figure 5.2; arrow 3) (59). Grubler and Nakicenovic (105) estimated and plotted the average kilometres travelled daily for the French population over a 200-year period (1800-2000) and found that spatial mobility has increased more than 1000-fold. According to Held et al. (59) tourism is one of the most obvious forms of cultural globalisation and it illustrates the increasing time-space compression of current societies.

However, travel for business and pleasure constitutes only a fraction of total human movement. Between 1990 and 2000, the worldwide number of people residing outside their country of birth increased with almost 14 percent to a total of approximately 175 million (106). For instance, almost every state or region is importing or exporting labour (59). Other examples of people migrating are missionaries, merchant marines, students, pilgrims, militaries, migrant workers or Peace Corps workers (55). Besides these forms of voluntary migration, resettlement by refugees is also an important issue: about 9 percent of all migrants are refugees. Since the late 1970s, the concerns regarding the economic, political, ecological and environmental consequences of migration has been growing and many governments are moving towards more restrictive immigration policies (106).

5.2.5 Social interactions: conflicts

The tragic terrorist attacks in New York and Washington D.C. on September 11, 2001, fuelled the already ongoing discussions on the link between globalisation and conflicts. Globalisation can decrease the risk on tensions and conflicts, as societies become more and more dependent on each other due to the worldwide increase in global communication, global mobility and cross-cultural interactions (Figure 5.2; arrow 3). Others argue that the resistance to globalisation has resulted in religious fundamentalism and to worldwide tensions and intolerance (60). In addition, the intralevel relationships at the distal level play a very important role, because many developments in other distal factors that have been associated with the globalisation process are also believed to increase the risk on conflicts. In other words, the globalisation-induced risk on conflict is often mediated by changes in other factors at the distal level (see also paragraph 5.2.9).

5.2.6 Social interactions: social equity and social networks

Cultural globalisation (global communication, global mobility, cross-cultural interaction) can also influence cultural norms and values about social solidarity and social equity (e.g. gender roles) (Figure 5.2; arrow 3). Some fear, for example, that the neo-liberal approach prevailing in the global market also brings about widespread cultural changes, as the self-interested

individualism of the marketplace spills over into cultural norms and values resulting in increasing social exclusion and social inequity. Only those who conform to the ideals of individualism are included in society, while those who cannot are excluded. Exclusion involves disintegration from common cultural processes, lack of participation in social activities, alienation from decision-making and civic participation, and barriers to employment and material sources (107). Alternatively, a socially integrated individual has many social connections, in the form of both intimate social contacts (spouse, friends, relatives) as well as more distal connections (membership of church groups and voluntary associations) (108).

On the other hand, the geographical scale of social networks (the web of social relationships that surround individuals) is increasing due to global communications and global media. The women's movement, peace movement and environmental movement are good examples of such transnational social networks (59). Besides these more formal networks, more informal social networks are gaining importance as well. For example, like-minded people are now able to interact at distance through the Internet. In addition, the global diffusion of radio and television plays an important role in establishing such global networks (59). For example, television networks like CNN, BBC or MTV have a global reach. The digital divide between poor and rich, however, can result in exclusion from the global civil society.

5.2.7 Knowledge

The knowledge capital within a population is increasingly affected by developments in global communication, cross-cultural interaction and global mobility (Figure 5.2: arrow 3). Education is an essential activity in people's lives, access to which is denied or limited in some regions of the world. The term 'globalisation of education' suggests getting education into every nook and cranny of the globe. Due to the supraterritoriality in publishing, millions of people now acquire part of their knowledge from transworld textbooks. Air transport, faxes and the Internet made it possible for most colleges and universities to work together with academics from different countries and also facilitate opportunities to study abroad or even to participate in transborder programmes (61). In addition, new spaces of learning in a globalising world are increasingly being defined by new technologies (109) and 'virtual campuses' have been developed via television and computer networks (61).

New technologies have even broadened the character of literacy. Scholte (61) argues that 'in many line of work the ability to use computer applications has become as important as the ability to read and write with pen and paper. In addition, television, film and computer graphics have greatly enlarged the visual dimensions of communication. Many people today 'read' the globalised world without a book'. Finally, the diffusion of new technologies have enabled researchers to gather data in no time from all-around the world and to process much greater quantities of information resulting in increased amounts of empirical data (61).

Overall, it is expected that the above-discussed developments will also improve health training and health education (see for example (79, 110)).

5.2.8 Ecosystem goods and services

Global environmental changes like, for example, climate change or the widespread loss of biodiversity can have profound effects on the provision of ecosystem goods and services to mankind (Figure 5.2; arrow 4). The Intergovernmental Panel on Climate Change (IPCC) concluded that it is expected that climate change can result in significant ecosystem disruptions (e.g. fire, drought, pest infestation, invasion of species and coral bleaching) and that the stresses caused by climate change, when added to other stresses on ecological systems such as land use changes, threaten substantial damage to the earth's natural systems. In addition, several authors have addressed the link between biodiversity and ecosystem functioning and it is agued that maintaining a certain level of biodiversity is necessary for proper ecosystem functioning (111-114). However, it is still unclear which ecosystem functions are primarily important to sustain our physical health. Basically, the following types of 'health functions' can be distinguished. First, ecosystems provide us with basic human needs like food, clean air, clean water and clean soils. Secondly, they prevent the spread of diseases through biological control. Finally, ecosystems provide us with medical and genetic resources, which are necessary to prevent or cure diseases (115).

5.2.9 Importance of intra-level relationships at the distal level

We must keep in mind that determinants within the distal level also interact with each other, adding complexity to our model. Some examples of important intralevel associations at this level are given below:

- As already mentioned, the globalisation-induced risk on conflict is often mediated by changes in other factors at the distal level stressing the importance of intra-level relationships at this level. For instance, increased global trade in arms, changes in economic inequity, inadequate policies and environmental degradation have all been associated with globalisation as well as with the risk on conflict (e.g. Zwi et al. (116)). On the other hand, the increased trade can reduce the risks on conflicts by increasing the interdependence among societies (61). Conflicts themselves can, in turn, have profound impacts on other distal factors like economic growth, trade, social interactions or the implementation of adequate policies.
- Changes in health-related policy, of course, have the potential to influence many distal health determinants. For example food safety policies are gaining importance as a global health issue and can have profound implications for food trade. These policies aim to harmonise food safety measures in order to eases trade between countries and to protect consumer health (117). On the other hand, new food safety regulations in developed countries have sometimes far reaching implications for exporters in developing countries as they face difficulties in meeting the increasingly stringent regulations imposed by the developed world and the countries that are not able to meet these new regulations are at risk of being excluded from global trade (118).

- Adverse changes in the provision of ecosystem services can result in increasing migration (environmental refugees), growing risks on conflicts or compromised economic development.
- Economic development without regard for environmental concerns can result in environmental degradation with negative effects on the provision of ecosystem goods and services. For example, food trade often develops at the expense of the environment (119). Economic development without regard for the poor or for other social concerns can result in adverse effects on, for example, economic and social equity.
- Increasing (technological) knowledge can result in the mitigation of adverse effects on the provision of ecosystem goods and services (e.g. due to the widespread implementation of clean technology) or can boost economic development.

5.3 Globalisation and proximate health determinants

Figure 5.2 shows that the impact of globalisation on each proximate health determinant is mediated by changes in several distal factors (Figure 5.2; arrows 5-12). The most important relationships will be discussed in more detail below. It is important to note that health-related policies can have an influence on all proximate factors (Figure 5.2; arrow 5).

5.3.1 Health services

Health services are increasingly influenced by globalisation-induced changes in health care policy (Figure 5.2; arrow 5), economic development and trade (Figure 5.2: arrow 6) and knowledge (Figure 5.2; arrow 7), but also by migration (Figure 5.2: arrow 7).

Although the WHO aims to assist governments to strengthen health services, government involvement in health care policies has been decreasing. Public services like health care are becoming increasingly under the control of the commercial sector due to privatisation and reductions in public spending. As a result, medical institutions are more and more confronted with the neo-liberal economic model, the expansion of markets, competition and profit in health care. Health is increasingly perceived as a private good leaving the law of the market to determine whose health is profitable for investment and whose health is not (92). In addition, some argue that the increasing pressures brought about by global competition have resulted in long-term degradation of health systems in many countries, including the capacity to deal with infectious diseases (120).

According to Collins (121) populations of transitional economies are no longer protected by a centralised health sector that provides universal access to everyone and some groups (e.g. poor) are even denied the most basic medical services. In the US and several Latin American countries health services have been provided by the private sector over the past decade and a decline in the accessibility of health care has been observed in these countries (99). Additionally, the increasing trade in health services can have profound implications for provision of proper health services. Although it is perceived as to improve the consumer's choice, some developments are believed to have long-term dangers, such as establishing a two-tier health system, movement of health professionals from the public sector to the private

sector, inequitable access to health care and the undermining of national health systems (92, 98). In addition, the illegal trading of drugs and the provision of access to controlled drugs via the Internet are potential health risks (122).
Increased (technological) knowledge resulting from the diffusion of information can further improve the treatment and prevention of all kinds of illnesses and diseases. However, the globalisation process can also result in a 'brain-drain' in the health sector as a result of labour migration from developing to developed regions.

5.3.2 Social environment

The central mechanism that links personal affiliations to health is 'social support', the transfer from one person to another of instrumental, emotional and informational assistance (123). Social networks and social integration are closely related to social support (124) and, as a result, globalisation-induced changes in social cohesion, integration and interaction can influence the degree of social support in a population (Figure 5.2; arrow 9). This link is, for example, demonstrated by Reeves (125), who discussed that social interactions through the Internet influenced the coping ability of HIV-positive individuals through promoting empowerment, augmenting social support and facilitating helping others. Alternatively, social exclusion is negatively associated with social support.
Another important factor in the social environment is violence, which often is the result of the complex interplay of many factors (Figure 5.2; arrow 5, arrow 8 and arrow 9). The WHO (36) argues that globalisation gives rise to obstacles as well as benefits for violence prevention. It induces changes in protective factors like social cohesion and solidarity, knowledge and education levels, and global violence prevention activities such as the implementation of international law and treaties designed to reduce violence (e.g. social protection). On the other hand, it also influences important risk factors associated with violence such as social exclusion, income inequality, collective conflict, and trade in alcohol, drugs or firearms.

5.3.3 Lifestyle

Due to the widespread flow of people, information and ideas, lifestyles also spread throughout the world. Individuals respond to the range of healthy as well as unhealthy lifestyle options and choices available in a community (126), which are in turn determined by social interactions (Figure 5.2; arrow 9), global trade and marketing trade (Figure 5.2; arrow 8) and economic development (Figure 5.2; arrow 8).
Although major chronic diseases such as heart disease or cancer are not transmittable via an infectious agent, the behaviours that predispose to disease can be communicated by advertising, product marketing and social interactions (e.g. via social influence, news media and popular entertainment) (127). Global trade and marketing developments drive, for example, the nutrition transition towards diets with high proportions of salt, saturated fat and sugars (41). The MirBurger fast food chain, for instance, is selling American-style hamburgers and fried potato chips in Tashkent, capital of Uzbekistan. Although this food is

relatively expensive, it still attracts a large clientele of fashion conscious young people and the success of MirBurger could be a sign of a preference shift towards Western 'junk food', which has a greater potential to cause obesity (126). Another example is the worldwide spread of tobacco consumption as transnational tobacco companies take advantage of the potential for growth in developing countries (41) (Box 5.4). Additionally, the scale of cigarette smuggling poses a considerable global threat to the efforts to control tobacco consumption (122). Illegal trade in illicit drugs poses similar problems. At the same time, the alcohol industry is almost as globalised as the tobacco industry (128).

Box 5.4: Globalisation and lifestyle: the spread of the 'brown-plaque'

Cigarette consumption varies considerably among countries among the world and, in general, wealthier countries show a higher consumption rate than developing countries. However, while a decline in cigarette consumption has been observed in the developed countries, the annual consumption rate in less developed countries increased. This increase can be attributed to 'aggressive marketing', the absence of regulations and educational programs and rising incomes. These past decades transnational tobacco companies have moved into Latin America, Asia, the former communist countries of central and eastern Europe, China and Vietnam. In less developed countries, advertisements portray smoking as part of the desirable Western lifestyle and many people have little knowledge about its health effects (129). A study by Ezzatti and Lopez (130) estimated that in 2000 2.41 million people died of smoking in developing countries and 2.43 million in rich nations. Besides the direct health effects of smoking, tobacco consumption also indirectly affects health; when it comes to choosing how to spend family income, tobacco competes with food in some countries. Also, the increasing consumption of tobacco competes with the growing of food, because the land used for the production of tobacco is often also suitable for other crops. Additionally, tobacco consumption is also an important global environmental issue as it contributes to deforestation (129).

However, health education can play an important role in promoting healthy lifestyles by improving an individual's knowledge about the health effects of different lifestyle options (Figure 5.2; arrow 9). Besides health education, (global) policies can also directly discourage unhealthy behaviour by means of economic incentives (e.g. charging excise on tobacco) or other legislation (Figure 5.2; arrow 5). An example is the WHO Framework Convention on Tobacco Control (FCTC), which is the first public health treaty negotiated under the auspices of WHO. The FCTC represents a paradigm shift in developing a regulatory strategy to address addictive substances (131).

5.3.4 Physical environment: infectious disease pathogens

The spread of infectious diseases is probably one of the most mentioned health effects of globalisation and past disease outbreaks have been linked to factors that are related to the globalisation process (Table 5.1). The risk on emerging infectious diseases is increasingly in conjunction with intensifying human-induced changes in biological systems worldwide. The combination of movement of goods (Figure 5.2; arrow 10) and people (Figure 5.2; arrow 11), and profound changes affecting ecosystem goods and services (Figure 5.2; arrow 12) all contributes to increased risk of disease spread (132). For example, the globalisation of food

trade has been associated with the increased spread and transmission of food born diseases (120, 132). Diseases like HIV/AIDS or hepatitis B can also spread through trade in infected biological products (e.g. blood) (122).

Table 5.1: Disease emergence and globalisation (adapted from Newcomb, 2003 (132))

Disease	Factors believed to be associated with emergence as well as with globalisation
Cholera (Peru 1991)	Possibly introduced from Asia by ships Disseminated by human travel
Foot and Mouth (Taiwan 1997- UK 2001)	Global trade and transport facilitates movement of highly contagious viral agent
West Nile Virus (USA 1991)	Human travel or human transport of infected birds or mosquitoes Land use factors contributing to the loss of avian diversity
SARS (2003)	Disseminated by human travel
Avian Flu (Netherlands, Belgium, Germany, 2003)	Trade and travel

Although some important communicable diseases are inherently mainly local in their transmission and epidemiology, like diarrhoeal diseases (133), the factors contributing to the transmission of these more local infectious diseases can in fact be affected by global forces. For other diseases, like for example malaria, HIV/AIDS and tuberculosis, international spread is a major concern. The recent outbreak of the Severe Acute Respiratory Syndrome (SARS) demonstrates the potential of new infectious diseases to spread rapidly in today's world, increasing the risk of a global pandemic. Globalisation is also causing a broadening of the scope of biological and economic consequences (e.g. the economic impact of SARS on Asian economies is feeding back into the global economy) and increases the speed of responses in some cases (133). Knowledge about new technologies can improve the surveillance of infectious diseases and monitoring of antibiotic resistance (79, 110) (Figure 5.2; arrow 11). Wilson (55) states that responding to disease emergence requires a global perspective- both conceptually and geographically- as the current global situation favours the outbreak and rapid spread of infectious disease. As a result, the policies and actions undertaking by the WHO are becoming increasingly important in controlling infectious diseases at a global level (Figure 5.2; arrow 5). For instance, the WHO played a critical role in controlling SARS by means of global alerts, geographically specific travel advisories and monitoring (134).

5.3.5 Food

Food trade has become an increasingly important factor with regard to food security worldwide (Figure 5.2; arrow 10). In many areas of the world the specific food demands (quantity and quality) do not match the food production and this misallocation is one the most important drivers behind food trade. In the 20 years following the World Food Conference in 1974, the volume of agricultural trade grew by 75% and the value of food trade increased by

300% (119). Opinions differ, however, with regard to the effects of trade on food security. Free trade creates access to better and cheaper food supplies via food imports and can stimulate more efficient use of the world's resources as well as the production of food in regions that are more suitable to do so (46, 119). Food trade permits food consumption to grow faster than domestic food production in countries where there are constraints on increasing the latter. Accelerated economic growth can also contribute to food security (Figure 5.2; arrow 10) (119). Others, however, argue that the forces of globalisation in fact endanger food security (e.g. see Lang (135)) and that countries should strive to become more self-sufficient (119). For many countries the increasing dependence on food imports goes hand in hand with a higher vulnerability to shocks arising in global markets (119), which can affect import capacity and access to food imports (119). Many food insecure countries are not able to earn enough with exporting goods in order to pay for the needed food imports (136). Current liberalisation policies are expected to have profound implications on food security (Figure 5.2; arrow 5). As developed countries usually subsidise their agricultural sectors, while developing countries often tax them, the effect of the policy reforms on food security remain often ambiguous (119). In case of extreme food-insecurity and insufficient import capacity, food aid may be provided in order to supplement the scarce food imports. Globalisation can also affect food security by enhancing the knowledge of foreign nations about the usefulness of food aid and its value to donor countries (119) (Figure 5.2; arrow 11). The right to adequate food is directly addressed in the 1966 International Covenant on Economic, Social and Cultural Rights. In 1996, the World Food Summit reaffirmed the right of everyone to have access to safe and nutritious food (Figure 3; arrow 5).

Besides food trade, one can also deal with the mismatch between demand and supply by increasing food production in food-short regions. The globalisation process can increase food security by facilitating the worldwide implementation of better technologies and improved knowledge (e.g. irrigation technologies, research on genetically modified food) (Figure 5.2; arrow 11). At the same time, the natural resource base for food production is increasingly threatened (Figure 5.2; arrow 12). Finally conflicts are, of course, a threat to food security and it is expected that food security in sub-Saharan Africa, for example, will not increase without the establishment of political stability (Figure 5.2; arrow 11) (137).

5.3.6 Water

The effects of globalisation are also raising concerns over water security. The current globalisation process is accompanied by privatisation policies affecting the provision of water (138) (Figure 5.2; arrow 5). Governments and international financial institutions promote privatisation, as they believe it will promote market competition and efficiency. However, others are less optimistic about the effects of privatisation. In fact, some cases show that prices and inequalities in access even rise (139, 140). It is also argued that water, with vital importance socially, culturally, and ecologically, 'cannot be protected by purely market forces' (138). On a global scale, there are increasing efforts to set up global guidelines or policies with regard to fresh water (Figure 5.2; arrow 5), however none of the international

declarations and conference statements requires states to actual meet individual's water requirements (141).

The virtual trade of water is also believed to be of increasing importance (Figure 5.2; arrow 10). The water that is used in the production process of a commodity is called the 'virtual water' contained in the commodity. Therefore, the increasing global trade of commodities is accompanied by an increasing global trade in virtual water. The global volume of virtual water embedded in crop and livestock products traded between nations is estimated to be 1400 billion cubic metres per year (142).

In addition, the globalisation process can increase water security by facilitating the worldwide implementation of better technologies and improved knowledge (Figure 5.2; arrow 11). For example, increasing the efficiency of irrigation systems on a global scale will be necessary as agriculture is responsible for the largest part of the worldwide water demand. At the same time, the natural resource base is increasingly threatened as, for example, global climate change and deforestation profoundly affect our ecosystems ability to provide us with sufficient and adequate fresh water (Figure 5.2; arrow 12).

5.3.7 Importance of intra-level relationships at the proximate level

We must keep in mind that determinants within the proximate level also interact with each other and some examples of important intralevel associations at this level are given below:

- Aspects of lifestyle can be important factors in the exposure to the physical environment. For example, the actual exposure to infectious disease pathogens in the environment is, to a large extent, determined by lifestyle factors such as, unhygienic practices.
- The social environment can reinforce unhealthy behaviours via social influence (38).
- Water and food are two factors at the proximate level that are strongly interrelated; food production is heavily reliant on the availability of sufficient water and often competes with other water uses such as sanitation or drinking.

6. Conclusions and next steps

The world around us is becoming progressively interconnected and complex and human health is increasingly perceived as the integrated outcome of its ecological, social-cultural, economic and institutional determinants. In addition, the effects of globalisation are causing a growing concern for our health, and the intergenerational equity implied by 'sustainable development' forces us to think about the right of future generations to a healthy environment and a healthy life. This paper develops a conceptual framework for the health implications of the globalisation process. The most important outcomes are visualised in Figure 5.1 and Figure 5.2.

The developed framework clearly demonstrates that an interdisciplinary approach towards globalisation and health is required, which draws upon the knowledge from relevant fields such as, for example, medicine, epidemiology, sociology, political sciences, (health) education, environmental sciences and economics. Despite some empirical research efforts indicating the link between the globalisation process and specific health impacts, the present weakness in empirical evidence on the multiple links between globalisation and health is still a problem (122). The described conceptual framework could give a meaningful contribution to further empirical research by serving as a 'think-model', since it provides valuable insights in how to organise the complexity involved in studying the health effects resulting from globalisation. We claim that our approach has several beneficial characteristics. First, it is embedded in a holistic approach towards globalisation; in this paper we perceive globalisation as an overarching process in which simultaneously many different processes take place in many societal domains. Although the globalisation process is too complex to analyse as a whole, the conceptual framework is not restricted to the effects of economic globalisation alone; besides global markets, it also includes (the need for) global governance structures, global communication and diffusion of information, global mobility, cross-cultural interaction and global environmental changes. Second, the conceptual framework is embedded in a holistic approach towards population health and it is based on a comprehensive framework of population health determination. As a result, our model explicitly visualises that globalisation affects the economic, ecological, social-cultural and institutional determinants of population health and that the globalisation process mainly operates at the contextual level, while influencing health through the more distal and proximate determinants.

However, the discussion in Chapter 5 also demonstrates the prevailing lack of consensus about the effects of globalisation on the distal health determinants and the subsequent effects on the proximate health determinants. Due to the current lack in conclusive evidence and the ensuing uncertainty surrounding each arrow in Figure 5.2, we argue that all the opposing interpretations and perspectives described in the current literature are- at present- legitimate. Scenario analysis is an often-used tool to deal with these kinds of uncertainties by making the different legitimate interpretations explicit. Formally, scenarios are plausible but simplified descriptions of how the future may develop, according to a coherent and internally consistent

set of assumptions about key driving forces and relationships (143). Scenarios are usually developed in sets, in which each scenario explores the implications of different assumptions concerning uncertain relationships or uncertain developments in key drivers. Therefore, an integrated set of global health scenarios explicitly dealing with the different interpretations of uncertain relationships could contribute to our understanding of plausible future health effects of globalisation. Recent research showed, however, that the health dimension is largely missing in existing global scenarios (144).

The framework described in this paper provides a well-structured concept map for the qualitative exploration of future health in different but internally consistent globalisation pathways. Such a set of scenarios or storylines would be, of course, purely narrative. A consequent additional step would be the quantification of the conceptual model in order to develop modelled scenarios and compute quantitative estimates of possible health effects. In order to bridge the prevailing gap between our qualitative framework and the formulation of modelled scenarios on globalisation and health, combining scenario development with fuzzy cognitive mapping (see e.g. Kosko (145) could be a useful approach. Scenario-based fuzzy cognitive mapping (SBFCM) would allow for variations in sign and degree of causality within consistent storylines. The framework for globalisation and population health described in this paper can then be used to structure future explorations of the health implications of globalisation by means of SBFCM.

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Appendix A:
Existing frameworks for globalisation and health

A) Framework by Woodward et al.

The framework by Woodward et al. (1) encompasses both the direct effects of globalisation on health operating through national economy, household economies and health related sectors such as water, sanitation, and education, as well as the effects on population-level and individual risk factors for health and on the health care system (Figure A.1). The following linkages are identified as critical to the effects of globalisation on health:

- impacts on health systems and policies operating directly (e.g. the effects of the WTO General Agreement on Trade in Services (GATS));
- impacts on health systems and policies operating through international markets (e.g. the effect on pharmaceutical prices of the WTO Agreement on the Trade-Related Aspects of Intellectual Property Rights (TRIPs));
- direct effects on other influences on health at the population level (direct; e.g. cross-border transmission of infectious diseases, marketing of tobacco);
- effects operating through the national economy on the health sectors (e.g. effects of trade liberalisation and financial flows on the availability of resources for public expenditure on health, and on costs of inputs);
- effects operating through the national economy on population risks (particularly the effects on nutrition and living conditions resulting from impacts on household income).

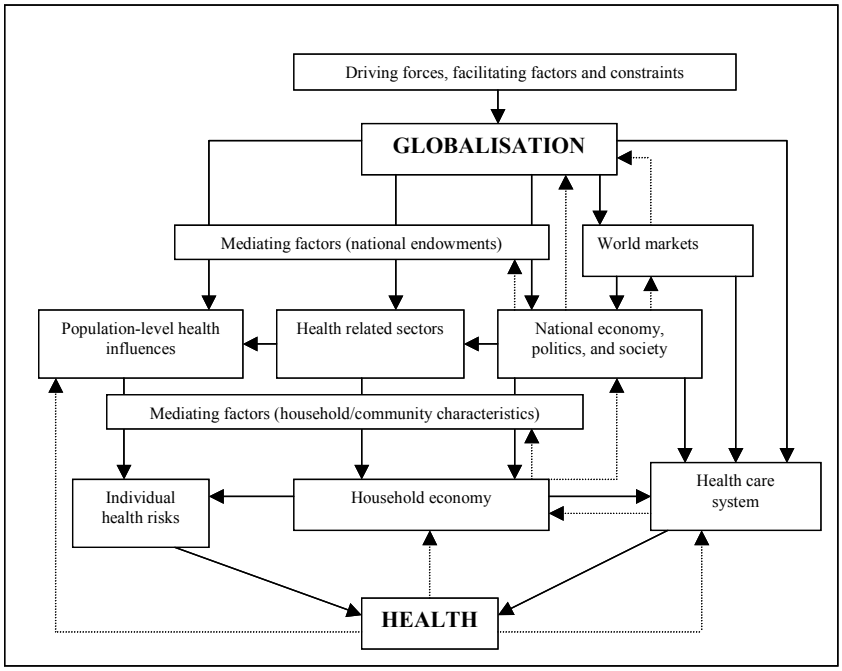

Figure A.1: Outline of the conceptual model for globalisation of health designed by Woodward et al. (1)

B): Framework by Labonte and Torgerson

Labonte and Torgerson (2, 3) provide a framework for understanding how contemporary globalisation can affect health. The key points of their framework are (2, 3):

- How contemporary globalisation affects countries health depends on their historical context and their stock of pre-existing endowments (e.g. demographic structure, economic development);
- Globally, the major vehicles through which contemporary globalisation operates are imposed macro-economic policies, enforceable trade agreements and associated transborder flows of goods, capital and services, official development assistance, and 'intermediary global public goods' (the numerous, largely unenforceable multilateral agreements on, for example, human rights, environmental protection;
- The vehicles, in turn, have both positive and negative health effects on domestic policy space, by increasing or decreasing public sector capacity or resources and regulatory authority. Key domestic policies, which condition health outcomes, include access to education and health care, legislated human and labour rights, restrictions on health-damaging products (e.g. tobacco) and environmental protection. At issue are the health impacts of liberalisation on public revenue and redistribution programs, and the role of trade agreements in circumscribing domestic regulatory capacities in areas of social and health development;
- National policies and resource transfers affect the abilities of regional or local governments to regulate their immediate environments, provide equitable access to health-promoting services, enhance generic community capacities or cope with increases and rapid urbanization;
- At the household level, all off the above determines in large measure family income and distribution, health behaviours, and household expenditures for health, education, and social programs;
- Each level affects, and is affected by, environmental pathways, chief amongst these being resource depletion (water, land, forest), biodiversity loss and pollution.

Appendix B:
Existing health models

This appendix will present nine existing frameworks of health and its driving forces:

1. PHSF-model by the RIVM (20)
2. TARGETS' population and health sub-model developed by the RIVM (21)
3. Model developed by Dahlgren and Whitehead (22)
4. Model developed by Evans and Stottard (23)
5. Model developed by Frenk et al. (24)
6. Model developed by Wollleswinkel (25)
7. The Butterfly Model of Health developed by VanLeeuwen et al. (26)
8. The Mandala of Health developed by Hancock and Perkins (27, 28)
9. SCENE-model applied to health by Huynen and Martens (29)

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1) PHSF-model

Figure B1 shows the basic form of the conceptual model for Public Health Status and Forecast model developed by the Dutch Institute of Public Health and the Environment (RIVM) (20, 30). The model shows that the determinants influence public health status, which in turn influences the health care use. Public health status as well as the health determinants and health care determine health policy. Health policy has an indirect effect on health status via the determinants and a direct effect on health care use. This whole process is influenced by demographic, macro-economic, social-cultural and medical-technological autonomous developments.

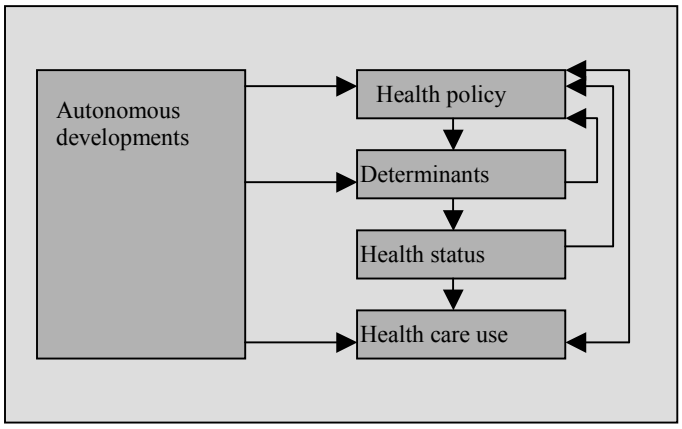

Figure B.1: The basic conceptual model of the PHSF reports (20)

Determinants in the PHSF-model

Figure B2 shows an elaboration for the determinants in the model. It distinguishes three clusters of determinants:

- Personal factors: genetic, acquired or psychological factors;
- Exogenous determinants: physical environment (physical, chemical and biotic factors), social environment (pattern of social network, working environment, housing conditions and socio-economic status) and lifestyle (e.g. physical activity, diet, safe behaviour, dental care, sexual behaviour, stress coping, drug abuse);
- Health care and prevention: medical action and preventive measures (see also Box B1).

Health policy in the PHSF-model

Health policy in the broadest sense is characterised as the actions of governments and others in the field, which are aimed at maintaining and improving the population's state of health. A distinction can be made between:

- Health care policy: organisation of diagnostics, treatment, nursing and care;
- Prevention policy: measures and activities whose purpose is to prevent health problems from occurring or detoriating;
- Intersectoral policy: health-related policy which lies outside the official Public Health sphere, but still involves the prevention of damage to health.

Health care use in the PHSF-model:

The use of health care is a consequence of ill health and the resulting economic aspects of medical care. The use of health care is subjected to the laws of supply (determined by the health state of the population together with attitude and expectations about medical care) and demand (influenced by medical technological developments, the economic capacity of the medical establishment and health policy).

Autonomous developments in the PHSF-model:

The autonomous developments are at the macro level and are considered to fall beyond the scope of health policy. These developments include:

- Demographic developments (e.g. population size, population structure);
- Macro-economic developments (e.g. income, unemployment, health care budget);
- Social-cultural developments (e.g. education levels, health knowledge);
- Medical technology.

Box B1: Health care and prevention in the PHSF-model

In the PHSF-model, 'health care and prevention' includes medical action and preventive measures. Health care affects endogenous determinants or acts directly on the state of health itself (e.g. surgery). Preventive measures include activities aimed at preventing loss of health or promoting and protecting health. Disease prevention acts above all on endogenous determinants (e.g. the effect of vaccination on the immune system), health protection above all on the physical environment (e.g. safety of food, clean air) and health promotion above all on lifestyle (information, education).

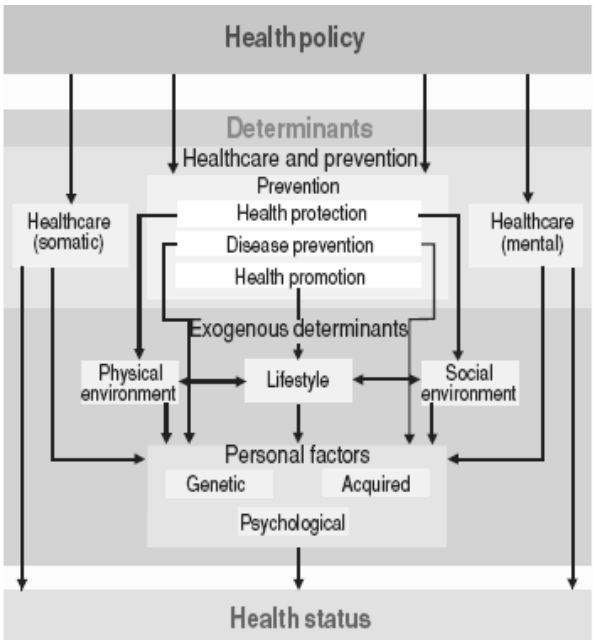

Figure B.2: The PHSF-model: elaboration for 'Determinants' (20)

2) TARGETS: Population and Health Sub-model

In 1992 the National Institute of Public Health and the Environment (RIVM) launched the interdisciplinary research programme 'Global Dynamics and Sustainable Development'. The main objective of this research has been to investigate the concept of sustainable development from a global perspective. A key project within the programme was the development of a global model called TARGETS (Tool to Assess Regional and Global Environmental and health Targets for Sustainability) (21).

TARGETS consists of five interlinked submodels: 1) Population and Health model, 2) Energy model, 3) Biochemical model (CYCLES), 4) Land Model (TERRA) and 5) Water Model (AQUA). The Population and Health submodel simulates the population size and the health of a population (life expectancy, healthy life expectancy) based on a number of socio-economic and environmental determinants. This submodel consists of three modules:

1) a fertility module determining the number of births which is influenced by social, economic and cultural processes;
2) a disease module simulating the process of being exposed to and dying of several health risks;
3) a population state module which combines these fertility and mortality levels in a cohortmodel.

Using an integrated systems approach, the fertility- and mortality processes are structured into Pressure, State, Impact and Response (P-S-I-R) modules. This framework consists of (see Figure B.3):

- a pressure module representing the factors that determine the fertility level, the health risks and the causes of illness and death. The health determinants can be divided into socio-economic factors (Gross World Product and literacy status), environmental factors (food and water availability, and temperature increase). Besides these determinants the disease module also accounts for lifestyle and the fertility module also includes life expectancy as a pressure;
- a state module simulating births in the fertility module and disease-specific mortality and morbidity in the disease module. Both modules having their inputs to the population module distinguishing sex and age groups. In the population state module, the calculated birth and death figures are used to simulate the population size and structure distributed over 5 age groups and males and females;
- an impact module that describes the quantitative and qualitative aspects of the state module such as the (healthy) life expectancy as well as the size and structure of the population;
- a response module consisting of population policies influencing the fertility behaviour and health policies influencing the disease processes.

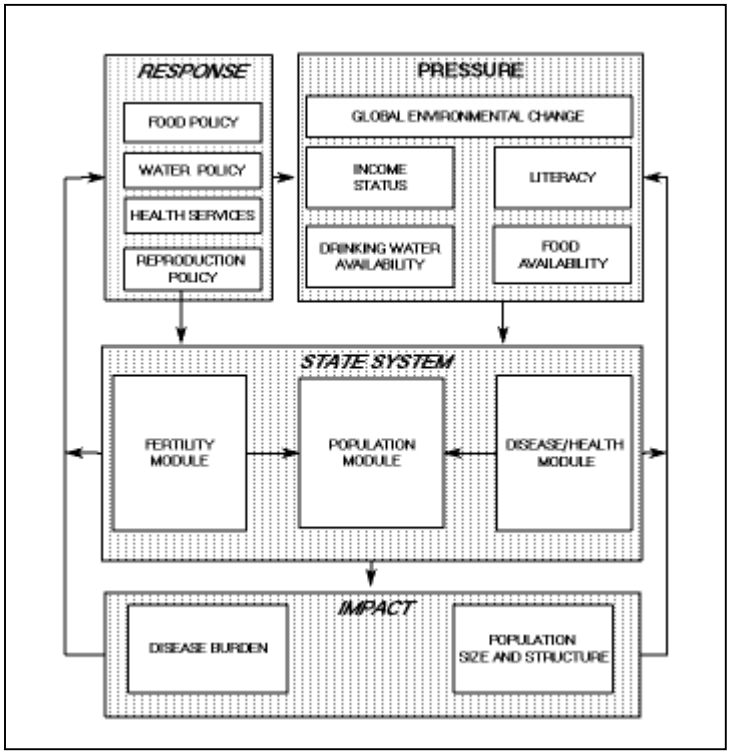

Figure B.3: A PSIR representation of the Population and Health Sub-model (21)

3) Model by Dahlgren and Whitehead

In 1995, Dahlgren and Whitehead (22) conceptualised the determinants of health diagrammatically as a number of layers of influence, each enveloping the previous one. The multiplayer model (Figure B.4) of factors influencing health has become a widely used approach to understanding the multiple determinants of health.
Whereas the inner core consists of factors, which are 'fixed' and therefore not modifiable (age, sex and hereditary factors), the surrounding layers could theoretically be modified. 'Individual lifestyle factors' are the adopted behaviours and way of life that can have health-enhancing or health-damaging effects. Since, however, individuals interact with family, friends and others around them, their behaviour and way of life is influenced by wider social and community influences (next layer). Wider influences on an individual's health are constituted by the living and working conditions, including access to essential services and facilities. Overarching all these layers is the set of economic, cultural and environmental conditions, many of which 'have a bearing on every other layer.'
Categories of determinants in the model:

- General socio-economic, cultural and environmental conditions;
- Living and working condition (work environment, education, agriculture and food production, unemployment, water and sanitation, health care services, and housing?);
- Social and community networks;
- Individual lifestyle factors (behaviours/way of life);
- Age, sex and constitutional conditions.

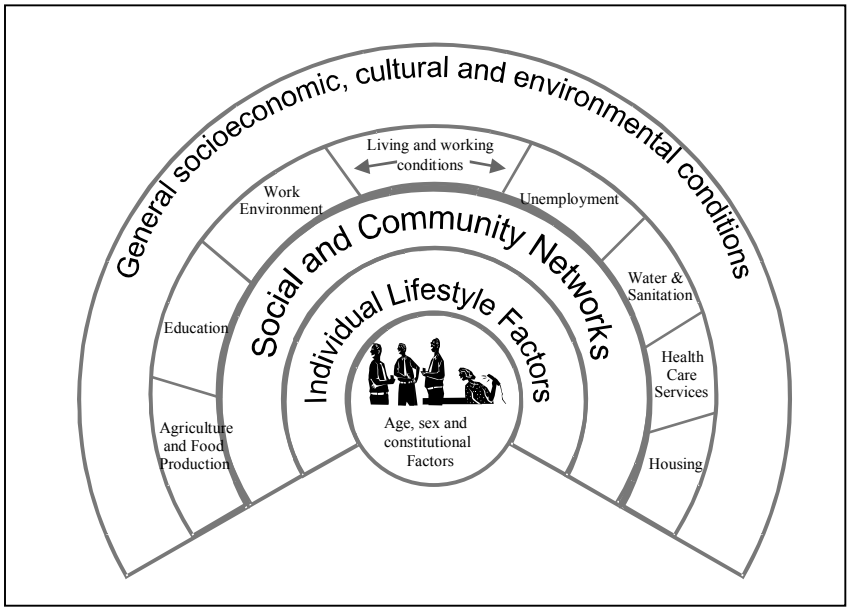

Figure B.4: The health model developed by Dahlgren and Whitehead (22)

4) Model by Evans and Stottard

According to Evans and Stottard (23) the growing gap between the understanding of determinants of health and the primary focus of health policy on the provision of health care could be the result of the oversimplified mental framework within we think about the determinants of health. Therefore they present a more complex conceptual model in order to construct a framework with which evidence on the determinants of health can be fitted, and which highlights the ways in which different types of factors and forces can interact. They constructed their model component by component, progressively adding complexity, building on the 'health field concept' (32).

The model proposed by Evans and Stoddard identifies several major fields of influence of health status and their interactions (Figure B.5). Unlike a biomedical model that views health as the absence of disease, this model includes functional capacity and well-being as health outcomes of interest. The three main input variables are the social environment (e.g. social support, emotional deprivation), the physical environment (e.g. exposure to harmful substances) and genetic endowment. These environments interact to influence health and function via individual responses, under the headings of 'behaviour' and 'biology'. The model also emphasises general factors that affect many diseases or the health of large segments of the population, rather than specific factors that account for small changes in health at the individual level. The model is not linear, but also reinforces the interrelatedness of many factors by means of feedback loops. Outcomes are the product of complex interactions of factors rather than of individual factors operating in isolation.

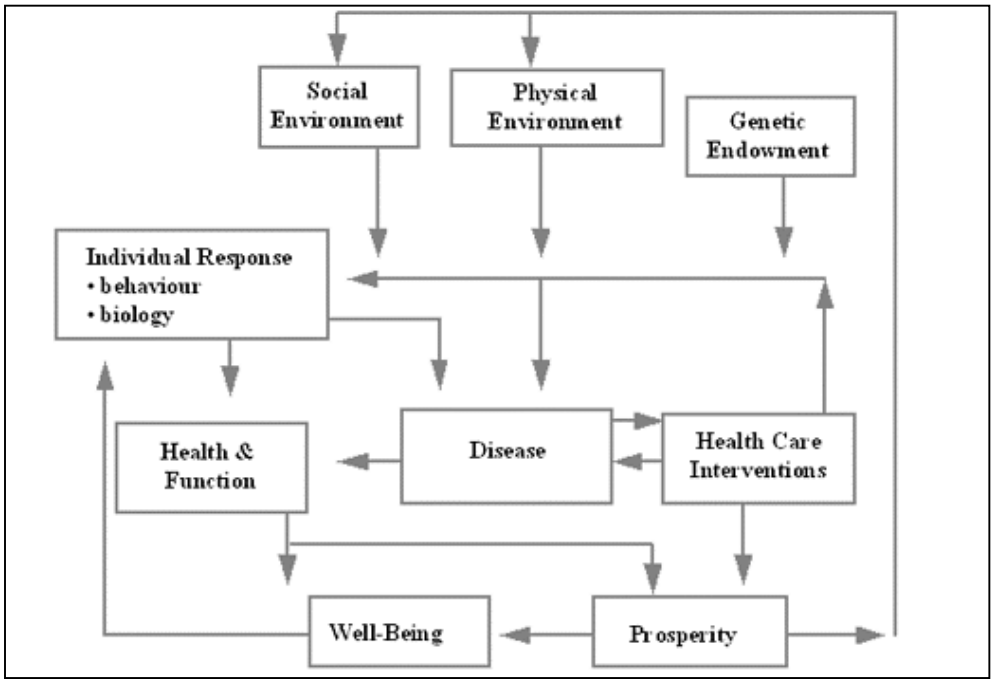

Figure B.5: Population Health developed by Evans and Stottard (23)

5) Model by Frenk et al.

The purpose of the framework proposed by Frenk et al. (24) in 1991 is to organise conceptually the complex multicausality of health conditions and systems in order to add a formulation about the determinants of health status to the health transition field. The starting point of the model is the relationship between the population and its physical environment. According to Frenk et al, the most important population attributes are size, growth rate, age structure and geographical distribution. With respect to the environment, altitude, climate, natural resources and types of parasites and vectors continue to exert important influences for specific diseases processes, but also very important considering the human habitat is the extent and quality of urbanisation.

In this model (Figure B.6) population and environment are linked through two major bridges. First by social organisation, through which human beings develop necessary structures and processes to transform nature (e.g. culture and ideology, science and technology, political institutions, economic structure). Second, by the genome, which transforms the deepest constitution of human populations in response to changes in the environment. These elements, population, environment, social organisation and the genome, set the broadest limits for the analysis of health determination and specific relationships of determination take a place within this basic frame. The framework is rather complex and needs extensive explanation.

A second figure summarises the complete set of processes, while distinguishing five analytical levels in order to portray the hierarchical multicausality that underlies their theoretical model: systematic (basic), societal (structural), institutional (proximate), household (proximate) and individual determinants. The higher analytical levels are intrinsically not more important or complex than the lower ones. Furthermore, it does not imply a unidirectional flow of determination, as important feedbacks exist (Figure B.7).

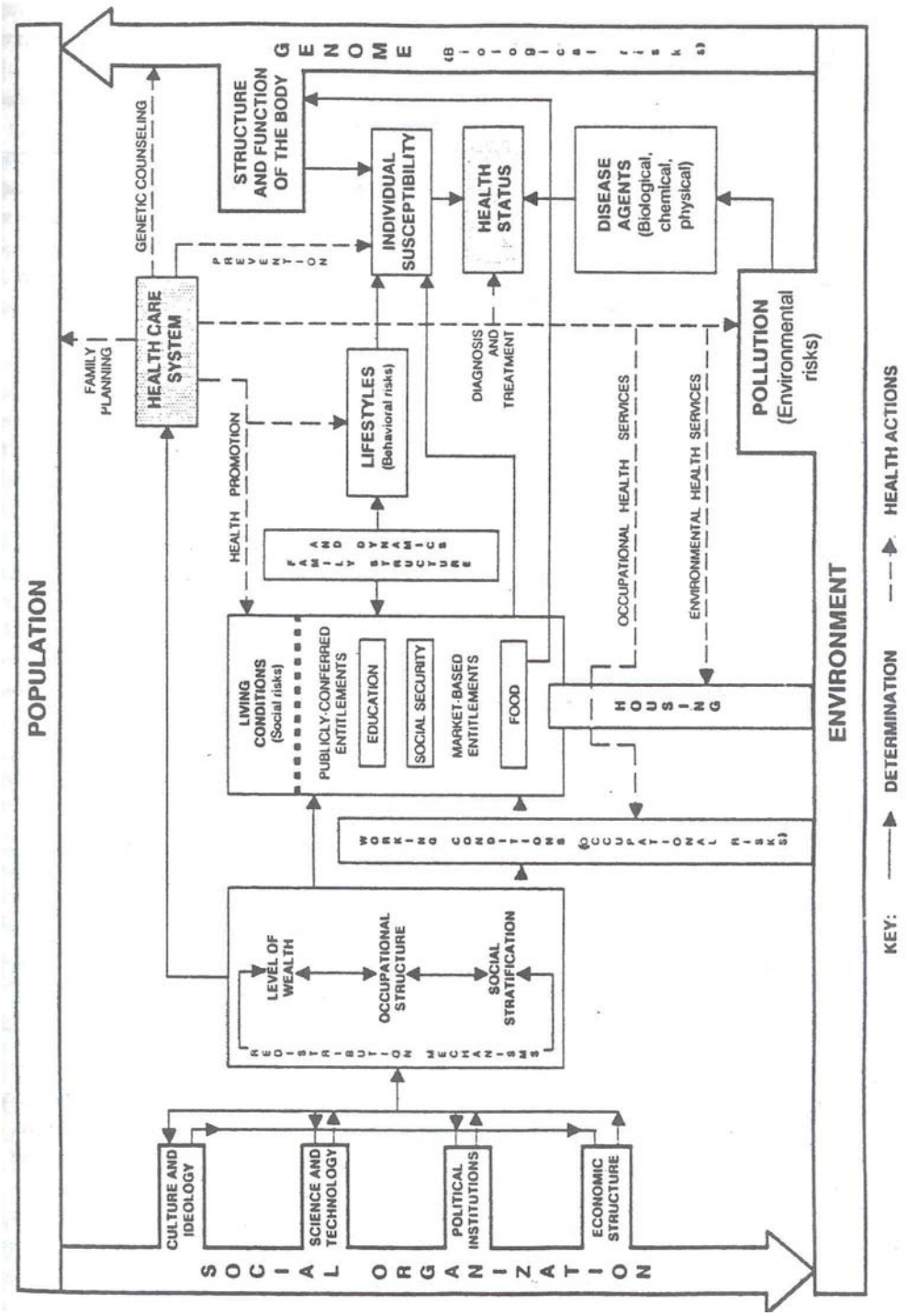

Figure B.6: Comprehensive health model developed by Frenk et al. (24)

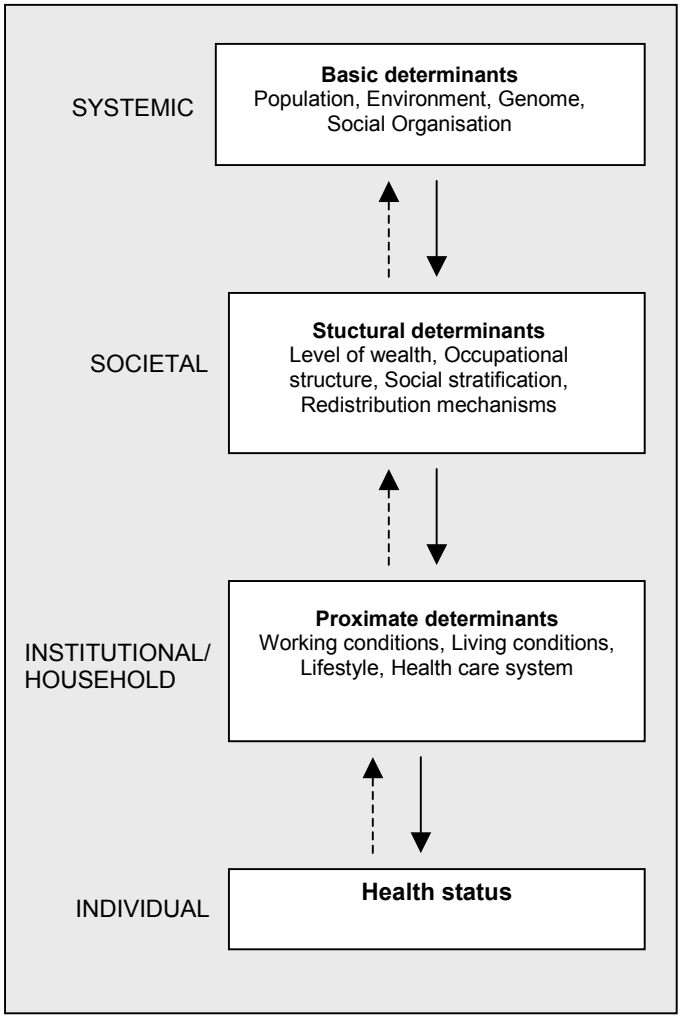

Figure B.7: Types of determinants and levels of analysis in the health model developed by Frenk et al. (24)

6) Model by Wolleswinkel

Wolleswinkel (25) described a simple framework of determinants of mortality decline, consisting of two analytical level: a proximate level and a distal level (Figure B8). The level of proximate determinants corresponds to direct associations of determinants of mortality. There is no intermediate factor in the relationship with the determinant and mortality. The determinants that act on this level have been summarised by the terms living conditions e.g. (nutritional status, working and housing conditions), lifestyle or behaviour factors (e.g. marital fertility, breastfeeding practices and childcare), medical factors (e.g. medical consumption, vaccination and treatment) and public health measures (e.g. clean drinking water and sewage systems).
The level of distal determinants of mortality decline on the other hand is indirectly associated with mortality decline. The determinants have been summarised by the terms: socio-economic factors (e.g. wealth, education), culture (e.g. religious affiliation), political institutions (e.g. political environment) and ecological setting (e.g. soil type, climate). The determinants at the distal level affect mortality through other, more proximate determinants.
According to Wolleswinkel, the distal determinants are more stable than proximate variable, and in some cases are better perceived as a condition for mortality decline than a determinant of mortality decline (e.g. ecological settings).

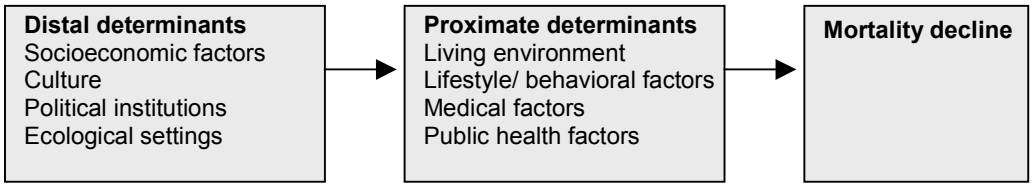

Figure B.8: Health model developed by Wolleswinkel (25)

7) Butterfly Model of Health

The Butterfly Model of Health (26) has been presented as a descriptive model for presenting and studying human health in ecosystems (Figure B9). Within the model, the health of the individual of population (the body of the butterfly) enveloped by biological and behavioural filters, is affected by both the biophysical (BP) and socio-economic (SE) environment The model incorporates several structural elements and functional features in the biophysical (BP) and socio-economic (SE) holaric environments (the wings), which are influenced by each other through the actions of individuals. The biological filter constitutes the innate biochemical and biophysical abilities of a population to maintain healthy and to fight disease. The behavioural filter constitutes the power to control personal behaviour, lifestyle and associated exposures within a specific set of opportunities. The structural elements of the BP environments include air, water, soil, climate, microbes, plants and animals. The identified BP features constitute the quality and quantity of the air, food and water as well as aesthetic quality and quantity. Within the SE environment, the elements include home/family, neighbours/friends, workplace/workers, voluntary organisations, political institutions, social support networks, and health care system. The SE features consist of early childhood development, personal empowerment, community attachment, and social support. Lying outside the boundaries of the ecosystem are the BP and SE environments of neighbouring ecosystems, which can influence the internal BP and SE environment. Health depends on the balance within and between BP and SE environments, and the ecosystems around them.

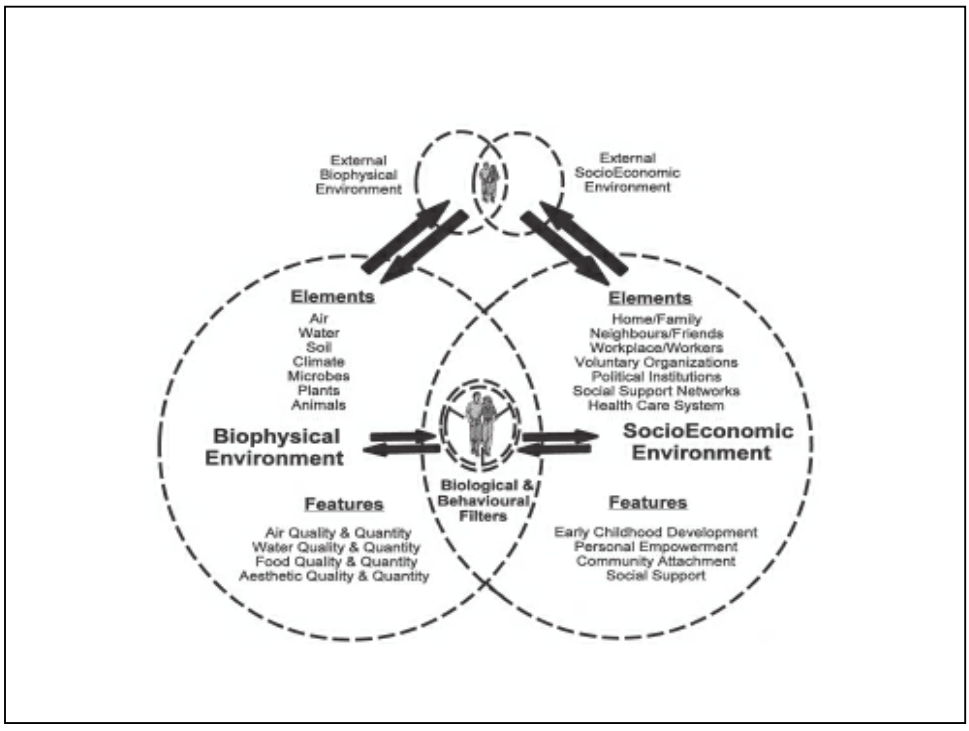

Figure B.9: The Butterfly Model of Health developed by VanLeeuwen et al. (26)

8) The Mandala of Health

The Mandala of Health (27, 28) was first developed in the early 1980s and has since gained widespread acceptance (27, 28). It is a model of the human ecosystem, which presents the influences on health by three circles or levels around the individual: the family, the community and human made environment, and finally, the culture and biosphere (Figure B10). In the centre, individual health is subdivided into three parts: body, mind and spirit. Family is seen as the most important of all mediating structures. Accordingly, four subgroups of health influence are identified, which impinge directly upon the individual and the family:

1. Personal behaviour (lifestyle): specific dietary habits, smoking and drinking, the use of seat belts and other driving habits, as well as to more general risk taking and preventive behaviour;
2. Human biology: genetic traits and predispositions, the competence of immune system, and the biochemical, physiological and anatomical state of the individual and family;
3. The physical environment; e.g. adequate housing, the physical state of the workplace, and the physical state of the local neighbourhood.; and
4. The psycho-socio-economic (PSE) environment: socio-economic status, peer pressure at school and work, exposure to advertising, social support systems etc..

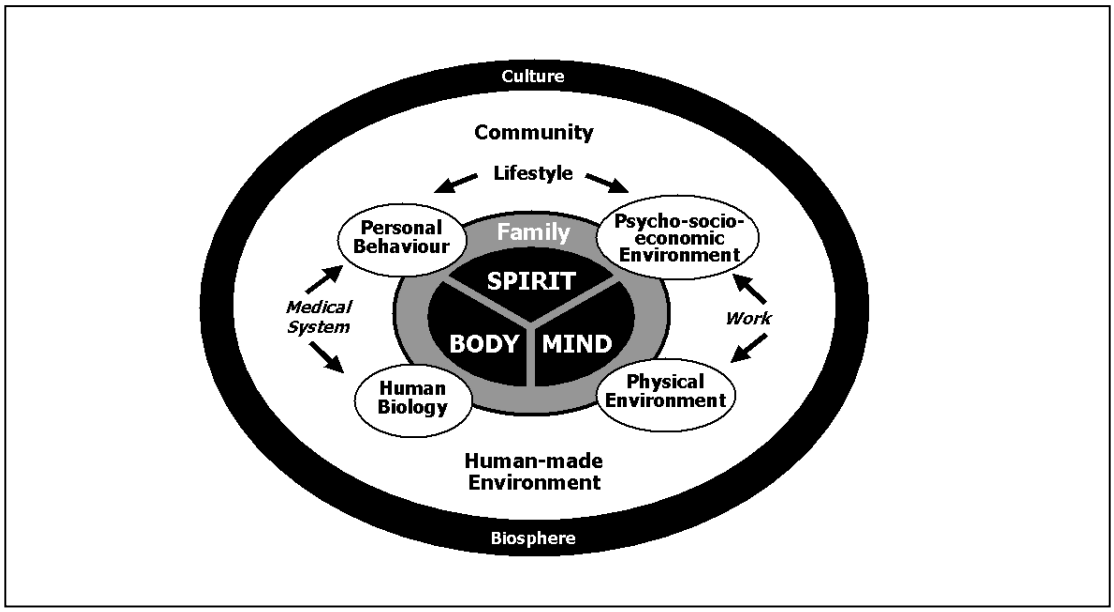

Figure B.10: The Mandala of Health developed by Hancock and Perkins (27, 28)

In addition, the health of the individual and family is influenced by their lifestyle (defined as 'personal behaviour as influenced, modified and constraint by a lifelong socialisation process, and by the PSE environment, including cultural and community values and standards'), their work, and the medical care (or sick care) system.

The community has values, standards, support systems and networks of its own, and in this sense, it also exerts an important influence on health. The human-made environment

includes, for North Americans, the urban setting, and the energy, transportation, agricultural and other man-made systems that have a dramatic impact upon health.
Finally, the outer level of the Mandala encompasses culture (values, attitudes, beliefs) and the biosphere (which is ultimately our planet).

9) The SCENE-model applied to health

Grossgurth and Rotmans (33) described the SCENE-model, which constitutes a conceptual approach towards sustainable development. The SCENE-model makes the same traditional distinction of different forms of capital as developed at UN-DPCSD and the World Bank: ecological, social-cultural and economic capital (Figure B.11a). The social capital also includes institutional and cultural aspects.
These capital forms, in turn, consist of respectively ecological, social-cultural and economic stocks (Figure B.11b). Ecological capital consists of all stocks that relate to the quality and quantity of natural stocks, e.g. quality and availability of natural resources (water, air, soil) and biodiversity. Social-cultural capital consists all stocks that relate to the quality and quantity of the population or social and cultural provisions, e.g. health, demographic structure, knowledge structure and cultural heritage. Economic capital consists of all stocks that relate to the quality and quantity of the economic infrastructure or capital goods, e.g. resources/materials, labour structure and transport infrastructure. Stocks represent changes in the long term; relative to their volume, they change rather slowly. Human activities result in exchanges between the different stocks. The relations between stocks are called flows and they represent short-term changes. There are two different kinds of flows. The intraflows connect the several stocks within a particular capital form, while the interflows connect the stock exchanges between different capital forms (Figure B.11c).
The possible applications of the SCENE-model include integrated issue description, monitoring of sustainable development, evaluation of complex sustainability related issues, strategy planning and a framework for quantitative modelling. Health can be seen as the integrated outcome of its determinants and as a high level index of the sustainability of human activities and Huynen and Martens (29) applied the structure of the SCENE-model to population health and its determinants (Figure B.12).

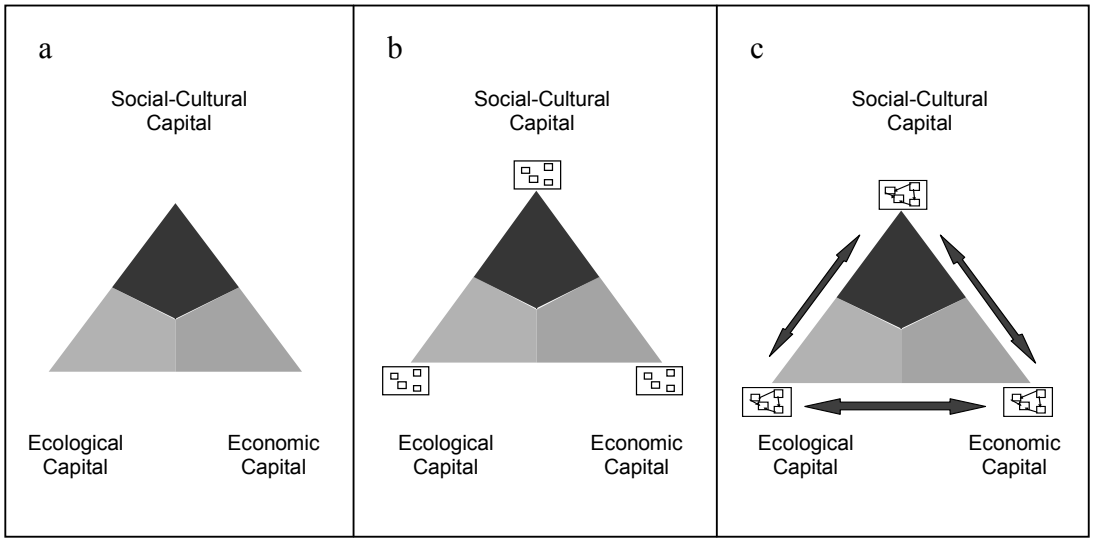

Figure B.11 The SCENE-model: a) the three capital forms, b) inclusion of the stocks within each capital form and c) inclusion of the flows within and between the capital forms (33)

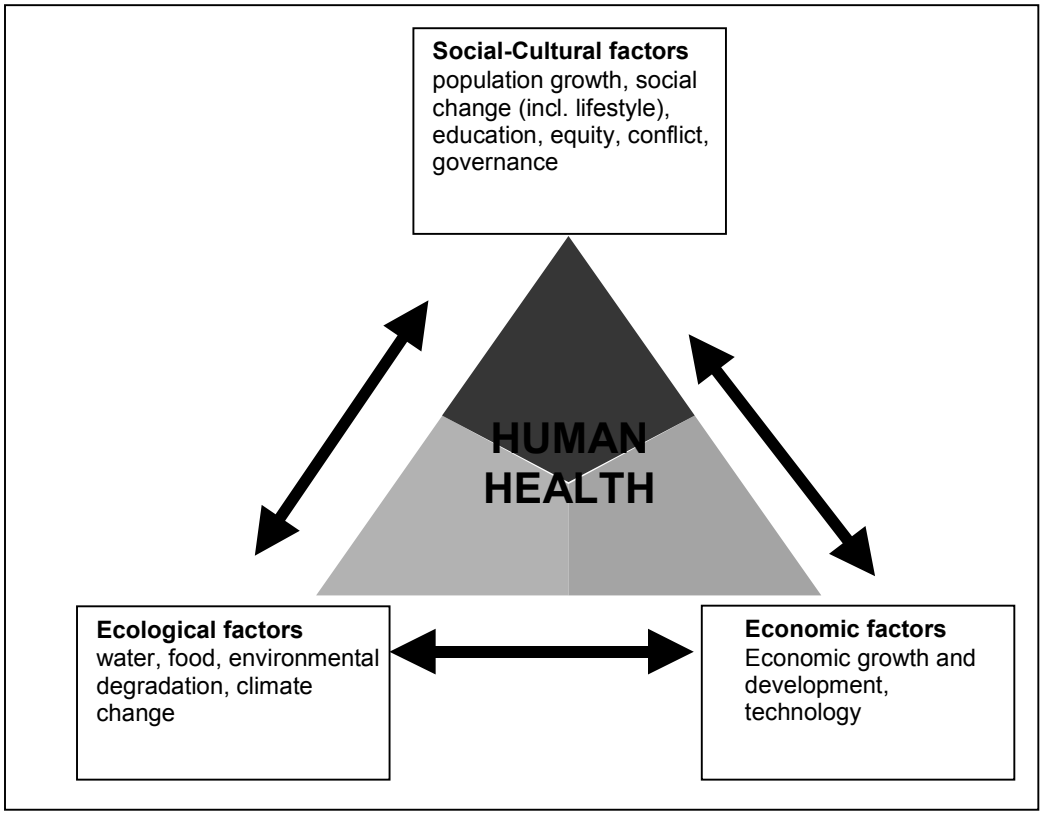

Figure B.12: The SCENE-model applied to health by Huynen and Martens (29)