National Institute for Public Health
and the Environment
Ministry of Health, Welfare and Sport

Methodology for Trend Scenario for Dutch Public Health Foresight Report (VTV) 2018

Colophon

This is a background document to the Dutch Public Health Foresight Report (VTV) 2018

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Contents

1 Introduction

The Public Health Foresight 2018 (VTV-2018) consists of various products, including a Trend Scenario. The Trend Scenario describes the future developments that are relevant to public health and health care, ranging from key drivers and determinants to health status and expenditure on health care. The question at the centre of the study is: if historical trends continue in the future in the same way and if no new or additional policies are developed, what will the future look like? The Trend Scenario is therefore not a forecast or a prediction, as it is very likely that new policies will be introduced that will influence future developments. The purpose of the Trend Scenario is to identify societal challenges for the future. The base year of the scenario is 2015 and the timeline is 25 years.

The Trend Scenario contains the following sections or One-Pagers:

1. How old will we get in the future?
2. How healthy will we be in the future?
3. What diseases will we have in the future?
4. How (un)healthy will we live our lives in the future??
5. How will health care expenditure evolve in the future?
6. How will health inequalities develop in the future?

The most relevant developments that affect the outcome measures used, the so-called key drivers, will also be described.

This document provides a justification for the method that is used to make future projections in the various sections of the Trend Scenario. To this end, the data sources used, the selection of data and indicators (for example with regard to diseases and causes of death), the analysis methods and the projection methods are described. This document is a shorter version of the longer, Dutch version. In the Dutch version additional methodological information is presented for each One-Pager.

2 Trend Scenario Method

The Trend Scenario is one of the parts of the scenario methodology as used within the VTV.

2.1 Scenario methodology

The scenario methodology follows several steps, one step of which is the development of the Trend Scenario. This Trend Scenario is the result of a systematic inventory of the key drivers and trends according to the DESTEP format. DESTEP charts Demographic, Economic, Sociocultural, Technological, Ecological and Politico-institutional developments. Using the VTV conceptual model, these DESTEP developments are related to mediating factors such as determinants, disease and mortality, which in turn affect the outcome measures of public health and health care (Figure 1).

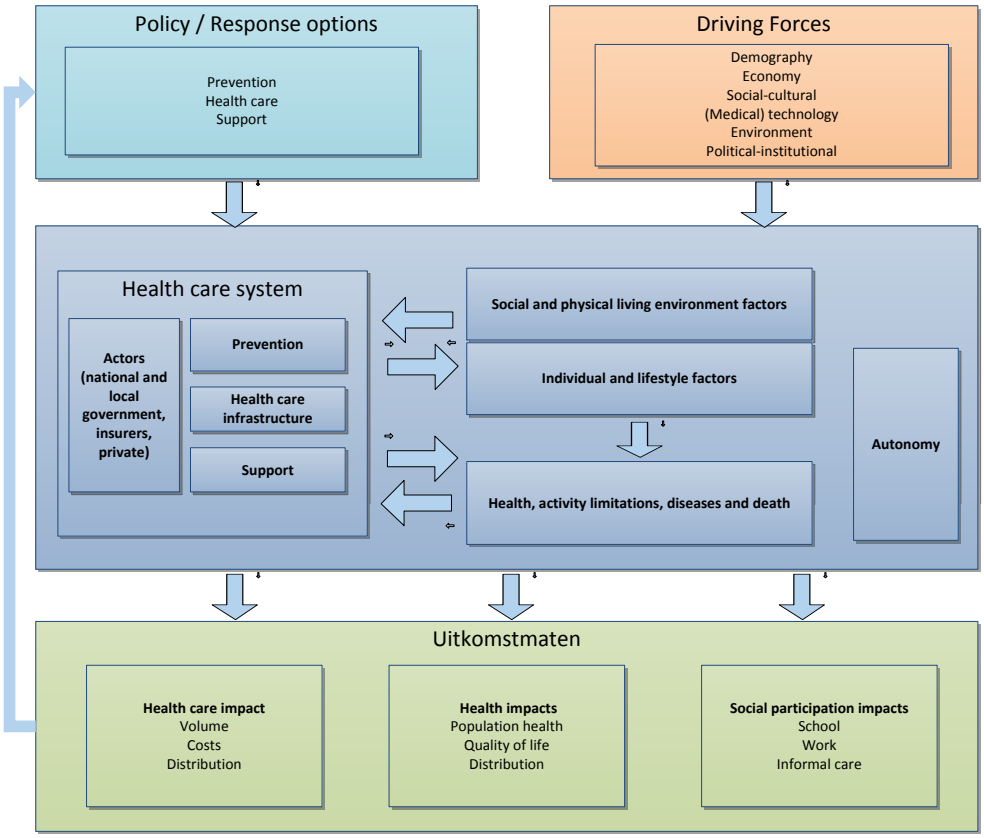

Figure 1 VTV conceptual model

2.2 Topics and indicators

In each section of the Trend Scenario various topics are addressed. For each topic one or more indicators are used. The table below provides an overview of which topics are dealt with in the different sections. The selection of the topics and indicators used was made on the basis of, in

particular, relevance (what are the main outcome measures for describing future developments in public health?) and data availability.

Table 1 Overview of the topics in the six One-Pagers

Trend Scenario One-Pager	Topics
How old will we get in the future?	(Period) Life expectancy
	Healthy life expectancy
	Causes of death
How healthy will we be in the future?	Perceived health
	Perceived activity limitations
	Loneliness
	Mental health
	Control
What diseases will we have in the future?	Prevalence of one or more chronic diseases (multimorbidity)
	Consequences of having a chronic disease
	Prevalence and incidence of specific diseases or disorders
	Burden of disease
How (un)healthy will we live our lives in the future?	Smoking, daily and occasional
	Overweight and obesity
	Physical activity
	Alcohol consumption
	Nutrition
How will health care expenditure evolve in the future?	Total health care expenditures, absolute and per person
	Annual increase in health care expenditure
	Health care expenditures by age, sex, sector, disease group
	Breakdown of health care expenditures according to demography and other factors
How will health inequalities develop in the future?	Socio-economic inequalities in (healthy) life expectancy, overweight, smoking
	Regional inequalities in life expectancy (municipal level) and air quality
	Male-female differences in disease burden
	Age differences in the perception of ill health and activity limitations as a result of a chronic disease
	Perceived health and income according to type of employment contract

2.3 Input data and analyses of historical trends

In order to make future projections, we first of all analyse historical data. The input data for these analyses are taken predominantly from national data sources. Table 2 (appendix) gives a condensed overview of

the most commonly used data sources for the analyses and projections in the Trend Scenario. VZinfo.nl provides an overview of and justification for most of the sources[1].

The analysis of historical trends determines what changes have occurred over time. These changes are analysed using various regression methods. Regression methods are used to identify explanatory variables that are related to an outcome variable. On the basis of one or more (independent) explanatory variable(s) a projection can be made for a (dependent) outcome variable.

Policy-neutral and the trend in policy
The aim of the Trend Scenario is to put in place a policy-neutral future scenario, comparable to other Future outlooks[2]. This means that the existing policies will continue and new policies will be disregarded. This implies that in the analyses of historical data an inherent, implicit (historical) policy trend is assumed. The effects of specific policies on the historical trends differ from topic to topic. For example, it is highly likely that in recent years the policy impacted health care expenditure to a far greater extent than, for instance, overweight. However, in the historical analyses policy effects cannot be distinguished from other effects such as income developments. Hence, in the Trend Scenario policy-neutral also implies that there is a historical, trend-based policy but that no new or additional policy will be introduced.

2.4 Future projections

The following methods are used to make future projections:

- Demographic projections: projections are made only on the basis of future changes to the size and age structure of the population, while the relative sex-specific and age-specific figures (for example for prevalence) from the base year of the projection are kept constant. This method is used if there are no historical series available (for example in the case of most incidence and prevalence data) or if the analyses of the historical data have not shown any changes over time, or if these changes are not sufficiently robust. Hence, the future changes are fully determined on the one hand by the size of the population and on the other hand by the changing age structure such as ageing of the population.
- Demographic and epidemiological projections: if there are changes in the relative sex-specific and age-specific figures, these changes are projected into the future. These future changes are then added to the above-mentioned demographic changes.

The projections in most sections of the Trend Scenario are based on a combination of demographic and epidemiological projections. If there are no adequate historical trend data available, only a demographic projection is made.

[1] https://www.volksgezondheidenzorg.info/bronnen-methoden-en-achtergronden
[2] http://www.wlo2015.nl/

In previous VTVs, model-based projections were also made using, for example, the DYNAMO HIA model[3]. DYNAMO HIA has not been updated with the most recent data. Such an update, which requires a major effort, was not carried out for the VTV-2018, as only a limited number of risk factors and diseases are modelled in DYNAMO HIA. Moreover, the added value of a model-based projection for the Trend Scenario is limited by the dominant role of demography. It can, however, be useful to carry out model-based analyses in order to, for example, determine the effects of interventions. However, this issue does not arise in the Trend Scenario.

CBS population forecast
For the projections in the Trend Scenario, frequent use is made of the CBS's Population Forecast 2016-2060[4]. For instance, the future population size and structure are used as a foundation for, amongst others, incidence and prevalence projections and expenditure on health care. The Population Forecast 2016–2060 describes the expected development of the Dutch population between 2016 and 2060 on the basis of assumptions relating to number of children, migration and mortality. The mortality forecast, which is part of the Population Forecast, is used as a starting point for the projection of mortality according to cause of death, and the associated life expectancy is also taken from the CBS population forecast.

2.5 Selections of diseases / disorders and causes of death

In order to describe public health, the VTV uses selections of diseases and causes of death. These are used in various sections of the Trend Scenario. Various selections are made depending on the topic.

VTV selection of diseases
The selection as developed for the VTV-2014 is used for the Trend Scenario. Fifty-nine diseases and disorders are selected using several selection criteria, such as high mortality, high expenditure, avoidability and policy relevance. Further information about this selection of diseases can be found in the report *A new selection of diseases for the Public Health Status and Forecast Reports*[5]. The Appendix Table 2 contains an overview of these 59 diseases.

Mortality
The Trend Scenario describes mortality related to the diseases in the VTV selection of diseases. As we want to project the mortality for the ICD Main Groups too, additional analyses were necessary. For instance, dementia and stroke were split up into two groups for the analyses and projections as these diseases come under two different ICD Groups. Also, for each ICD group a residual group was defined for all the residual deaths in that ICD group that are not included in the VTV selection of diseases. This enables us to show projections for the future of the ICD

[3] Lhachimi SK, Nusselder WJ, Smit HA, van Baal P, Baili P, Bennett K, Fernández E, Kulik MC, Lobstein T, Pomerleau J, Mackenbach JP, Boshuizen HC. DYNAMO-HIA-a Dynamic Modeling tool for generic Health Impact Assessments. PLoS One. 2012;7(5):e33317.
[4] https://www.cbs.nl/nl-nl/achtergrond/2016/50/kernprognose-2016-2060
[5] https://www.volksgezondheidenzorg.info/selectie-van-ziekten

Groups in addition to the projections of the VTV diseases. As regards mortality according to ICD Groups we are in line with the CBS[6] classification. The CBS based this classification on the categories in the 10th revision of the *International Classification of Diseases and Related Health Problems* (ICD-10)[7]. The ICD-10 coding of the causes of death that are included in the Trend Scenario is presented in Table 2 (Appendix).

Within the ICD Group Injuries, we can no longer draw a distinction for mortality as regards the nature of the underlying cause such as personal accidents, sport or work, as this is no longer classified as such. However, in the Trends Scenario these causes are still distinguished for Injuries with regard to incidence.

[6] http://statline.cbs.nl/statweb/publication/?vw=t&dm=slnl&pa=7052_95
[7] https://class.who-fic.nl/browser.aspx?scheme=ICD10-nl.cla

3 Presentation of the results

The results of the Trend Scenario are presented using six One-Pagers, which give the main results of the Trend Scenario. These results and their presentation involve several choices that are explained here. For instance, the results presented are of course just a selection of all the results of the Trend Scenario. The results are presented in such a way that they are accessible, i.e. relatively easy to read and to interpret. To this end, the underlying, more detailed analyses, for example of five-year age groups and/or sex, are aggregated into broad age groups and also into population level. The aggregation level chosen, serves to support the message, while losing as little as possible of the underlying information. Another choice that has to be made for the presentation is about the measure or unit in which certain indicators are expressed. For some indicators this is absolute numbers (for example the number of people who are lonely), for others it is a relative measurement (for example the percentage of smokers), and for still others it is the differences compared to 2015 (for example an increase in healthy life expectancy). Often, several measures are used side by side. Again, the choice was based on the aim of presenting the message in as accessible a way as possible.

All the quantitative results are the result of underlying calculations. These figures are rounded off for the purpose of readability and to avoid pseudo-accuracy. The rounding was based on the size of the results. For instance, incidence and prevalence have been rounded to the nearest hundred. The graphic representation of the results also includes several choices. With regard to the time axis, attempts were made to show the results from 1990 in order to give the projection a visual representation 25 years ahead of the trends over the last 25 years. However, this is not possible for all the graphs because of the limited data availability. In the case of the Y axis, it was decided to use a scale that again supports the message, without making the differences too large or too small (visually). In a few cases three-year moving averages are shown for the historical data in order to create a more ordered picture.

4 Appendix (additional table)

Table 2 The 59 VTV Diseases with coding, source and operationalisation

No	Description of disease	Mortality (Source CBS DOS) ICD-10 code	Disease Incidence / prevalence Coding	Source	Indicator
1	Infectious diseases of the gastrointestinal tract	A00-A09	D70, D73	NZR	Incidence
2	Diseases in the National Immunisation Programme	Not included	Not included	Not included	n.a.
3	AIDS and HIV infection	B20-B24, Z21	Taken from CIB	CIB	Annual prevalence
4	Zoonotic diseases	Not included	Not included	Not included	Annual prevalence
5	Hospital infections and antimicrobial resistance	Not included	Not included	Not included	Annual prevalence
6	Colorectal cancer	C18-C21	ICD coding IKNL	IKNL	Ten-year prevalence
7	Lung cancer	C33-C34	ICD coding IKNL	IKNL	Ten-year prevalence
8	Skin cancer	C43-C44	ICD coding IKNL	IKNL	Ten-year prevalence
9	Cervical cancer	C53	ICD coding IKNL	IKNL	Ten-year prevalence
10	Prostate cancer	C61	ICD coding IKNL	IKNL	Ten-year prevalence
11	Non-Hodgkin lymphoma (NHL)	C82-C85, C88,	ICD coding IKNL	IKNL	Ten-year prevalence
12	Breast cancer	C50	ICD coding IKNL	IKNL	Ten-year prevalence
13	Diabetes	E10-E14	T90	NZR	Annual prevalence
14	Dementia (including Alzheimer's)	F01-F03, G30	P70	NZR	Annual prevalence
15	Mood disorders	F30-F34, F38-F39	Ti study	NIVEL / NEMESIS[8]	Annual prevalence
16	Schizophrenia	F20	P72	NZR	Annual prevalence
17	Autism spectrum disorders	Not included	n/a	CBS-Statline	Annual prevalence
18	Anxiety disorders	F40-F42	Ti study	NIVEL /	Annual prevalence

[8] For the annual prevalence (the number of people who registered with their general practitioner (GP) with a disease in 2015) NIVEL data is used, for the calculations of the disease burden the estimates of NEMESIS are used to calculate point prevalence at population level.

No	Description of disease	Mortality (Source CBS DOS) ICD-10 code	Disease Incidence / prevalence Coding	Source	Indicator
				NEMESIS[8]	
19	Personality disorders	Not included	P80	NZR	Annual prevalence
20	Behavioural disorders	Not included	P22	NZR	Annual prevalence
21	Intellectual disabilities	F70-F79	SCP classification	SCP	Annual prevalence
22	Alcohol-related disorders	F10	P15, P16	Verhulst-Nemesis II	Annual prevalence
23	Substance-related disorders	Not included	Not included	Not included	n.a.
24	ADHD	Not included	P21	NZR	Annual prevalence
25	Burn-out (overworked, surmenage, adjustment disorders, stress-related disorders)	Not included	P78	NZR	Annual prevalence
26	Parkinson's disease	G20-G22	N87	NZR	Annual prevalence
27	Epilepsy	G40-G41	N88	NZR	Annual prevalence
28	VTV visual impairments	Not included	F84, F92-F93, R83	NZR	Annual prevalence
29	Hearing impairments	Not included	H84-H86	NZR	Annual prevalence
30	Migraine	G43	N89	NZR	Annual prevalence
31	Diseases of the endocardium/valve defects	I05-I08, I34-I39	K70-K71, K83	NZR	Annual prevalence
32	Heart failure	I50	K77	NZR	Annual prevalence
33	Coronary heart diseases	I20-I25	K74-K76	NZR	Annual prevalence
34	Arrhythmias	I47-I49	K78-K80	NZR	Annual prevalence
35	Stroke	G45, I60-I69	K89-K90	NZR	Annual prevalence
36	Cardiac arrest	I46	Taken from VTV2014	LMR	Incidence
37	Infections of the lower respiratory tract	J12-J18, J20-J22	R78, R81	NZR	Incidence
38	Influenza	J09-J11	CMR MEASURING STATIONS 2010-2012	CMR Measu-ring stations	Incidence
39	COPD	J40-J44	R91, R95	NZR	Annual prevalence
40	Asthma	J45-J46	R96	NZR	Health care prevalence

No	Description of disease	Mortality (Source CBS DOS) ICD-10 code	Disease Incidence / prevalence Coding	Source	Indicator
41	Dental disorders	Not included	Not included	Not included	n.a.
42	Renal insufficiency (acute and chronic) / renal failure	N17-N19	Taken from VTV2014	Kidney foundation	Annual prevalence
43	Complications in pregnancy, childbirth or confinement	Not included	Not included	Not included	n.a.
44	Atopic dermatitis	Not included	S87	NZR	Health care prevalence
45	Contact eczema	Not included	S88	NZR	Annual prevalence
46	Rheumatoid arthritis (RA)	M05-M06	L88	NZR	Annual prevalence
47	Osteoarthrosis	M15-M19	L89-L91	NZR	Annual prevalence
48	Neck and back complaints	M45-M48, M50-M51, M53-M54	L01-L03, L83-L84, L86	NZR	Annual prevalence
49	Osteoporosis	M80-M82	L95	NZR	Annual prevalence
50	Congenital abnormalities of the cardiovascular system	Q20-Q28	K73	NZR	Annual prevalence
51	Down's syndrome	Q90	Not included	Not included	n.a.
52	Premature births	P07	ICD-10 code used	NZR	Annual prevalence
53	Low birth weight	Not included		Not included	n.a.
54	Road traffic accidents	V01-V79, V81-V99, Y85	SEH from LIS	VeiligheidNL	Incidence (SEH)
55	Self-inflicted injury	X60-X84	SEH from LIS	VeiligheidNL	Incidence (SEH)
56	Injury resulting from violence	X85-Y09	SEH from LIS	VeiligheidNL	Incidence (SEH)
57	Personal, work and sports accidents	W00-W99, X00-X59	SEH from LIS	VeiligheidNL	Incidence (SEH)
58	Sports injuries	Not available	SEH from LIS	VeiligheidNL	Incidence (SEH)
59	Occupational accidents	Not available	SEH from LIS	VeiligheidNL	Incidence (SEH)